

MANAGERIAL ROLE PERCEPTION IN ORGANIZATION

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## A B S T R A C T

In this thesis a study is made of the cognitive processes and maps by which managers, in interaction with each other, perceive and organize stimuli related to the functions which they fulfil in the organizations involved. An attempt is made to analyze and explore, via a systems approach and complementary action frame of reference, the nature and structure of role-perceptions which top level functional managers have of each other. These role perceptions are viewed from the framework of middle-range organization theory.

It is hypothesized that managers will simplify their perceptual worlds by reducing a large number of stimuli to a simple evaluative structure and that certain axes of differentiation, which further affect this evaluative structure, may be identified.

The hypotheses are derived from the interest of the author in the perceptual categories which managers use naturally in assessing each other, the structure of these categories, and the effects of role.

In order to answer the questions posed, data was collected from 90 of the most senior functional and general managers in 10 randomly selected medium-sized South African industrial companies. The data was obtained by means of a specifically devised 10 x 40 Repertory grid (Kelly, 1955) and semi-structured interviews. Holzbach's (1974) version of French and Raven's (1968) bases of power instruments was used for supplementary interpretation of the data.

The repertory grids of 90 managers (36 000 observations) were compared on a hypothetico-deductive basis against a model



quasi-consensus grid of identical dimensions, to test for the effects of perceptual mediation in terms of personal construct and implicit personality theories.

Thereafter the effects of role and organizational decision-making as axes of differentiation were explored on the basis of the phenomenological viewpoint that managers have certain models, theories or cognitive maps which affect perception and therefore behaviour.

Results derived from the above two approaches were analyzed using the appropriate theoretical frameworks and multivariate statistical analytical techniques. Comment is also made on the significance of such levels of analysis for organizational theory.

DECLARATION

I declare that this thesis is my own, unaided work, except as acknowledged. It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

B. J. Bogill  
(Name of candidate)

14th day of August 1981.

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## CHAPTER 1

### ORGANIZATIONAL ANALYSIS

#### 1.1. Introduction

One of the major conceptual tasks in the area of Organizational Behaviour is to inter-relate data at different levels of analysis: individual, group, organization and environment. A number of theorists have argued that organizational systems are primarily the outcome of the values, theories, and models of human nature held by managers.

In the final analysis each manager's behavior will be determined by his underlying theory of organizational behavior, so it is essential for him to understand the different results achieved by different models of organizational behavior (Davis, 1968, p.38).

According to Schein (1965) managers make assumptions about people in organization. Whether the managers are aware of these assumptions or not, they operate as models in terms of which they decide how to deal with superiors, peers and subordinates. Management effectiveness will depend on the degree to which the manager's assumptions "fit empirical reality". Schein develops outlines from basic models or viewpoints held of man in organization: rational-economic man, social man, self-actualizing man and complex man.

Limerick (1976) points out that there are different fundamental images and assumptions held about the basic matter of organizations (activities, groups, or individuals) "the boundaries of membership, and the goals, processes and relationships which give the organization identity" (p.60). Speaking from a sociological point of view, Inkeles (1964) maintains that each sociologist "carries in his head one or

more models of society and man which greatly influence what he looks for, what he sees and what he does with his observations by way of fitting them, along with other facts, into a large scheme of explanation" (p.28). He also points out that every scientist holds some general conception of the realm in which he is working, some mental picture of "how it is put together and how it works" (p.28).

Sociologists, particularly Gouldner (1954) and Weber (1964), concentrate on the factors which shape the structure of organizations and the roles which are played out within themes such as a division of labour and the administrative procedures for authority and control.

The industrial psychologists and the human relations theorists concern themselves chiefly with the problems of the individual in his efforts to adapt to the physical environment and to technical, administrative and social pulls and pressures. By experiment and observation they have sought ways to equate efficiency with human satisfaction. The theorists of formal organizations such as Fayol (1949) and Urwick (1943) try to derive from the experience of managers some principles of practical use for those who have to design and maintain organizations.

There is, however, a growing awareness that to work within the constraints of managerial language is a severe deterrent to understanding. Pugh (1966) makes the following assertion about industrial psychology:-

Their (those in the field of industrial psychology) overwhelming limitation is that almost without exception they have defined their work in terms of management problems, not psychological ones, and this has turned them from scientists into applied scientists or technologists... It is no criticism to be an applied scientist if there is some science to apply. But applied psychology is a

contradiction in terms because there is yet no coherent body of acceptable theory and data which can be drawn upon and applied once we get beyond the level of learning of perceptual and motor skills (p.243).

Working largely independently, research workers at the Tavistock Institute have gone further than most in building a framework which can bind together the various psychological and sociological theories of organizations. Rice (1963), a member of the Tavistock Group, elaborates a conceptual framework which, as he says, "relates individuals, groups and institutions to each other in one coherent system" (p.1). The framework proposed by Rice represents the organization as a series of encapsulated, significant environments. (See Figure 1.1 below).

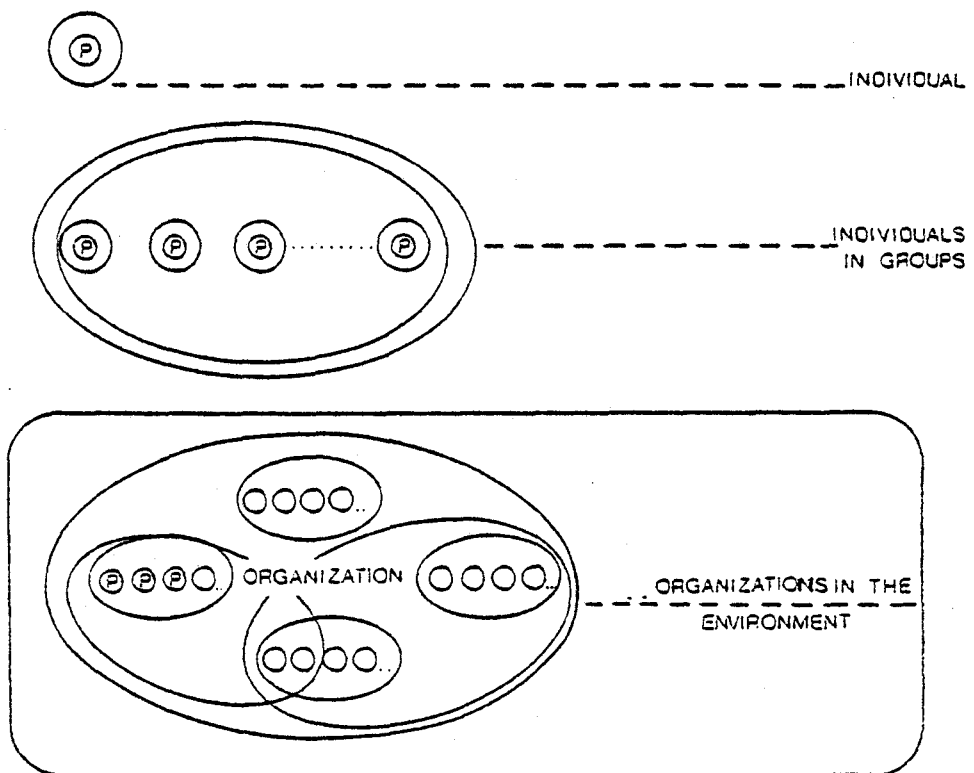


Figure 1.1  
Relationship between individual, group and organization  
(Adapted from Rice, 1963)

The individual member of an organization has his internal world and an external world which includes the other individuals with whom he constantly interacts on the job. This working group is a significant environment for the individual, in which he seeks satisfactory relationships. This group, too, has its own internal life, which comprises the complex of interpersonal relationships, influenced by shared or discrepant norms of behaviour, common or conflicting beliefs and attitudes. A sub-unit of a large organization might include many such groups, and its internal system is described by the relationship between them. Its environment consists of other sub-units and the organization as a whole.

Since the organizational participant is, however, unable to cope with the large number of complex organizational cues, he reduces the stimuli so that he can deal with them more effectively. The result is a simplified model of the organization.

Field theory is also applicable to the concept of organization. Lewin's (1951) lifespace includes the personality region and the environmental region. The environmental region corresponds with the individual's organization map.

Figure 1.2 represents an individual's lifespace. The personality region (P) is surrounded by various organization map regions ( $r_1, \dots, r_n$ ). The regions are sub-divisions within organization space which are important in explaining the individual's behaviour at a given time. For example, the individual's perception of the authority and reward structures are considered possible regions in an organization map.

Regions are also described by Lewin in terms of differentiation. Two types of differentiation can be noted. First there is differentiation of regions (e.g.  $r_1, r_2, \dots, r_n$ ) within organization (environmental) space. That is,

an individual may have only one, or many different regions (e.g. his role, reward structure, sociometric structure, goal structure) within his map. Secondly there is differentiation within regions. For example, an individual's perception of the authority structure (one region) may vary from a limited vertical picture to a complex horizontal and vertical representation. A high differentiator in this analysis is defined as a person who has greater within-region differentiations in more regions than a low differentiator (Goodman, 1968).

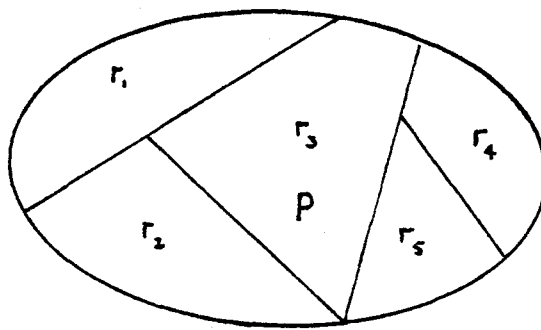


Figure 1.2  
An individual's life-space

In this dissertation the primary axis of differentiation chosen for analysis is the horizontal differentiation of departments in medium sized South African industrial companies. The vertical axis of differentiation is the complexity of decision-making as measured by Paterson's (1972) model of decision-making. (Figure 1.3).

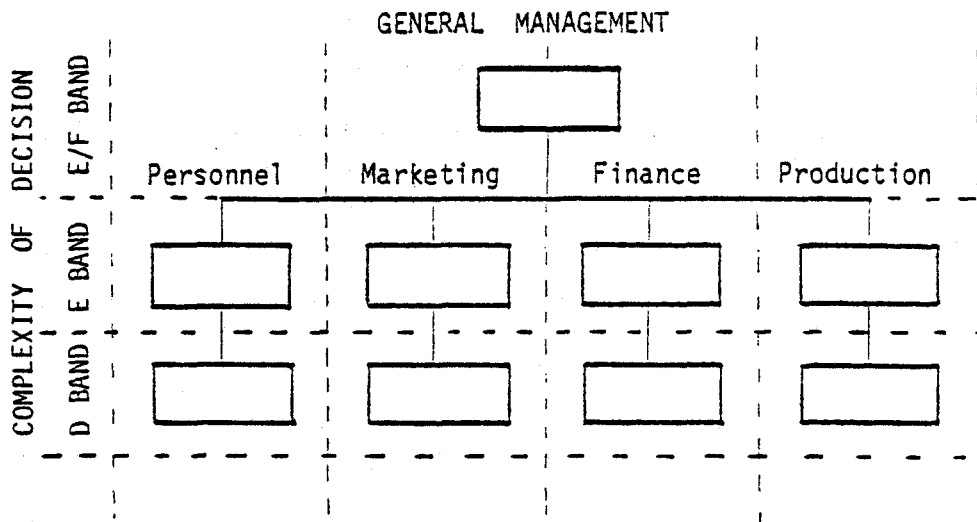


Figure 1.3  
Differentiation of Managerial Role-set

Harbison & Myers (1959) in a study of management throughout the industrial world conclude that advancing industrialization leads to more advanced models of organizational behaviour. A number of syntheses of organization models has been attempted by various theorists, e.g. Davis (1968), Harbison & Myers (1959), Moberg & Koch (1975) and Schein (1965). In general these models follow an historico-analytic viewpoint ranging from classical views of organization to more modern contingency views.

It is possible to view organizations, and their component groups and individuals, along many axes of differentiation in a manner analogous to Lewin's (1935) concept of personality as a multi-layered system, or Kelly's (1955) multi-dimensional Personal Construct Theory. In the final analysis, a model is however only as valuable as the extent to which it may be used for meaningful analysis and discourse. Descriptions of the

classical model can be found in the works of American and European authors such as Fayol (1949), Taylor (1911), Tolstoy (1938), and Urwick (1943). Expositions of more modern theories are given by Hicks & Gullett (1975) and Luthans (1977), and contingency viewpoints are developed among others by Lorsch (1976) and Moberg & Koch (1975).

These "models" of organization operate as frames of reference through which participants and the public view organizational relationships and problems. Fox (1966) points out that the importance of a frame of reference is clear: "It determines judgement which in turn determines subsequent behaviour" (p.2). Several conceptual contributors have noted the significance of organization perceptions and image, but have not proceeded beyond rudimentary theory building. In this context Thompson (1967) has noted:

The image presented by the organization, moreover is not one image but a variety of images; for the various elements contribute differently to the organization and have different interests to be satisfied through the relationship. We would expect them to be especially interested in the capacity of the organization to satisfy whatever interests they believe will be important to their futures. Thus the complex organization is constantly being assessed by a variety of assessors each inclined to employ a different kind of yardstick; and these are often incompatible (p.88).

Even though models may vary and, as Thompson points out above, are often incompatible, such models are indispensable to scientific work. It is not always possible to distinguish precisely between a scientific model and a scientific theory.

The terms are often used interchangeably. In this study the concept of model is used in the manner in which Inkeles (1964) sees the term, i.e. model refers to a "rather general image of the main outline of some major phenomenon, including



certain leading ideas about the nature of the units involved and the pattern of these relationships" (p.28).

A systematic theory is a set of logically interrelated propositions, all of which pertain to connections between at least two variables.

A scientific theory is a deductive system in which observable consequences logically follow from the conjunction of observed facts with the set of fundamental hypotheses in the system (Braithwaite, 1953, p.22).

## 1.2 Levels of Analysis

The term behavioural science as applied to management came into popular use in 1951 as a shorthand description for a Ford Foundation programme on individual behaviour and human relations. The term became further embedded in management writing with the establishment of the Foundation for Research on Human Behavior in the USA in 1952. The goals of the Foundation were to promote support for behavioural research in business, government and other organizations (Berelson, 1963).

"The behavioral science approach to the study of management may be broadly described as the study of observable and verifiable human behavior in organizations" (Filley, House & Kerr, 1976, p.16). The approach is focused on the issue of human behaviour, follows scientific methodology and draws on a number of related fields such as psychology, sociology, anthropology and economics.

The discipline of organizational behaviour itself is relatively young. Organizational psychology, a new multidisciplinary research field that views organizations as curiosities deserving of research, and which is therefore as much concerned with the nature of systems and the nature of human decision-making as with any applied problems, emerged

in the early 1960's. In contrast to other approaches, this behavioural view centres more specifically on people and their inter-actions in organization. Administrators and students are challenged to understand non-rational as well as rational, and informal as well as formal, aspects of organizational behaviour.

As it has evolved since the early 1950's, behavioural science research can be classified in terms of three levels of analysis:

#### 1.2.1 The behaviour of the individual

Research in this domain has been typically concerned with such topics as personality, motivation, attitude, leadership and interpersonal dynamics. This perspective has led to an intensified interest in human behaviour as it is influenced by organizational properties, and in organizations as they have been influenced by the behaviour of their members.

Argyris (1974) however, has argued that only two levels of analysis, individual (micro) and organizational (macro) are inappropriate:

Individuals and social systems are independent of each other in trivial ways. Certainly it is true that any given individual may come and go, but the system exists. The system will exist as long as the individuals in it behave according to its requirements (p.118).

Argyris seems to be saying that individuals make up the organizations and must therefore be the basis for understanding organizations. He argues that it may be inadequate to state that one can study organizations

as wholes if one elects to ignore the critical parts of organization. According to Argyris, individual behaviour, small group behaviour and inter-group behaviour represent important parts that help create the whole. He believes that the only viable and reasonable way to study behaviour in organizations is to look at the micro level of analysis. On this point Miller and Rice (1967) conclude: "Any theory of organization requires therefore not only a theory of systems of activities and their boundaries, but also a theory of human behaviour" (p.14). Wolfe (1968), on the other hand, argues that approaches like that of Argyris' provide a very limited perspective on behaviour in organizations.

Wolfe (1968) maintains that the complexity of formal organizations poses problems in their study. One cannot study an organization by breaking it down. The whole is more than the sum of the parts. It is the interaction of the parts with each other and with the complex of which they are a part that constitutes organizations. An organization is a dynamic field which should be studied as a Gestalt. To change one part is to change interaction among other parts and to change the whole. One cannot understand the whole by dealing with the parts in isolation.

#### 1.2.2 The behaviour of the group

Earlier research in this area was concentrated on small experimental groups in laboratory settings. Topics which were examined included norms, roles, interaction patterns, conflict, emergent leadership, problem-solving and decision-making.

#### 1.2.3 The complex organization

At this level the total organization is analysed as an institutional whole. The organization is examined in

relation to other total organizations, in relation to its own sub-systems and the interactions occurring within its own units and sub-systems.

Initially these three levels of analysis were pursued with little overlap or co-ordination by psychologists, social psychologists and sociologists respectively; however, they have since become areas of common concern for management researchers who adopt a behavioural science approach.

Organization is defined as a system of interpersonal relations ...

Individuals are differentiated in terms of authority, status, and role with the result that personal interaction is prescribed or structured. Anticipated reactions tend to occur, while ambiguity and spontaneity are decreased (Presthus, 1958, p.50).

Few segments of society have engaged in organizing more intensively than business. The reason is clear. Business is largely dependent upon what organization offers. Business needs a system of relationships among functions; it needs stability, continuity, and predictability in its internal activities and external contacts.

Weick (1969) maintains that his book does not tell the reader what organizations are; for the very simple reason that "organizations and their environments change so rapidly that it is unrealistic to show what they are like now, because that's not the way they're going to be later" (p.1)

Weick (1965) puts forward the view that if one is going to learn about organizations, it is not necessary

for one to assume immediately that they are complex. "The currently popular term complex organizations conveys more information about organization theorists than about organization" (p.204). Instead, Weick (1969) maintains that:

There are processes which create, maintain and dissolve social collectivities, that these processes constitute the work of organizing, and that the ways in which these processes are continuously executed are the organization (p.1).

Thus if one wants to learn something about an organization, one might look for "interlocked behaviors that are embedded in conditionally related processes" (p.1). Weick is of the opinion that careful observation, description and summary of the above features would lead to a clearer understanding of the concept of organization.

### 1.3 Historico-analytical analysis

#### 1.3.1 Developmental approach

Greiner (1972) views work organization as moving through five distinct phases of development. Each phase contains a relatively calm period that he calls an evolutionary phase, which ends with a management crisis marked by a substantial amount of internal turmoil. Greiner maintains that, since each phase is strongly influenced by the previous one, a knowledge of the history of the organization can aid management in determining its future.

Greiner identifies a number of crises that occur at different stages in the growth of the organization. These are shown in Figure 1.4 overleaf. The first

crisis is one of leadership. As the company grows in size and complexity the need for greater efficiency cannot be achieved through informal systems or channels of communication. This crisis of leadership may lead to the founders' relinquishing some of their power to a professional manager and/or to the installation of more "scientific" management systems and procedures. The second major crisis is one of autonomy. The directive management techniques which enabled the organization to grow become ineffective as the organization becomes more complex and diverse. According to Greiner, lower-level supervisors are more knowledgeable and demand more responsibility in decision-making powers. Resolution of this crisis may be accomplished by the relinquishing of some authority by powerful top managers, leading to a greater degree of power equalization.

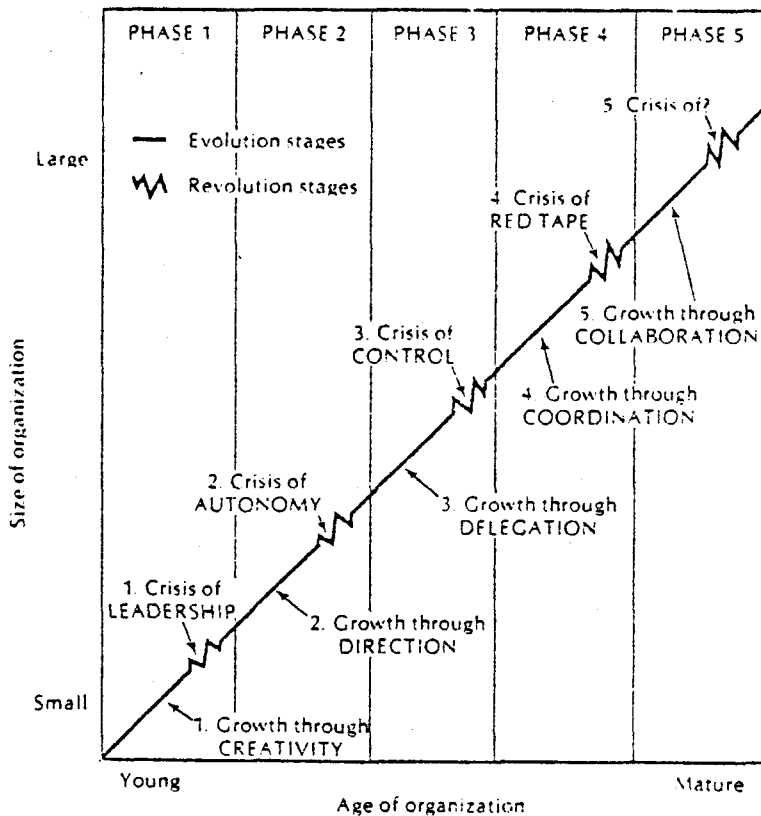


Figure 1.4

From L. Greiner. Evolution and Revolution as organizations grow (1972, p.41).

The third crisis revolves around issues of control. Having allowed and encouraged the decentralization of authority and its delegation to divisional managers, the top executives may feel that they are losing control over a highly diversified operation. Divisional managers want to run their own operations without co-ordinating plans, money, technology or human resources with the "rest" of the organization. Special techniques of co-ordination go a long way towards the resolution of this problem.

The fourth crisis is one of bureaucracy. The newly implemented systems of co-ordination prove useful for achieving growth and more co-ordinated efforts by line managers, but a lack of confidence begins to develop between line and staff and between head office and the divisional operators. Procedures and well-defined policies tend to supersede problem-solving and effective decision-making. However, the organization has actually become too large and complex to be managed through formal systems and procedures. The solution to the "red tape" crisis is collaboration, which involves more flexible and more behavioural approaches to the problems of managing a large organization.

The developmental approach to the study of organization concerns itself with the micro, meso and macro levels of analysis. At the micro level the focus is on the individual, in particular personality.

The development of human personality can be hypothesized to follow the directions and dimensions outlined below. It is hypothesized that human beings:

- tend to develop from a state of passivity as infants to a state of increasing activity as adults. This is what Erikson (1950) has called self-initiative and Bronfenbrenner (1951) has called self-determination;
- tend to develop from a state of dependence upon others as infants to a state of relative independence as adults. Relative independence is the ability to "stand on one's own two feet" and simultaneously to acknowledge healthy dependencies. It is characterized by the liberation of the individual from his childhood determiners of behaviour (e.g. family) and developing his own set of behavioural determiners (White, 1952);
- tend to develop from being capable of behaving only in a few ways as infants to being capable of behaving in many different ways as adults (Lewin, 1935; Kounin, 1943);
- tend to develop from erratic, casual, shallow quickly-dropped interests as infants to having deeper interests as adults. The mature state is characterized by an endless series of challenges, where the reward comes from doing something for its own sake. The tendency is to analyse and study phenomena in this full-blown wholeness, complexity and depth (White, 1952);
- tend to develop from having a short time-perspective (i.e. the present largely determines behaviour) as infants to a much longer time perspective as adults;
- tend to develop from being in a subordinate position in the family and society as infants to aspiring to occupy an equal and/or superordinate position in society (Argyris, 1960).

In the domain of cognitive development, Grant (1969) has clearly demonstrated the effect of education and urbanization on intellectual performance and the effect of education in bringing about a change in the organization of mental abilities.

Inkeles and Smith (1974) have closely examined attitudinal modernity in highly individualized, highly industrialized and highly education-oriented social settings.



In these developmental studies, the effect of education, work and the working environment on psychological functioning in general has been investigated.

#### 1.3.2 Classical school

The classical model deals almost exclusively with the anatomy of the formal organization, and classical theorists have tended to ignore the human element in organization or, perhaps to state it more correctly, tended to emphasize formal non-human aspects. Mooney and Reiley (1931), for example, felt that an efficient formal organization based on sound principles would function to the maximum benefit of all concerned.

Where attention was devoted to man by classical theorists there was a fundamental assumption that man is lazy, untrustworthy and works only for money. The resulting organizational design suggested by this assumption has been of the bureaucratic variety, and the motivational presuppositions of classical theory still underlie much modern "incentive" theory and associated modes of compensating performance (Opsahl & Dunnette, 1966).

If any criticism is to be levelled at classical doctrine it would be at its Utopian approach, in that the classicists over-estimated man's ability to achieve perfection in the art and science of organizing.

Classical theory had as its pillars the recognition of objectives, the division of labour, scalar and functional processes, structure and span of control.

### 1.3.3 Neo-classical school

The prime distinction between classical and neo-classical scholars is the neo-classicists' recognition of the need for the modification of classical doctrine to accommodate the complexities of human interactions and the social needs of individuals in organizations.

The human relations approach was born out of a reaction to the formal classical approach. It focussed on elements in the organization which were of little or no concern in the classical approach. Mayo (1933) is generally recognized as a father of the school; Davis (1962) indirectly and Lewin (1951) most directly also contributed much to its initiation.

Above all, the human relations school emphasized the role of communication, participation and leadership. The following are the distinguishing features of organization according to the neo-classical school:

- The basic element of organization is the individual.
- Individuals join and are joined to form sub-groups within an organization on the basis of propinquity, mutual functional interests, authoritative relationships, co-ordinative pressures and social action.
- Members normally belong to more than one sub-group (both formal and informal) and interact with each other within each group.
- Members of one sub-group also interact with members of other sub-groups.
- Members of sub-groups are bound together by common objectives.
- The totality of all sub-groups is bound together by common objectives.
- The organization interacts with other major groups (for example, society, customers, vendors and competitors).

- A formal organization is guided in its action by an underlying philosophy - a system of policies, principles, and procedures - implemented by sound leadership practices.
- To be sound, an organization must, in the long run achieve the values desired by its members and by other organizations interacting with it.

The above conclusions indicate that organization theory is made up of a highly complicated set of inter-dependent relationships, a fact emphasized by the systems viewpoint in the so-called modern doctrine or school.

#### 1.3.4 Modern school

The modern school of thought is composed of many segments, each emphasizing its own area of interest. Typical contributors are Argyris (1957), Beer (1961), Haire (1959), Homans (1950), Likert (1961), and March & Simon (1953).

Modern school researchers make use of both quantitative and behavioural sciences to examine people at work. However, modern organization "theory" is still evolving and is hence difficult to evaluate.

Modern organization theory tends to look at an organization as a system made up of the individual, the formal structure, the informal organization, status and role patterns and the environment. The thrust of this approach is "...the study of a system based on a method of analysis involving the simultaneous variations of mutually dependent variables" (Scott, 1962, p.3).

In modern organization "theory", writers consider significant aspects of the organization that were not seriously considered by either classical or neoclassical writers. Included among these are strategic parts of the system; the nature of their mutual dependency; processes in the system that link the parts together and facilitate the adjustment to each other;

goals set by the system; and research tools that should be used to study the system.

Some writers of the modern school have been highly critical of much of the work of previous management writers because of "...a great disparity between hypotheses and evidence" (March & Simon, 1958, p.5).

The evolution of organization theory is depicted in Figure 1.5.

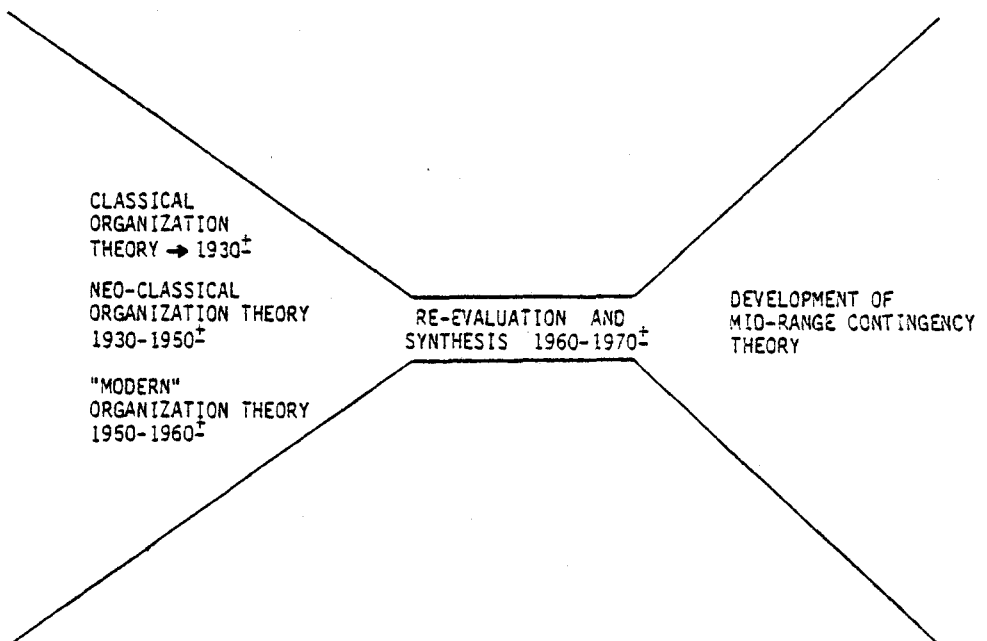


Figure 1.5

The evolution of organization theory

It is true that much that has been developed in the management field has not to date been subjected to empirical verification. Some reason exists for this state of affairs but the organization is so complex and dynamic and subject to the interaction of so many interdependent variables that it is very difficult to isolate one factor for analysis and measurement.

Collecting evidence under the rigorous controls of laboratory experimentation is not the only means of testing hypotheses; other acceptable means are through data that have stood the pragmatic test of time and through those that are supplied by expert testimony.

Many examples of conflict between the interests of micro and macro units can be seen. Generalizations, descriptions or prescriptions valid for a particular level of analysis, may or may not be valid for another. A comprehensive understanding of organizations requires an understanding of factors appropriate to each unit or level and of the inter-relationships between units and levels.

#### 1.4 Frameworks for analysis

##### 1.4.1 Systems theory

Viewed as natural systems, organizations are composed of an inter-related series of processes. It is the inter-relationship and the process, rather than some or other separate aspect, which constitutes the object of study in the systems approach. A second important tenet of general systems theory is the emphasis on the similarity of the processes occurring in many different types of relationships. Whether one is dealing with a machine, an organism, or an organization one can analyse the system in terms of the supply of resources "input", a conversion process "throughput" and the production of an object or objects "output". A third important tenet of systems theory concerns the point that organizations are composed of a set of interdependent parts. Each part of an organization contributes to and receives something from the whole.

The individual, the small group, and the large group are seen as progressively more complex manifestations of a basic structured principle. Each can be described in terms of an internal world, an external environment and a boundary function which controls transactions between what is inside and what is outside.

Boulding (1956) has extended the application of systems theory to the study of organizations by examining various levels of organization. In a hierarchy of organizational systems he conceptualizes human organizations as being relatively highly advanced. (Figure 1.6).

Depending on one's viewpoint, however, one may debate the superordinacy given by Boulding to human organization (9th level) over and above biological systems (7th and 8th levels for animal and man respectively) as biochemical physiology and genetic processes have a level of complexity yet to be unravelled.

FIGURE 1.6      Levels of organisation.

| System level             | Description or characterisation                                                                                                                   | Examples                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1. Static structure      | Normative or descriptive models of things, events and concepts.                                                                                   | Road maps. Organization charts.                                                          |
| 2. Simple dynamic        | Predetermined or necessary motions                                                                                                                | Clocks. Standard operating procedures.                                                   |
| 3. Cybernetic            | Possess the ability to modify itself or seek or maintain a condition.                                                                             | Heating system with thermostatic control. Management using standard cost control system. |
| 4. Elemental interaction | Fundamental                                                                                                                                       | Chemical reaction                                                                        |
| 5. Open system           | Simple self-maintenance with capacity to reproduce and ability to accept input, transform that input and produce output.                          | Germs.<br>Body cells.                                                                    |
| 6. Genetic-societal      | Division and specialization of labour among cells; each part or cell aggregation mutually dependent.                                              | Botanical plants.                                                                        |
| 7. Animal                | Possess specialized information receivers (eyes, ears, nose), complex nervous systems and a brain.                                                | Cats, dogs, horses, cows.                                                                |
| 8. Human                 | Intelligence, self-reflexivity, time reference, adaptability, control of environment to certain extent, tool-making, language, cultural heritage. | Man.                                                                                     |
| 9. Human organizations   | Organizations of two or more people.                                                                                                              | Corporations. Social clubs. Athletic teams                                               |
| 10. Transcendental       | In pursuit of ultimate and perhaps elusive knowledge, truths and aesthetics.                                                                      | Religious groups<br>Philosophical orders. Abstract thought                               |

Adapted from: Boulding, K.E. General systems theory - the skeleton of a science. Management Science, April 1956, pp.197-208.

#### 1.4.2 Structural analysis

Structural analysis proceeds from the recognition that the organization is a system. The identification of elements of the system depends on the level of analysis and on what may be termed perspective. Levels of analysis are usually thought of in terms of a macro-micro continuum. One level of analysis takes entire organizations as its basic unit, while another uses individuals in the organization.

Depending on the investigator's perspective, it is possible to have different structural interpretations of the same thing. For most firms, for example, one can speak of their financial structure, the structure of their work tasks, their market structure or even between organizations, their industry structure. It is perhaps misleading therefore to refer to "the structure of an organization". All organizations possess structure, but a particular representation of structure always presumes some perspective and level of analysis.

Any structure consists not only of elements but of relationships between elements. Relationships are simply forms of interaction or combination. They may be specified in many different ways, both quantitatively and qualitatively. Logical properties such as transitivity or symmetry may be attributed to them.

The above viewpoint approaches structure from the perspective of people in the organization. The unit of analysis is the person and the relationships are the social bonds between people (the social structure of the organization).

Two types of relationships between people in an organization may be distinguished. On the one hand there is the formal organization characterized by the



organization chart, including lines of authority, work related communication and succession relationships. Formal documents specify these relationships often in the form of job descriptions, position charters, and promotional routes. On the other hand there is the informal organization, where links not specified by the organizational chart are made between individuals. Casual communication, status, power, trust, liking or disliking are all aspects of the informal organization.

#### 1.4.2.1 Formal organization

The emphasis in theory and practice here has typically been on the development of measures of various aspects of formal structure and the attempt to relate these to environmental factors, effectiveness or to each other.

Durkheim (1947) popularized Smith's (1776) concept of the "division of labour". This concept refers to the division of task activities between people in the organization. Fayol (1949) also contributed to this notion with his "functions of management".

Research in the last two decades has continued to emphasize the importance of functional divisions. Pugh, Hickson, Hinings and Turner (1968) used a measure of functional specialization based on whether each of a set of activities assumed to be common to all organizations is or is not performed by one or more people full-time. Hage and Aiken (1967) employed a measure of professional activity to reflect the extent of each person's occupational specialization. Blau and Schoenherr (1971) have used as a measure of structure the number of positions and sub-units. Gross classifications have been employed by Porter and Lawler (1965) in which organizations have been characterized

as being centralized or decentralized in terms of decision-making and as having either "tall" or "flat" structures. The structural dimension of interest in this study was that of authority between people.

Traditional theorists were concerned with span of control and the number of levels in the organizational hierarchy. Research has also concentrated on the depth of hierarchy (Evan, 1963; Pugh et al., 1968). Research has concentrated on the dimensions of functional specialization, hierarchical depth and physical location. Blau (1970) has hinted at the socio-psychological importance of structural analysis in this statement : "... the fact that members of a collectivity are differentiated on the basis of several independent dimensions is the foundation of the collectivity's social structure" (p.203). The classic study of Lawrence and Lorsch (1967) has examined the psychological basis of differentiation.

#### 1.4.2.2 Informal organization

In their pioneering work, Roethlisberger and Dickson (1939) recognized that human interaction is not confined to the bounds of formal organization - the human relations school. The pattern formed by these more socially determined interpersonal relations is usually referred to as informal organization structure. Students of both psychology and sociology have, of course, made an effort to understand these interpersonal relations. Organization theorists have relied heavily on this work.

Research strategies in this area range from ranking-and-rating scales through sociogram techniques to more recent multi-dimensional scaling. Sociometry, as this body of research is often referred to, has been

devoted to developing better, less intricate methods of describing group structure. The conventional strategy has been to view sociometric data in terms of "linkages". In the sociogram people are represented as points which either are or are not linked together depending on the existence of a relationship. There is no implication, however, about the distance between points as is necessarily the case with the two-dimensional sociogram. With multi-dimensional scaling on the other hand, matrix theory may be employed in the analysis of relationships. Cast in metric terms the existence of linkages is given by the elements of an  $n \times m$  matrix.

The conceptual grid is a pre-mathematical representation of an individual's psychological space, and it is designed to set the stage for a mathematical analysis of that space. As we see it, it is essentially multi-dimensional in character (Kelly, 1955, p.304).

In terms of the interpoint-distance model of multi-dimensional scaling, two people judged to be similar in personality would be considered to be close together in a multi-dimensional space and two people judged dissimilar would be considered far apart. The multi-dimensional scaling procedure involves obtaining a set of inter-person distances and converting it to a matrix of scaled products which is then factored to obtain a matrix  $F$ . This matrix  $F$  is analogous to the factor matrix of multiple factor analysis; its rank corresponds to the dimensionality of the space and its elements to the projections of the personalities (stimuli) on a set of orthogonal axes placed at the centroid of the points. A more detailed account of these procedures may be found in Torgerson (1958) or in Messick and Abelson (1956).

#### 1.4.3 The action frame of reference

Common to most of the above theories or models of organization has been an exogenous or inter-organizational approach. The basic problem is, however, that few attempts have been made to develop a model of organization constructed by the individual from within the organization, i.e. from an endogenous or intraorganizational level.

Sociologists, in particular Berger (1966), Berger and Luckmann (1966), Cicourel (1964), Cohen (1968), and Schutz (1964) have advocated that an action approach be used to study this problem. In a critical study of organization theory, Krupp (1961) implies that the systems model, just as much as goal models, involves examining organizations from the point of view of the executive. The environment for instance is to be considered only in as much as it affects the problems of the organization, which is to say the problems of those with authority. Moreover, in seeking to explain what actually happens in organizations in terms of a series of impersonal processes (e.g. homeostasis), it directs attention away from purposive action.

Two apparently opposed ways of viewing organization have been suggested. The systems approach dealt with in 1.4.1, stresses the way in which the action of the parts is structured by the systems need for stability and goal-consensus, and emphasizes the process of integration and adaptation. The alternative approach, stemming mainly from a sociological framework of action, argues that organizations are "merely the ever-changing product of the self-interested actions of their members" (Silverman, 1970, p.39). Silverman maintains that while behaviour may be viewed as a reflection of organizational structure and its problems, it may be argued that:

It is equally as valid to suggest that an organization itself is the outcome of the interaction of motivated people attempting to resolve their own problems (p.126).

Two of the major propositions of the action approach concern differences in the orders of subject matter dealt with in the natural and social sciences, and the fact that explanations of human actions must take account of the meanings which those concerned assign to their acts : the manner in which the everyday world is socially constructed yet perceived as real and routine.

According to Parsons (1951), action occurs not as a response to an observable stimulus but as a product of a "system of expectations" (p.130) arising out of the actor's past experiences and defining his participation of the probable reaction of others to his act.

The action frame of reference, in emphasizing that action derives from the meanings that men attach to their own and each others acts, argues that man is constrained by the way in which he socially constructs his reality. Silverman (1970) comments : "On the one hand, it seems, society makes man, on the other, man makes society" (p.141). He further postulates that the action frame of reference and previously formulated exogenous or systems approaches would appear to be complementary to each other.

Social action theories are generally concerned with explanations in terms of interpersonal human action. Weber (1964) defined action as "all human behavior when and insofar as the acting individual attaches a subjective meaning to it" (p.88).

#### 1.4.4. Construct theory

Two significant features of construct theory make it particularly suitable as a framework for analysis for this study. Firstly the theory was deliberately stated in very abstract terms to avoid the limitations of a particular time and culture. Bannister and Fransella (1974) point out that construct theory is an attempt to build a theory with a very wide range of convenience "a theory not tied to one particular concept-phenomenon" (p.16). Secondly, the theory is deliberately content-free. It is the user of the theory who has to supply a content of which the theory might make sense. Kelly (1955) sought to make his theory comprehensive enough to serve the purposes of those with very different issues in mind.

The theory relies on two main notions : Anticipation (or sometimes prediction) and construct. A construct is a particular kind of category. It is particular in that it is unique to the person using it. The theory regards man as a categorizing animal and demonstrates that a person tends to react to other people and objects (organizations) depending on how he has categorized them.

##### 1.4.4.1 The formal structure of personal construct theory.

The formal tenets of the theory are to be found in the statement of a fundamental postulate and eleven corollaries which elaborate on this postulate. These are discussed in detail in Chapter 3.

##### 1.4.4.2 The development of construct systems

According to Kelly (1955) people interpret and re-interpret themselves and their situations. Construct theory is based upon this fundamental idea that "a person's psychological processes are channelled by the ways in which he successively construes events" (p.46).

### 1.5 An integration

It is possible to view organizations and their component groups and individuals along a number of axes of differentiation in a manner analogous to Lewin's (1935) concept of the personality as a multi-layered system or Kelly's (1955) multi-dimensional personal construct theory. In the final analysis a model is only as valuable as its contribution to meaningful analysis and discourse.

Insight into concepts and functioning of organization is related to the fit between language of analysis and description and the type of organizational phenomenon under investigation.

Daft and Wiginton (1979) point out that natural language may be more powerful than mathematical language for understanding many organization processes. They propose that "high variety language is needed to make significant statements about complex human organizations. The vastness and complexity of high variety language is what makes it powerful for describing complex systems" (p.182). They propose a continuum of language forms which may be used to describe organizational processes (Figure 1.7).

Special purpose mathematically-based languages tend to be more precise but low in variety (precise) and thus limit research to simple, quantifiable variables and linear relationships. Non-verbal communication (such as music and art) at the other end of the continuum tend to be high in variety and are more ambiguous, but can communicate ideas which cannot be verbalized. Variations of natural language make up the centre part of the continuum. Daft and Wiginton point out that the arrangement in Figure 1.7 is tentative and simple.

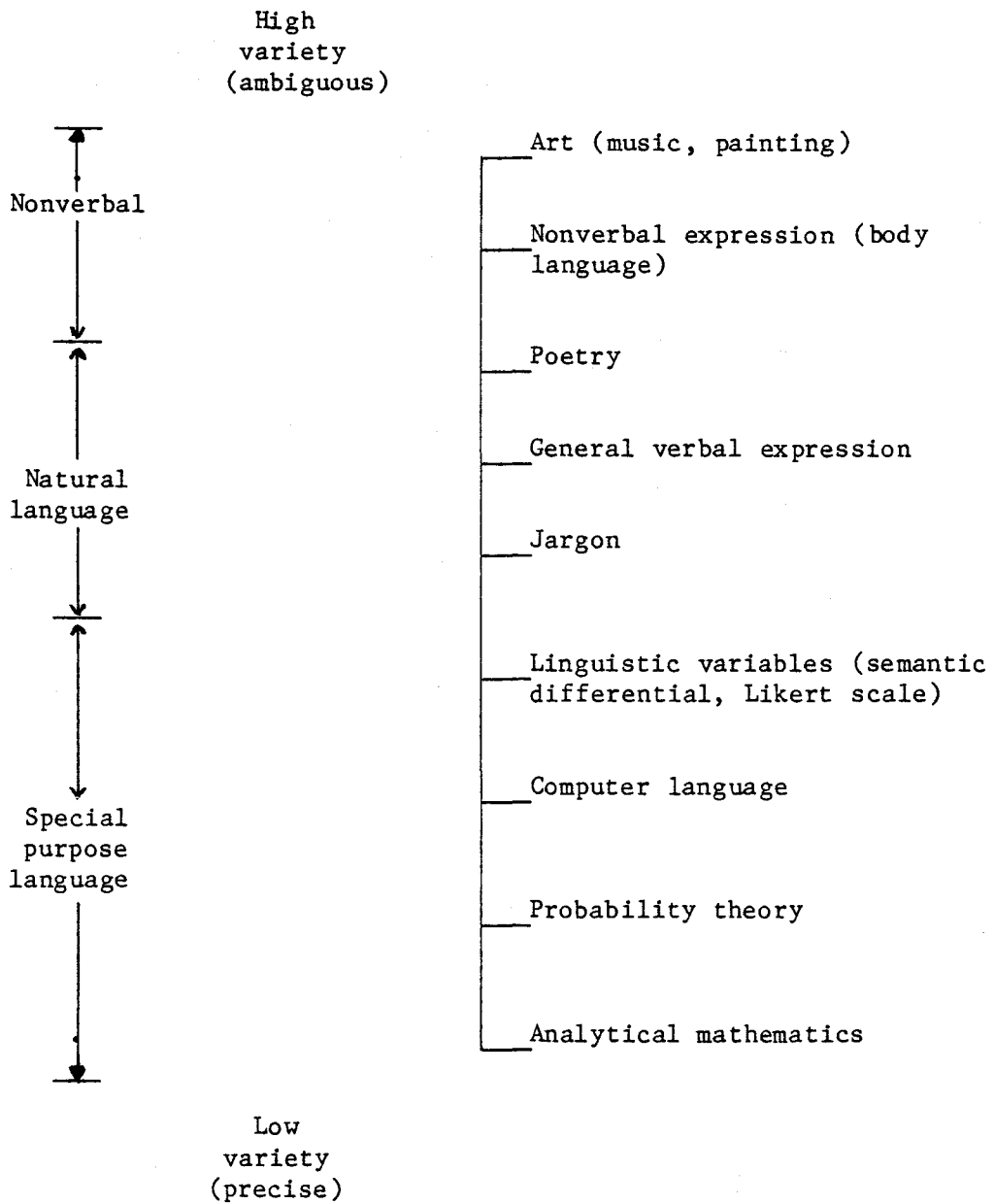


Figure 1.7

Continuum of Languages for Describing  
Organizational Reality  
 (Daft and Wiginton 1978, p.181).



Boundaries are not discrete since the various forms of language "typically blend into the nearest alternatives" (p.182).

Daft and Wiginton's viewpoints may be related to Silverman's (1970) proposition that the social and natural sciences deal with an entirely different order of subject matter. "While the canons of rigour and scepticism apply to both, one should not expect their perspective to be the same" (p.126). Daft and Wiginton (1979) propose that insight into organizational behaviour arises from the appropriate fit between the language of description and organizational reality. They continue:

High variety language is needed to make significant statements about complex human organizations... Special purpose languages have been constrained by design so that they do not contain adequate variety and depth of meaning for this purpose, and thus would appear inadequate (p.182).

Daft and Wiginton's concepts may further be related to Kelly's (1955) construct theory and perception theory as they are in Chapter 3.

The human mind can summarize and abstract information to form coherent wholes. According to Daft and Wiginton:

Organization participants carry highly complex and intelligent means-ends maps about organizational relationships in their memories (p.184).

Kelly's (1955) theory postulates that individuals filter percepts through relatively fixed channels or sets of perceptual constructs. This notion in a simpler form can be related to Broadbent's (1958) "filter theory" and Tolman's (1948) concept of a "cognitive map". The concept may be further elaborated, as it is in Chapter 4, into the concept of image.

## 1.6 The study

Reference has been made on a number of occasions in this chapter to terms used by organization theorists such as a manager's "underlying theory of organizational behavior" (Davis, 1968, p.38); "mental picture" (Inkeles, 1964, p.28); the "image presented by an organization" (Thompson, 1967, p.88); "organizational participants carry complex means-ends maps about organizational relationships in their memories" (Daft & Wiginton, 1979, p.184). Simon (1952) proposes that there is a link between social and psychological concepts in this area:

The limit of human understanding in the presence of complex social structure leads human beings to construct simplified maps (i.e. theories or models) of the social system in which they are acting, and to behave as though the maps were reality (p.1135).

This study, in an attempt to examine a manager's organization map, builds specifically on systems viewpoints (Boulding, 1956; Katz & Kahn, 1978; Lewin, 1951; and von Bertalanffy, 1962) which demonstrate the differentiated and inter-related aspects of organizations.

Positions in organization are differentiated in terms of authority, power, status and role, with the result that personal interaction tends to be prescribed or "structured". Differences can be perceived too in terms of the cognitive and emotional orientations of different functional specialists (Lawrence & Lorsch, 1967).

In this study an attempt is made to analyse and explore via a complementary action frame of reference, the nature and structure of the role-perceptions which the top level functional managers - D, E and F bands, (Paterson, 1972) have of each other. These role perceptions are viewed from the framework of middle-range organization theory.

While being in line with the ethos of middle-range theory in part, this study is also in part exploratory-descriptive.

It is assumed in this study as is done by Frost and Hayes (1980) that:

Those models of organization which reflect a concern with subjective phenomenological interactive and inductive approaches to describing and understanding organization alert us to the "eye of the beholder" and thus the role of the organization member in determining the content of organization (p.355).

This viewpoint is congruent with the action frame of reference, perception theory, implicit personality "theory" and the concept of image.

### 1.6.1 The research questions

The principal research questions are:

1.6.1.1 What constructs (dimensions) do role-occupants (senior managers) in interaction with each other in organization typically use in evaluating each other?

1.6.1.2 Does the integration of such constructs occur in any meaningful way or pattern, i.e. what are the cognitive structures or perceptual maps which make up the phenomenological world of organizational participants and which thereby define the content of organization?

1.6.1.3 Do the perceptions of the role occupants in marketing, production, finance and personnel differ in terms of the primary factor structures identified?

### 1.6.2 The scope and significance of the study

In order to answer the above questions, data was collected from 90 of the most senior functional and general managers in 10 medium-sized South African industrial companies.

Data was collected by means of a 10 x 40 repertory grid (Kelly 1955) and semi-structured interviews. Holzbach's (1974) version of French and Raven's (1968) bases of power instruments was used for supplementary interpretation of the data.

The repertory grids of 90 managers (36 000 observations) were compared on a hypothetico-deductive basis against a model quasi-consensus grid of identical

dimensions with the grids of the 90 managers to test for effects of perceptual mediation in terms of personal construct and implicit personality theories.

Thereafter the effects of role, and organizational decision making level as an axis of differentiation, were explored on the basis of the phenomenological view point that managers have certain models, theories or cognitive maps of organization which affect perception and therefore behaviour.

Results derived from the above two approaches were analyzed using the appropriate analytical frameworks and comment was made on the significance of the findings for organizational analysis. An attempt was made not to be prescriptive in this dissertation.

#### 1.6.3 Overview of the study

This study is organized into eight chapters. The different levels of organizational analysis, frameworks for organizational analysis, the purpose, scope and significance and overview of the study are presented in Chapter I. The concepts of role and perception are presented in Chapter 2 under the heading "Role-Perception". "Implicit personality theory" (Chapter 3) deals with aspects of interpersonal perception and in particular with personal construct theory. Chapter 4 reflects the more holistic concept of "Image" and its use in organizational behaviour, marketing and international relations. In Chapter 5 the hypotheses are derived, the research design discussed and the methodology put forward. The multivariate and other statistical techniques used for analysing the data are discussed in Chapter 6. In Chapter 7 the empirical data are presented and analysed and interpreted. Chapter 8 contains the discussion of the data. In the summary, Chapter 9, the study is evaluated and concluded.

## CHAPTER 2

### ROLE PERCEPTION IN ORGANIZATION

... and who are you?

Alice: I - I hardly know sir, just at present - at least I know who I was when I got up this morning, but I think I must have been changed several times since then.

Lewis Carroll

#### 2.1. Introduction

In years past, the mind-body problem was a leading topic for philosophical discussion. For a large proportion of philosophers and psychologists the tenability of the mind-body model depended on discovering the precise locus of the meeting of the two. The contemporary person-organization-environment dilemma has prompted a similar search for a conceptual meeting point for social structural forces and individual personalistic forces. To a large extent the central concept most satisfactory for analysing, debating and prescribing action at the latter interface is that of role. Katz and Kahn (1966) see the concept of role as:

The major means for linking the individual and organizational levels of research and theory. It is at once the building block of social systems and the summation of the requirements with which the system confronts the individual member. Indeed it has been touted for a generation as the example of a concept uniquely fitted to social-psychological investigation and theory (p.197).

An analysis of the literature on the concept of role

reveals a body of knowledge, theory, and empirical research, in addition to a particular perspective and language.

In essence, the role theorists assume, as do players in the theatre, that performance results from the social prescription and behaviour of others, and that individual variations in performance are expressed within the framework created by these factors.

All the world's a stage  
And all the men and women merely  
players;  
They have their exits and their  
entrances,  
And one man in his time plays many  
parts ...

W. Shakespeare  
"As You Like It".

Katz and Kahn (1978) in their analysis of organizations enumerate roles, norms and values as being the major components of social systems. They maintain that the social psychological bases of social systems comprise the role behaviour of members, the norms prescribing and sanctioning these behaviours, and the values in which norms are embedded. According to Katz and Kahn roles are descriptive of specific forms of behaviour associated with given positions. They develop from task requirements.

In essence Katz and Kahn's model emphasizes the high degree of inter-dependence of organizational variables like rank, role, position within the structure, role expectations, perception of such expectations, coping patterns in response to perceived conflict and role effectiveness. The implication of their model is that organizational influences are largely limited to the specific sub-group with whom the member has contact. The overlapping role-set model constitutes a trend towards systems-level concepts.

## 2.2 The concept of role

Miller and Rice (1967) use the term role to refer to "the activities that the individual contributes to a particular activity system and to the inter-relations involved in carrying out those activities" (p.40).

Sarbin (1969) defines role as "a patterned sequence of learned actions or deeds performed by a person in an interaction situation" (p.225).

The term role is used to describe specific forms of behaviour associated with given tasks; roles develop spontaneously from task requirements. In their organizational form roles are standardized patterns of behaviour required of all persons playing specific parts in a given functional relationship, regardless of personal wishes or inter-personal obligations, and irrelevant to the functional relationships. (Katz & Kahn, 1978).

The individual is treated as being at the intersection of a set of roles which devolve upon him in consequence of the positions he occupies in a variety of status systems. However, such a statement is incomplete, since an individual is more than the sum of compartmentalized roles. He is an integrated and coherent whole. Therefore, an added concept employed in role theory is that of "personality". Whereas role refers to uniformities in the behaviour of different individuals occupying the same status, personality broadly refers to uniformities in the behaviour of one individual.

Katz and Kahn (1978) believe that roles are found in their purest form when they are most completely divorced from the personalities of role incumbents and from any specific motivational tie which could encumber the role relationship. Such a puristic concept of role is useful for academic analysis. However in real life, the final enactment of role



involves personality. McDavid and Harari (1974) regard the concept of role as "global ...incorporating all of the dimensions that might describe one's pattern of behavior within a social organization" (p.282). They continue "...the content of a particular role may be described in terms of many different qualities" (p.282).

McDavid and Harari regard the pattern of behaviour that constitutes a role as a product of the circumstances defining a position and the components of the personality of the individual occupying that position. They point out too that the role displayed by one person in a particular position may differ considerably from that displayed by another in the same position. On this point McDavid and Harari (1974) point out: "But the two are interdependent and group dynamicists have concluded that one cannot fully separate the effects of personality and of position as determinants of role behavior" (p.284).

Turner (1962) believes that the many valid criticisms of the more static and over-determining conception of roles are due to the dominance of Linton's (1936) view of role and the use of an oversimplified model of role functioning. Viewing role-playing and role-taking, however, as processes, Turner maintains that there is more to the concept and that a dynamic view of role adds novel elements to the notion of social interaction. Instead of postulating the initial existence of distinct, identifiable roles he posits a tendency to create and modify conceptions of self and other roles as an interactive orienting process. Since actors behave as if there were roles - although roles actually exist only in varying degrees of definitiveness and consistency - the actors attempt to define them and make them explicit, thereby in effect creating them and modifying them as they proceed. The key to role-taking according to Turner (1962) is the morphogenic

propensity "to shape the phenomenal world into roles" (p.22).

Role interaction is a tentative process of reciprocal responding between self and other, challenging or reinforcing one's conception of the role of the other, and consequently stabilizing or modifying one's own role as a product of this essentially feedback-testing transaction. The conventional view of roles which emphasizes a prescribed complementarity of expectations thus gives way to a view of role-taking as a process of devising a performance on the basis of an imputed "other" role, with an important part being played by cognitive processes of inference-testing. Turner views as a central feature of role-taking the process of discovering and creating "consistent" wholes out of behaviour, of devising a pattern that will cope effectively with various types of relevant others and meet some recognizable criteria of consistency. Such a conception supports the view held by Turner of "institutional morphogenesis" (1962, p.22).

Whenever the social structure is such that many individuals characteristically act from the perspective of two given roles simultaneously, there tends to emerge a single role which encompasses the action.

Pointing out the implications for formal organizational role-playing, Turner argues that the formal role is primarily a "skeleton" of rules which evoke and set into motion the fuller roles built up and "more or less consensually validated in the above ways" (p.26).

The purposes and actions of role incumbents constitute unifying elements in role genesis and maintenance, and hence role-taking must be seen to involve a great deal of selective perception of other behaviour and differential emphasis in the elaboration of the role pattern.

This selection process operates on the great variety of elements in the situation of relevant objects and other-behaviours which could become recognized components in a consistent role pattern. Not all combinations of behaviour and object relations can be classified into a single role: there must be criteria by which actors come to verify or validate the construction of a number of elements into a consistent role. This verification stems from two sources: "internal validation" of the interaction itself, and "external validation". The former hinges on successful prediction or anticipation of relevant other behaviour in the total role-set, and hence on the existence of role-patterns whereby coherent selection of behaviours judged to constitute a consistent role can be made.

Gross, Mason and McEachern (1958), in a study of the school superintendent role, found that i) incumbency in this role actually involved a great deal of choice behaviour in selecting among the alternative interpretations and behaviours deemed possible and appropriate, and ii) that the consistency and coherence of an incumbent's behaviour could be seen only in terms of the total role as an accommodation to the correlative other roles of school board members, teachers and parents, with which the superintendent was required to interact simultaneously. They posit that a "system model" as against a "position-centric model", involves the important inclusion of the inter-relationships among the counter positions.

A position can be completely described only by describing the total system of positions and relationships of which it is a part. In other words, in a system of interdependent parts, a change in any relationship will have an effect on all other relationships and the positions can be described only by the relationships.

To summarize Turner's views, organizations may provide a normative framework prescribing roles to be played, thus

assuring the required division of labour and minimizing the costs of exploratory role-set behaviour. The actual role-transactions that occur, however, generate a more or less coherent and stable working compromise between ideal prescriptions and a flexible role-making process; between the structural demands of others and the requirements of one's own purposes and sentiments. This conception of role-relations as "fully interactive" rather than merely conforming, contributes to the recent trends "to subordinate normative to functional processes in accounting for societal integration" (Turner, 1962, p.38) by emphasizing the complex adaptive interdependence of actors and actions in what one can see as an essentially morphogenic process.

Roles are undoubtedly social phenomena. They are not only external "demands", but they are also dynamic interactional processes. Through their identity implications roles become operationally integral to individual personality. Roles do more than link the individual and the social - they unite them.

Social organizations represent the clearest development of a pattern of interlocking roles. The roles in a social organization represent prescribed or standardized frameworks of activity. The network of standardized role-behaviour constitutes the formal structure of an organization. A fully formalized role-system, then, is one in which the roles defining the expected interdependent behaviour of incumbents of system positions are explicitly formulated and sanctions are employed to enforce the roles. Formalization or standardization of role-performance is a matter of degree, but the individual in the organization has less freedom to transform his role to coincide with the expression of his personality than in other social settings.

Other contributors to role-theory have been Bales (1970), Banton (1965), Kelly (1955), Merton (1957), Newcomb (1950), Sarbin and Allen (1968), and Shibutani (1961).

Kelly (1955), in introducing the concept of role, puts forward the following definition:

In terms of the theory of personal constructs, a role is a psychological process based upon the role-player's construction of aspects of the construction systems of those with whom he attempts to join in a social enterprise. In less precise but more familiar language, a role is an ongoing pattern of behavior that follows from a person's understanding of how the others who are associated with him in his task think. In idiomatic language, a role is a position that one can play in a certain team without even waiting for the signals (pp.97 - 98).

Kelly (1955) thought so strongly that role-theory and personal-construct theory were intimately related that he wrote: "personal-construct theory might have been called role-theory" (p.179).

#### 2.2.1 Role behaviour

Role behaviour refers to the behaviour resulting from the repeated actions of one person as he interacts with the repetitive actions of others. This set of inter-dependent behaviours constitutes a social system or sub-system and is a constant total pattern in which people play their parts:

The basic criterion, then, for studying role-behavior is to identify the relevant social system and locate the recurring events that fit together in converting some input into an output. This can be done by ascertaining the role-expectations of a given set of related offices since such expectations are main elements in maintaining the role-system and inducing the required role-behavior (Katz & Kahn, 1978, p.189).

### 2.2.2 Role differentiation

Most of one's life is spent in interaction with other people. In organizations much of such interaction is co-ordinated in terms of the role-sets defined by the structure of the organization itself.

Social systems lack the fixed physical structure of biological and other physical systems. Social systems have structure, but it is a structure of events rather than physical parts. As such it is a structure inseparable from the functions of the system.

Durkheim (1947) has observed that in primitive societies social integration was based on a common value system. With little division of labour and few sub-systems, there was a solidarity based on a collective conscience or a common morality manifested by all societal members and appropriate to all situations. With a highly differentiated social structure containing many sub-systems there is less of a simple universal moral code, and societal integration is based more on normative practices and role interdependence.

Modern man has learned to accommodate himself to a world increasingly organized. The trend toward ever more explicit and consciously drawn relationships so profound and sweeping, is marked by depth no less than by extension (Seidenburg, 1951, p.1).

Through its organization an enterprise assigns activities to roles and roles to individuals and groups; but the enterprise cannot always predetermine the consequential role-sets.

In any organization one can locate each individual

in the total set of ongoing relationships and behaviour comprising the organization.

In the language of role-theory, every person occupies positions within a number of status systems which may be represented on a multi-dimensional map.

According to Katz and Kahn (1978) the key concept for doing this is office by which is meant a particular point in organizational space; space in turn is defined in terms of a structure of inter-related offices and the pattern of activities associated with them. Office is essentially a relational concept, defining each position in terms of its relationship to others and to the system as a whole. Associated with each office is a set of activities or expected behaviour. These activities constitute the role to be performed, at least approximately, by any person who occupies that office.

Each office in an organization is directly related to certain others, less directly to still others and only remotely related to some offices in the organization. The closeness of such relationships is defined by the work flow and technology of the organization, and by the lines of authority (Katz & Kahn, 1978, p.188).

Some of the reasons for intense organizational activity are found in the fundamental transitions which revolutionized Western society, changing it from a rural culture, to a culture based on technology, industry and urbanization. From these changes a way of life emerged characterized by the proximity to and dependency of people on each other.

Proximity and dependency, as conditions of social life, harbour the threats of human conflict, capricious and anti-social behavior, instability of human relations and uncertainty about the nature of the social structure with its concomitant roles (Scott, 1961, p.7).

A formal organization comes into existence when two or more people agree to act in concert with a view to attaining a goal or goals. Division of labour or specialization of functions, a unique characteristic of formal organization, takes place and if properly managed leads to increased efficiency and output. Formal organizations become departmentalized for the sake of order, efficiency and effectiveness and functional specialization; departmentalization brings about a need for the role differentiation on the part of the individual. However, essential collaboration between sub-units is often hampered by such compartmentalization. Such organization designs often lead to competition and conflict between groups which could better co-operate in working toward organization-wide goals. Blake & Mouton (1964) point out that when contacts between two groups are competitive and mutually frustrating, negative stereotypes of other functional groups can develop quickly.

In recognition of such intergroup conflict, Blake, Shepard and Mouton (1964) have noted that "effective management of intergroup relations is a dimension of management that requires more analysis, more theory and more skills than has been traditional in industrial life" (p.10). They further suggest that organizational survival and success depend upon how well management understands and copes with a wide spectrum of assumptions, attitudes and orientations toward intergroup relations.



Weick (1969) has suggested that dissimilarities among individuals in an organization are in themselves among the primary causes of structural alignment (which is usually associated with authority differences) in an organization.

Even though the organization is composed of different structural units which evolve by a process of differentiation, there exists a very real collective force that exhibits itself as "company policy" or organizational thinking. This leads to the point that once a structure is formed people try to preserve it.

Formalization or standardization of role performance is a matter of degree, but in organizations individuals have less freedom to transform their roles to coincide with the expression of their personalities than in other social settings.

### 2.2.3 The process of role-sending

All members of a person's role-set depend on that person's performance in some fashion; they are rewarded by it, judged in terms of it, or require it to perform their own tasks. Because they have a stake in that person's performance they develop beliefs and attitudes about what he should and should not do as part of the role. Such prescriptions and proscriptions held by members of the role-set are designated role expectations. In the aggregate they define the role or behaviour expected of the person who holds it. The role expectations held for a certain person by a member of his or her role-set will reflect that member's conception of the office and its requirements, modified in some degree by the member's impressions of the abilities and personality

of the office holder.

The content of role expectations consists mainly of preferences with respect to specific acts, things the person should do or avoid doing. Role expectations may also refer to personal characteristics or style, ideas about what the person should be, should think or should believe. Role expectations are by no means restricted to the job description as it might be given by the head of the organization or prepared by some specialist in personnel work although these individuals are likely to be influential members of the role-sets of many persons in the organization. Role expectations for a given office (and its occupant) exist in the minds of members of its role-set and represent standards in terms of which they evaluate the occupant's performance. The expectations do not remain in the minds of members of the role-set however. They tend to be communicated or "sent" to the focal person. Moreover, the numerous acts that make up the process of role-sending are not merely informational. They are attempts at influence, directed at the focal person and intended to bring about conformity to the expectations of the senders.

As a communicative and influential process, acts of role-sending can be characterized in terms of any of the dimensions appropriate to the measurement of communication and influence. Some of the more important ones proposed by Gross, Mason and McEachern (1958) include sign (prescriptive or proscriptive), magnitude (strength of the influence attempt), specificity (extent to which the expected behaviours are made concrete and detailed), intensity (extent to which the focal person is allowed freedom of choice in complying or refusing compliance) and range of conditions under which compliance is intended.

#### 2.2.4 The received role

"Each individual responds to the organization in terms of his or her perceptions of it, a subjective or psychological "organization" that may differ in various ways from the actual organization" (Katz & Kahn, 1978, p.192).

For each person in an organization there is not only a sent role consisting of the influential and communicative acts of the appropriate role-set; there is also a received-role, consisting of that person's perceptions and cognitions of what was sent. How closely the received role corresponds with the sent role is an empirical question for each focal person and set of role-senders and will depend on properties of the senders, the focal person, the substantive content of the sent expectations, and the clarity of the communication.

It is by means of the sent role that the organization communicates to each of its members the do's and don'ts associated with his or her office. It is the received role, however, that influences each member's behaviour and which is the immediate source of his or her motivation for role-performance.

When sent role-expectations are seen by the focal person as contrived or coercive, they may arouse strong resistance forces that lead to outcomes different from or even opposite to the expected behaviour.

Every person is subject to a variety of psychological forces in addition to those stimulated by pressures from the role-set in the work situation. Role-sendings from that set are only a partial determinant of the person's behaviour on the job.

Additional sources of influence in role-taking are the objectives in personal properties of the situation itself. The taking of roles may be aided by the nature of the task and the person's experience of the individual with respect to similar tasks.

People can be conditioned to play their roles by cues other than those of the communicated expectations from other system members. Nevertheless, in most organizations, role-behaviour is largely dependent on role-sending.

Schein (1965) points out the kinds of expectations which members of the role-set hold, the manner in which they attempt to influence the focal person, his perception of their expectations, his feelings and reactions to these and his attempts to cope with related or organizational factors, personality factors and with interpersonal factors which characterize the relationship between the role occupied and the focal person.

The individual acquires a set of values and expectations about his or her own behaviour and abilities, about the nature of human organizations and the conditions of membership in them. As Miller (1963), Dai (1955) and others have observed, the person has an occupational self-identity and is motivated to behave in ways that affirm and enhance his valued attributes. The individual comes to the job in a state of role-readiness, a state that includes the acceptance of legitimate authority and compliance with its requests, a compliance that for many people extends to acts that they do not understand and that may violate many of their own values. Milgram's (1965) finding that two-thirds of the adult subjects in an experiment obeyed an instruction to administer what they believed to be electrical shocks

of several hundred volts to groaning and protesting victims only highlights the phenomenon of compliance in role-behaviour. The concepts role-expectations, sent role, received role and role-behaviour can be thought of as constituting a sequence or role episode.

2.2.5 Role-taking

Role-sending and role-behaviour can be conceptualized as events in an ongoing and interdependent cyclical process. This process is affected by several additional or contextual factors - individual, interpersonal and organizational. The role episode and its context are shown in Figure 2.1 below.

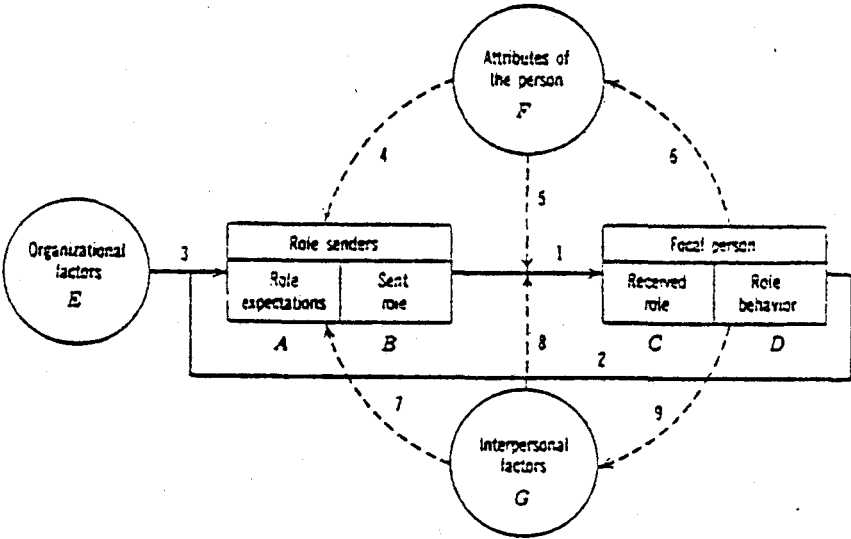


Figure 2.1

The role episode as depicted by Katz and Kahn (1978, p.196).

This emphasis on the controlling power of one's immediate social environment - past and present - reflects a doctrine of limited social determinism. The behaviour of the individual is examined in terms of how it is shaped by the demands and rules of others, by their

sanctions for his conforming and non-conforming behaviour and by the individual's own understanding and conception of what his behaviour should be (Biddle & Thomas, 1966, p.4).

#### 2.2.6 Status

In 1936 Linton proposed a classic distinction between status (position) and role. A status, as distinct from the individual who may occupy it, is simply a collection of rights and duties ... A role represents the dynamic aspect of a status. The individual is socially assigned to a status and occupies it in relation to other statuses. When he puts the rights and duties which constitute the status into effect he is performing a role. Role and status are quite inseparable and the distinction between them is only of academic interest. There are no roles without statuses or statuses without roles (Linton, 1936, pp.113 - 114).

Roles become more complex when they require the focal person to be involved in two or more sub-systems, since each is likely to have its own priorities and to some degree its own sub-culture. The crossing of sub-system boundaries may be physically required of the focal persons themselves or it may consist of the co-ordination of persons whose roles are located in different organizational sub-systems.

When people are asked to name members of their role-sets, the responses sometimes include friends and union officers, husbands and wives.

The inclusion of multiple activities and multiple sub-system involvements is increasingly evident as one

moves up the hierarchy in most large organizations. A supervisor is, for example, a member of two sub-systems - the managerial structure and the unit supervised.

The organizational role system thus denotes the system of institutionalized expectations about the likely action of others without which social life cannot proceed. It expresses the rules of the game, which all groups tend to accept for the time being, either because they feel that they can do nothing to alter them or, more importantly, because of the rewards which stable group relations offer to all those concerned. Organizations are not, therefore, as Crozier (1964) and Burns (1961, 1966) have pointed out, merely systems of power. But it is also true that the values of actors are involved to a greater or lesser extent in any particular role system. They may, therefore, be more or less continuously involved in seeking to maintain or to alter the rules of the game (Silverman, 1970).

#### 2.2.7 Position

The term position is used to designate the particular slot, or niche, within the structural organization of a group occupied by a particular individual, and it therefore refers to the configuration of situational or contextual expectations that influence his behaviour.

By utilizing the term position in this manner, the term role is reserved for the functional behavior displayed by an individual in a particular position as a product of the interaction between his own personality and the situational position he occupies.

(McDavid & Harari, 1968, p.268).

"A position is a cognitive organization of role-expectations" (Sarbin, 1969, p.225).

Mead (1934) developed the concept of role-taking as central to his analysis of role. An allied concept "taking the role of the other" posits that not only must the person take into account the role of the other in formulating his own actions; the role-performances and the judgements made about such performances serve as building blocks for construing the self (Sarbin, 1977, p.15).

Kelly made use of the concept of role. His usage reflected the essential difference between personal construct theory and role-theory, namely, the locus of concern. Personal construct theory is concerned with the contemporary version of what goes on in the interval between the presentation of a stimulus and the verbal or motoric acts. Role-theory is concerned with actions of persons in social situations. Personal construct theorists in common with other cognitive theorists of the 1950's and 1960's tried to explicate the conditions of knowing. It evolved from the central concerns of mentalist philosophers and psychologists. Role-theory has tried to explicate the conditions for action. Kelly's prototype is the scientist; the role-theory prototype is the actor (Sarbin, 1977, p.17).

#### 2.2.8 Role-conflict and role-ambiguity

Organizational roles have been identified as points of linkage and also as principal sources of conflict between individuals and organizations by Cyert and MacCrimmon (1968), Hunt (1967), Gross, Mason and McEachern (1958) and Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964). Rizzo, House and Lirtzman (1970) identified four basic inter-related types of role-conflict, all based on perceptions of inconsistent demands: (i) intersender conflict - when inconsistent demands are made on the role incumbent by one or more



role-senders; (ii) inter-role conflict - when a person holds two or more positions simultaneously; (iii) intra-sender conflict - when the availability of time, resources, and capabilities of the individual are incongruent with the role-behaviour expected and (iv) person-role conflict - when the role incumbent's internal standards or values and the defined role-behaviour are incompatible.

Role-ambiguity (Lyons, 1971) may result if position incumbents lack adequate role-relevant information as when information is restricted or when role-expectations are not clearly defined. Rizzo, House and Lirtzman (1970) argued that role-ambiguity was related to the predictability of responses to one's behaviour and the clarity of behavioural requirements or expectations.

Role-conflict and ambiguity may occur in two ways. In the first case it may occur as a property of the social structure where, in fact, the sent roles from role-set members exert pressures for various mutually exclusive behaviours on the part of the focal person. Role-ambiguity exists where the sent role-expectations lack sufficient clarity to be translated into behaviour by the focal person. The second variety of role-conflict occurs at the perceptual level and may or may not correspond with an actual state of affairs. Thus the focal person may not perceive conflict when it actually exists or he may perceive it when it does not exist or he may perceive it where it does indeed exist.

Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964) hypothesized that the degree of structural and perceived role-conflict varies as a function of several enduring organizational and personal characteristics. For example, organizational positions vary in their vulnerability to conflicting expectations. Typically,

the less structured and explicit the job requirement the closer the position is to the boundary of the organization, and the larger the number of bosses, subordinates, and equals associated with a given position, the greater is the likelihood that role-conflict will vary with such personalistic dispositions as needs for recognition, tolerance of ambiguity, neurotic achievement, or real achievement.

The theories and data of Kahn et al. (1964) and the Gross et al. (1958) study have led to a serious challenge of many old and static notions of organizational behaviour. These researchers have demonstrated crucial functions of personalistic dispositions as mediators between formal system requirements and individual outcomes. In other words, neither can stand alone as a comprehensive explanation of human behaviour in organizations. Kahn et al. clearly show that the organizational locus of emotional maladjustment can occur anywhere in an organization and is not necessarily restricted to unskilled or low-level workers. Employee activities apparently depend on the nature of the organization, the nature of the job and the nature of the person.

### 2.3 Norms and values

Norms refer to the expected behaviour required by a group system and have an "ought" or "must" quality. Katz and Kahn (1978) use the terms "norms" and "values" to refer to the "common beliefs of an evaluative type which constitute a coherent inter-related syndrome" (p.385).

That the operator of a drill press should get blank stock from the man to his left, should drill holes in 240 pieces of such stock each hour, and should put the completed pieces on a moving belt at his right, are

examples of role-requirements. Norms reinforce the role-requirements. The statement that all members of the organization shall follow to the letter the work instructions of their superiors or be penalized for insubordination is a norm.

Roles, norms and values differ also with regard to degree of abstraction. There are relatively few problems concerning understanding what the role-requirements are in most systems because of their specificity. Though the norms are often verbalized and sanction the role-expectations, there are aspects of norms which are stated in sufficiently general terms as to lead to varying interpretations.

Roles, norms and values thus differ both with regard to generality and with regard to the type of justification mobilised to sanction behaviour. At the level of role-behaviour it is simply a matter of expectancy about task performance; at the level of norms it is a matter of following the legitimate requirements of the system; at the level of values it is a matter of realising higher moral demands.

Roles, norms and values thus furnish three inter-related bases for the integration of social systems:

(i) People are tied together because of the functional, interdependence of the roles they play... because the requirements of different roles are inter-related, people who perform them are bound together in interaction and, as a result of this interaction achieve a degree of integration; (ii) the normative requirements for these roles add an additional cohesive element; for example, the worker not only plays his part in the interdependent chain of activities but he accepts the norms about doing a satisfactory job, and (iii) finally the values centering about the objectives of the system furnish another source for integration (Katz & Kahn, 1978, p.44).

Organizations have an elaborate formal role pattern in which the division of labour results in a functional specificity of roles.

The person in a social system who plays a role is subject to the demands of that role when acting in many of the ways he does.

Norms are the general expectations of a demand character for all role incumbents of a system or sub-system. Values are the more generalized ideological justifications and aspirations (Katz & Kahn, 1978, p.43).

#### 2.4 Perception

The world in which one functions is a spatial world containing many different objects, each with a variety of attributes. As a vast amount of experimentation has shown, these perceptual attributes do not correspond exactly with the physical dimensions and properties of the object. The attributes may vary widely, depending on the stimulus context in which they occur. Thus the apparent size, shape or colour of an object depend partly upon its immediate surroundings. In addition there is a tendency toward the preservation of constancy in the perceived size, shape and colour of an object despite major changes in, for example, its location and illumination.

The dynamic properties of movement and change give life to the static world of objects. Joining these influences brings one closer to the living realities of the perceived worlds which are the expressive and affective properties which one sees in objects and events. Such expressive and affective properties include sensuous and aesthetic attributes of perceived "causality" and "power".

Finally and indispensably, there is continuous interaction among the different impressions received from the

various senses which leads to a unified perceptual experience of objects and events.

The first step in the study of perception is to describe technically the immediate experience of the physical world in which one lives. This kind of description of one's immediate experience is known as phenomenology.

#### 2.4.1 The perceptual process

Hastorf, Schneider and Polefka (1970) attempt to answer the question: How does a human being create a coherent perceptual world out of chaotic physical impingements? They summarize the major findings on perception as follows:

1. The world of experience has structure.
2. The world of experience has stability.
3. The world of experience is meaningful.

(pp.4 - 9)

##### 2.4.1.1 Structure

The process whereby we gain knowledge of others is a complex one, as are the stimuli themselves. It is not surprising, therefore, that psychologists have concentrated their efforts on exploring less complex phenomena such as perception of size, shape and distance.

In the initial stages of investigation of perceptual phenomena the focus was on defining the nature of the physical stimuli which directly cause experience. In time the search was extended to the more subtle exploration of the role played by the perceiver himself in determining his experiences. In addition to his unique sensory nervous system, his past experience and motivational state were seen to

have an impact on how these stimuli were processed. Contemporary research on perception emphasizes the joint contributions of the physical stimulus and of the individual to his knowledge of the world. Hastorf et al. point out that a number of philosophers and psychologists have conceived of the translation process by the sensory apparatus in perception as an essentially passive one, completely determined by the physical proportion of the stimulus and by the structure of the receptors and sensory nervous system. Protagonists of this view point conceive of our sensory apparatus as working somewhat like a high speed translation device. Basically physical impingements are verified and the proper experience attribute is read out. The popularity of the passive recording view of perception may be ascribed to the immediacy of our experience.

Our experiences are immediate and they feel direct. These feelings led to the belief that the translation process must be automatic and built-in (Hastorf, Schneider & Polefka, 1970, p.4).

The main argument against this position stems from the fact that our experience of the world is highly selective. From a vast number of impinging stimuli we are aware only of certain objects and certain attributes of the objects. Experiments with the figure/ground phenomenon illustrate this very well as does the work done by Broadbent (1958) - the "filter theory" of perception.

The ideas of perceptual filtering, summation, interpretation and structuring have been put forward by a number of theorists including Boulding (1956),

James and Jones (1974), Mahoney (1977), and Hastorf et al (1970).

When analysing the perception of objects, we find that the stimuli produced by objects vary as a function of the conditions under which they are perceived. This is also true of people as stimuli. A further complicating factor in person perception is, however, that behaviour is dynamic rather than static. It is ever-changing and must be carved up into units in order that we may define the stimulus. One of the major ways in which we categorize our ongoing behaviour into distinct units is by taking into account behavioural effects. The individual does something and we observe its effect. In essence, the first level of coding in person perception consists of grouping together acts and effects to create manageable perceptual units.

Jones and Young (1972) conceive of social structure in the following terms:

Our concept of interpersonal perception implies that each individual in a social field has an internal representation of the other members in the field, with the individual positioned somewhere in the representation. This is his own personal "social environment" (p.108)

One of the most salient features of the person's participation in structuring his experiential world is the categorizing process. The individual extracts stimuli from the world and forces them into a set of categories. The categories which one uses are derived from one's past history and are dependent on language and cultural background.

Ittelson, Proshansky, Rivlin and Winkel (1974) have suggested that the individual organizes specific perceptions of the environment into a cognitive map that guides future predictions and behaviour.

#### 2.4.1.2 Stability

One's world of experience also demonstrates properties of stability. There is a certain "constancy" aspect to one's experience. Irrespective of marked changes in proximal stimuli, one experiences the phenomena of the world in a stable way. One processes incoming information to produce stability in one's world of experience. One seeks invariance by perceiving as constant those aspects of the physical world which are most enduring (for example, size, shape and colour) even though information one has about objects may change markedly.

A person moving about in a room is perceived to remain the same height to the perceiver although the height of the person's image on the retina varies. Some form of "modification" occurs between the stimulus and the final perception. This modification depends on the ability of the individual to reduce the amount of variance which exists between the "real" and "known" and is influenced by factors such as distance and incident illumination.

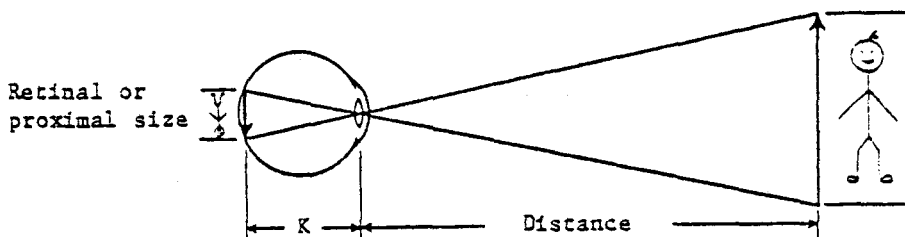


Figure 2.2

Size constancy in perception of an object



The following equation represents the process and relationships involved in the above diagram:

$$\text{Proximal size} = k \times \frac{\text{Distal size}}{\text{Distance}}$$

(Hastorf et al. 1970, p.7)

Considerable amounts of information are required in applying relationships such as the above: for example, the physical size of the object, distance, and illumination.

It would appear that processes analogous to those involved in the constancies of perception are involved in one's experience of other people. We search to perceive the invariant properties of other people.

In perceiving attributes of another person, we focus not on his behavior, which is ever changing, but on more invariant characteristics, namely, his intents and purposes. Since these invariant properties cannot be perceived directly, our search for invariance is centered on discovering functional relationships between behavior-effect sequences, which are observable and intentions which are not (Hastorf et al., 1970, p.13).

The scientist searches for invariance in order to understand and to predict the world. Perceivers also seek to understand and to predict the world in order that they may behave in it to their advantage. The perceptual act can be said to generate a prediction that one can use as a basis for action. The goal in both cases is predictability of the environment and the means to the goal is the specification of causal relationships.

One property of the organism, as an information processor, is that he possesses a linguistic coding system which possesses a set of implicative relationships. The impinging stimuli provide the raw material; the organism, with the aid of language, produces the meaning. The organism exists in time. He has a past and he anticipates the future. Past experience, language, and present motivational state or goals for the future influence one's perceptions of the present. One's past learning has a significant influence on perception, but it always operates within a framework of purposive activity. The rules one applies are derived from experience and are selected by the purposes one is trying to accomplish.

#### 2.4.1.3 Meaning

Meaning exists or is facilitated when structure and stability occur. One tends to perceive persons as causal agents with intentions and it is on perception of others' intentionality that one is led to organize the behaviour of others into "intent-act-effect" segments which form perceptual units (Hastorf et al. 1970, p.11). Meaning is also derived from the fact that other people are similar to each other and also to one's self.

A behaviour is familiar not only in that one has seen it before but also in that it implies other behaviours. Implicit personality theories, the assumed correlations between traits, are generalizations from behaviour one may have observed in one's self and a few other persons. Once one has acquired these theories, one can then apply them as a general rule. The process is identical to that which produces group stereotypes.

One's impression of another person is also a form of stereotype. One abstracts certain aspects of this behaviour, organizes them around certain dispositions, and then develops a picture of the person. This process permits the development of meaning in one's experience of other persons. It can also restrict one's awareness of some of another person's behaviour. Group and individual stereotypes create meaning and stability. They may, however, do so at the risk of inaccuracy.

Jones and Thibaut (1958) point out that the perceiver in any social situation will act in such a way as to reduce the need for information to sustain interaction. The perceiver adopts "simplifying strategies" in his interactions with others. They maintain that these strategies are in the service of cognitive and emotional economy.

Attneave (1954) puts forward the point that a major function of the perceptual machinery is to describe or encode incoming information in a form more economical than that in which it impinges on the receptors.

The particular semantic framework in terms of which an individual structures his inferences about interpersonal events is obviously a crucial and suitable focus for detailed empirical study.

#### 2.4.2 Person perception

Analysis will reveal that person objects differ from other objects in an individual's field and are especially important in determining

behaviour because they have among other characteristics, the properties of mobility, capriciousness, and unpredictability; because they are perceived to have power qualities - to provide rewards and threaten punishment; because they are perceived as sensitive and reciprocally reactive (Krech & Crutchfield, 1948).

Dornbusch, Hastorf, Richardson, Muzzy and Vreeland (1965) in a study of inter-personal perception found that the dimensions used depended much more on who was perceiving than on who was being perceived.

Freedman, Sears and Carlsmith (1978) point out that "each of us carries around some theory of personality that helps us form coherent impressions of other people" (p.91). They further state that sometimes this "theory" is rather commonly shared, for example, a warm person is also generous. "But it may also be quite unique to the specific perceiver" (p.92) as in the Dornbusch study quoted above or in terms of Kelly's (1955) personal construct theory.

Bruner and Tagiuri (1954) have reviewed the earlier studies relating to person perception and have raised a number of pertinent questions about the way in which one organizes one's judgement of other people. They conceive of individuals' expectancies that certain traits go together within other people in terms of the subjects' "naive, implicit theories of personality" (p.649). Following Bruner and Tagiuri's review and the paper by Cronbach (1955), it has become customary to describe the kinds of perceptual inferences revealed by Asch's (1946) experiments in terms of a subject's implicit personality theory - his expectancies about the way in which characteristics are inter-related within other people. Sarbin, Taft and Bailey (1960)

have discussed this in terms of a "perceived postulate system" (p.20).

Tagiuri (1965) points out that person perception is essentially different in that the similarity between perceived and perceiver is greater than in any other instance:

Banal as this may seem, it has far reaching consequences. The most obvious one of these is that the perceiver is probably maximally inclined and able to use his own experience in perceiving or judging or interfering in another's state or intentions. ...Whatever it is called, it is critical in the sense that the perceiver's repertory of categorising responses is somehow limited by his own personal or vicarious experience as a person (p.xi).

It is interesting to compare Tagiuri's use of the phrase "repertory of categorising responses" with Kelly's (1955) personal construct theory.

In dealing with person perception, we are concerned with it as it occurs in the layman as a process affecting ordinary human interaction, and not with the person as an object to be diagnosed by the expert. We are interested, as Heider puts it, in "naive psychology" rather than in psycho-diagnosis (p.xii).

The stimuli in person perception have various levels of integration, from simple physical variables (for example, size, speed, frequency), to complex configurations. The layman uses a kind of shorthand for particular event packages. He may culturally "inherit" the integration such as through language; hence it is very difficult for him to be "self-conscious" about component processes.

According to Tagiuri the perceiver is selectively tuned to perceive certain events in preference to certain others; and when the task is ambiguous enough, as complex events can often be, he will select and interpret the evidence accordingly.

#### 2.4.3 Role-perception

When one discovers that a person is a union leader, a student activist or a social scientist, one's frame of reference for these types of roles immediately calls up an entire network of expectations that may be automatically applied as representing characteristics of the person.

One may even go to the extreme of ignoring or distorting information about the person which does not fit into one's personal frame of reference. "...We mentally force the individual into one of our categories because of our mind's inability to handle an infinite number of images. As a result, we may miss much of who the person is ..." (Hellriegel & Slocum, 1974, p.261).

The perception of roles is an organized response of a person to stimuli in a social context (Sarbin, 1969). Role perception may be thought of as a sequence of behaviours in which the perceptual response is the first part of a social act : the silent naming or locating the position of the other from observed action or inferred qualities which serves to locate the position of the self. The second part of the social response is the motoric response, the role enactment in which the actor performs actions appropriate to his location of the positions of self and other.

McDavid and Harari (1968) define perceived role as

"the perception of behavior associated with a particular position in a social organization" (p.268).

The building blocks of role perception, of course, are the overt acts of others. These acts may be defined as everything the other does. This includes his gross skeletal movements, his verbal behaviour, and what he wears.

The term perceived role is defined as "the perception of behavior associated with a particular position in a social organization" (McDavid & Harari 1968, p.268).

A perceived role is the stabilized perception of a group member's behaviour, as perceived either by himself or by others within the group.

A number of researchers have found that work environment perceptions differ across roles and organizational positions (Adams, Laker & Hulin, 1977; Johnston, 1974; Stone & Porter, 1975).

Newman (1975) has concluded that different roles are subject to different experiences and that positional differences are more important than personal characteristics in the development of an individual's perceptual-cognitive map of the organizational situation.

When a social system ceases to function there is no longer an identifiable structure. It is difficult for us to view social systems as structures of events because of our needs for more concrete and simple ways of conceptualising the world. Hence we identify the buildings, the technological equipment and the people

they contain, as the structure of the organization.

Weick (1969) maintains that in the process of organizing, all organizations attempt to stabilise themselves by removing uncertainty from the environment. This is done through the perceptions of the members of the organization. The perception of salient features in the environment "create" the environment to which the organization must adapt.

The removal of uncertainty from this "created environment" is viewed as a two-stage process. Firstly, the uncertainty must be identified. Something that is unknown or unperceived cannot be dealt with. The second step is actually to remove the uncertainty. This is done by application of three organizational processes : enactment, selection and retention. The process of enactment creates the information with which the organization must deal. The important distinction here again is that the human being creates the environment to which the system then adapts. This point is important, obviously, because the "real environment" and the enacted or perceived environment may be dissimilar, but organizations react to the enacted environment.

#### 2.4.4 Perception and personal construct theory

Personal construct theory is based on the assumption that all men may be thought of as "scientists" in the sense that each is concerned with the prediction and control of his environment. Each individual develops his own personal repertoire of constructs by means of which he structures (interprets, conceptualises) his world and tries to anticipate events. According to Bannister (1962) these constructs may be thought of as the elements of a system by means



of which the individual codifies his experience.  
Bannister (1962) continues:

"Implicit in the theory is the notion that an individual does not respond to the "real" situation x (whatever real might mean) but to situation x as he sees it. In turn his interpretation of situation x will be a function of his current construing system" (p.104).

This viewpoint can be directly related to the phenomenological view (that man reacts to his world in terms of his unique perception thereof) and to action theory. One of the major propositions of action theory is that explanations of human actions must take cognizance of the meanings which those concerned assign to their acts: "... the manner in which the everyday world is socially constructed yet perceived as real and routine" (Silverman, 1970, p.127).

According to Parsons (1951), action occurs not as a response to an observable stimulus but as a product of a system of expectations arising out of the actor's past experiences and defining his participation of the probable reaction of others to his act. The action frame of reference argues that man is constrained by the way in which he socially constructs his reality. "On the one hand, it seems, society makes man, or on the other, man makes society" (Silverman, 1970, p.141).

## CHAPTER 3

### IMPLICIT PERSONALITY THEORY

A theory of organization can be no better than the assumptions it makes about human personality. (Lichtman & Hunt, 1971, p.271).

#### 3.1 Introduction

One forms impressions of others even on making brief observations of them or on hearing a brief description of some of their characteristics. One's impressions are verbalized in terms of traits such as helpful, submissive, arrogant, friendly. These impressions are immediate and one is unaware of the processes involved in inferences about others. These impressions are meaningful and organized; one classifies a person according to his behavioural tendencies or traits. One knows the person in the sense of being aware of his/her traits and being prepared to predict other traits or behavioural tendencies which one has not observed. Though the individual is unique he shares certain combinations of qualities with other individuals one has known.

#### 3.2. Implicit personality theory

Bruner and Tagiuri (1954) introduced the term "naive, implicit personality theory" (p.649) to explain the phenomenon that perceivers assume relations among attributes of people. The "theory" was characterized as implicit because a person's trait categories are inferred from his descriptions and expectations about individuals and groups rather than from his statements as a formal theory. It was considered unlikely by Bruner and Tagiuri that an individual could make many of his categories and beliefs explicit or could organize the basic elements into a formal and parsimoniously stated theory of personality. The word "naive" also subsequently termed "common sense" or "lay" was used to distinguish such theories

from formal theories of personality.

The individual's implicit personality theory assumes central importance in Kelly's (1955) theory of personality. According to Kelly, the process of social learning involves generating personal constructs which serve as dimensions along which others are categorized. The individual and his social world are revealed in the way he describes others with reference to these personal constructs. The covariation among personal constructs is one manifestation of the individual's organization of his social world.

The psychological phenomena referred to by implicit personality theorists are also of central interest to personal construct theorists. Although the range of personal construct theory is not limited to interpersonal perception, much of the explication of the theory as well as the actual empirical work is in terms of how a person views himself and others as psychological beings.

Two primary areas of study may be distinguished in the notion of implicit personality theory. On the one hand there are researchers who see person perception and particularly impression formation as being very much like concept formation, (for example, Bruner, Shapiro & Tagiuri, 1958, and Wishner, 1960), and on the other hand researchers who have been primarily concerned with an analysis of linguistic factors in judgement, (for example, D'Andrade, 1965, and Osgood, 1962).

Thorndike (1920) coined the term "halo effect" to describe the constant error observed in raters' perceptions of other people which resulted in spuriously high intercorrelations between ratings on various traits. Newcombe (1931) referred to "logical error" and Asch (1946) referred to the concept of "centrality". Furthermore, quite similar ideas were being developed about the same time by Cronbach (1955), Jones (1954), Steiner (1954) and Kelly (1955). Subsequently Hays

(1958) "trait inference, Bruner, Shapiro and Tagiuri (1958) "causal texture" and Berman and Kenny (1976) "correlation bias", have added to knowledge in the area.

The common linkage between these concepts is the assumption that each individual, in forming impressions of others, has expectations of certain traits going together. Bruner and Tagiuri (1954) point out:

Study of the inferential relations between attributes of personality is necessary if we are to understand common sense personality theory and the way in which certain forms of knowledge about another person come to influence drastically the total impression formed (p.649).

Early investigators viewed trait intercorrelations as an undesirable social perceptual bias that should be eliminated from psychological studies. They neglected the possibility that these assumed trait intercorrelations could be of functional value for the individual in enabling him to organize his social world. Thus, on the basis of the knowledge that another person possesses one characteristic, the individual can infer the presence of other characteristics. Since information about other people is limited, trait intercorrelations permit the individual to predict and anticipate other people's behaviour. An alternative explanation may be provided by examining the work of Broadbent (1958), Bruner, Goodnow and Austin (1956), and Tolman (1948).

What is involved when one person forms an impression of another? Events that had previously been termed errors or distortions of accuracy are now looked at as important underlying processes that must be understood in their own right.

Since ratings of other people are used extensively in behavioural and educational research and practice, not to

mention letters of recommendation and job performance, an understanding of the phenomenon is essential. One cannot simply disregard rating biases.

Asch (1946) suggested two general models of impression formation. A simple additive model predicts that the final impression is based on the sum of the impressions of the individual traits possessed by the stimulus person. A variant of the same model suggests that the quality of the final impression also affects the quality of each trait. For example, if the final impression is favourable, each trait will also tend to be seen as favourable. Asch preferred a second model which states that traits are immediately organized to form a whole or Gestalt. Thus each trait affects each of the others and the final impression is a dynamic one, not easily predictable from the individual traits taken separately. The final impression is more than the sum of its parts.

### 3.2.1 Research findings

Thorndike (1920) found that when flight commanders rated aviation cadets, intelligence correlated ,51 with physique, ,58 with leadership, and ,64 with character. Thorndike believed that these correlations were all higher than reality and too similar because intelligence and character and intelligence and leadership should give about three times as close a relationship as intelligence and physique. Newcomb (1931) found that when counsellors rated boys at a summer camp on 26 behavioural traits the mean intercorrelation was ,49 whereas direct behavioural observation on the same traits yielded a mean of ,14. Newcombe concluded that:

The close relation between traits which is evident in the ratings may, therefore, be presumed to spring from logical presuppositions in the minds of the raters, rather than from actual behaviors (p.228).

Dornbusch, Hastorf, Richardson, Muzzy and Vreeland, (1965) in a study of children in a summer camp, found that the dimensions used in evaluating others depended much more on who was perceiving than on who was being perceived.

Asch (1946) asked individuals to make inferences about others on the basis of several descriptive traits. He found that traits were combined in consistent ways, and that certain traits were central in determining one's impression of others; they seemed to bear a large responsibility for organizing the impression his subjects had formed. Analysis of the data indicated that favourable traits were assigned to "warm" persons and unfavourable traits were assigned to "cold" persons. Similar research was conducted by Kelley (1950).

Results of Mensch and Wishner's (1947) replication of Asch's study, using a larger and more representative group of judges, were essentially in agreement with those of Asch.

Wishner, (1960) on the basis of his findings, however, disputed Asch's Gestalt interpretation of impression formation and offered instead an atomistic model.

In a critical analysis of Asch's experimental procedure, Luchins (1948) pointed out the artificiality of the situation stating that:

Neither experimentally nor empirically, was the transition made from his experimental situations to life situations, from trait names to human actions, nowhere in the report was there shown the relevancy of the experimental procedures to more natural judgements (p.319).

Cogill (1975) in a study of assessment centres demonstrated the relevance in a field setting by showing that there was a high degree of intercorrelation between the dimensions rated in an assessment centre. In a 26 x 26 matrix of correlations, 314 were found to be significant whereas, on the basis of chance, one would expect only 6 to have occurred. These trends emerged even though the raters on these assessment centres had undergone extensive training in behavioural science rating techniques and had been exposed to theory concerning the properties of the normal curve and the distribution of abilities. Similar results were found by Lever (1976) in a replication of Cogill's study. Figure 3.1 below gives the distribution of correlations found in the Cogill study.

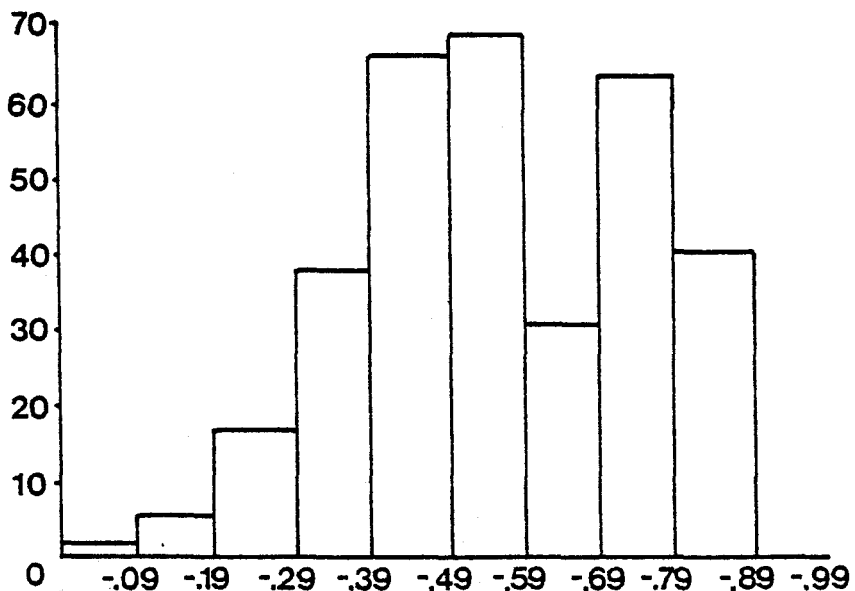


Figure 3.1

Distribution of correlation coefficients in assessment centre ratings.

Bruner, Shapiro and Tagiuri (1958) were specifically interested in the inferences subjects would draw from knowing a stimulus person is intelligent and independent, and considerate or inconsiderate. For example, given that intelligent people are seen as clever, efficient, and not submissive and inconsiderate and unintelligent people are thought to be aggressive, boastful, and discourteous, what could one predict about an intelligent, inconsiderate person? Bruner et al were able to show that inferences drawn from double traits are predictable from knowledge of the inference drawn from individual traits. Intelligent people were seen to be as moderately aggressive and unintelligent people as highly aggressive; an intelligent inconsiderate person is also perceived as aggressive. What occurs when the stimulus traits conflict, for example, what is an intelligent inconsiderate person? He is seen to be somewhat responsible and this finding turns out to be predictable on the basis of the strength with which each stimulus trait elicits its inference. In this case, intelligence elicits responsibility more strongly than lack of consideration elicits irresponsibility.

A number of studies have shown that groups of raters differ in the magnitude and direction of the associations they implicitly assume among traits. These differences among raters seem to go far beyond any identifiable stimuli coming from the persons being judged and seem to be attributable to differences in the raters' implicit personality theories (Gage & Cronbach, 1955).

Norman (1963) and Passini and Norman (1966) conducted a series of studies which had far-reaching implications. In the earlier study done by Norman on peer ratings it was observed that the numbers and kinds of dimensions of judgement were very similar for



subjects who had lived together for three years in a fraternity and for those who had had prolonged and intimate contact. It was Norman's initial view that he had isolated some basic dimensions of personality. Passini and Norman (1966), however, raised the possibility that those results could be reflecting perceptual tendencies of the raters instead of real dimensions of the stimulus persons' personalities. They asked subjects to rate people they didn't know but who were in the same room with them and the ratings used were highly similar to those made by subjects in the earlier Norman (1963) study. More recently Hakel (1969) has found similar results using the Bruner et al (1958) trait implication procedure. Passini and Norman (1966) argued that since the same dimensions of judgement seem to arise whether the perceivers know the stimulus person or not, it is reasonable to argue that the dimensions of perception are implicit in the perceiver. This research supports the contention in the realm of person perception (as was shown for physical object perception) that the perceiver plays a major role in organizing his perceptual world.

Norman (1963) is primarily interested in how the perceiver organizes his perceptions of others, and his research says something about the way culture socializes people to perceive others. It is not implied from this research that implicit personality theory is used in every situation by every individual for all possible traits. The generalized implicit personality theory is an abstraction of many individuals' theories and this theory may not be used completely by any one perceiver. Some perceivers may have theories which vary somewhat from the general theory.

One not only has implicit personality theories; one also has well-formulated implicit group personality theories or stereotypes. Research in stereotyping has an obvious relationship to implicit personality theory. Hastorf, Schneider and Polefka (1970) point out that stereotyping is a type of implicit personality theory and that race can be viewed as a central trait in stereotyping. Brigham (1971) has reviewed the literature in this field and has concluded that race is a powerful cue in trait attribution.

### 3.3 Traits and behaviour

In most studies of implicit personality theory use has been made of traits. This may be largely an historical accident resulting from the importance of traits in personality theory and personality assessment research and from the fact that much of the early research in the field was stimulated by Asch's impression-formation research where traits had been used merely as a convenience.

Schneider (1973) points out that we have "little or no hard evidence on what the natural units of person cognition are" (p.306). He also maintains that we have no evidence to demonstrate whether and when perceivers feel comfortable with personality traits as opposed to more behavioural units. Schneider makes a distinction between behaviour, trait language and typology by describing someone as "not being able to look another in the eye", "he's shy", and "he's introverted", respectively. He argues that as long as personality research provides perceivers with categories of explanation it can never answer the question of which categories are "naturally" used by perceivers.

There have been few studies on the relationship between behaviours and traits. The primary concern of attribution research (Hastorf, Schneider and Polefka 1970) has been with conditions which allow one to separate situational and personal causality, but there may simply be behaviours which are thought to be "revealing" in and of themselves. Nail biting implies nervousness for many perceivers. Psycho-analytical personality theorists have suggested classes of behaviour which ought to imply certain broad personality syndromes. There has been little research, however, into the relatively stable inferential relationships between behaviour and traits.

### 3.4 Personal construct theory

Kelly (1955) developed a theory of personality which is unique among personality theories. His theory may be claimed to be the most psychological of all theories in that it is almost entirely cognitive. Although, in his theory, he pays practically no attention to learning, emotions, motivation needs or behaviour, all of them are encompassed and subsumed as aspects or elements of the total personality controlled by the constructs which serve as dimensions along which others are categorized. Kelly held the following viewpoint of theory:

A theory may be considered a way of binding together a multitude of facts so that one may comprehend them all at once. When the theory enables us to make reasonably precise predictions, one may call it scientific ... or anticipation of daily events, while not scientifically precise, nevertheless surrounds our lives with an aura of meaning ... A theory provides a basis for an active approach to life, not merely a comfortable armchair from which to contemplate its vicissitudes with detached complaisance. (1955, pp.18-19).

It should be noted that Levy (1970) makes a strong case against the term "theories of personality", on the grounds

that what we currently call theories of personality are too loosely structured to qualify as theories and that theories of personality are unlikely ever to be achieved because of the extraordinarily wide range of phenomena encompassed by the term. He believes that it is possible to develop theories about different aspects of personality, "ways of thinking about human behavior that are the basis for the development of a variety of methods of scientific research into these phenomena and theories about them" (Levy, 1970, p.89).

Bruner (1956) referred to Kelly's work as the greatest single contribution to the theory of personality functioning of the decade ending in 1958. For Kelly, the person is only constituted in relation to others: "constructs are available through interaction with others and obtain their meaning in the context of that interaction as well as through their more general and socially determined presuppositions" (Stringer & Bannister, 1979, p.xiv).

Kelly's use of the term "to construe" means to interpret, to understand, to deduce or to explain. Personal constructs are an individual's conclusions about or interpretations of life. Kelly developed the view that life is not so much a matter of objective events as it is of what one makes of those events.

Construing is a social psychological act both through its necessary reliance on widely shared understandings and through its power to modify relations. If users of the repertory grid have sometimes treated the interpretation of constructs as problematic ("what do his constructs really mean?") it has been because they have failed to appreciate these points (Stringer & Bannister, 1979).

A key assumption held by Kelly was that man is forward-looking and proceeds in an anticipatory mode. Conversation

(of which construct elicitation is a highly formalized example) can be considered as anticipatory talking and listening. An individual's contribution to the conversation is both in anticipation of the other's reaction to what has been said and in anticipation of what will thereby be revealed of the other's construct system. If each is mutually reinforcing (Kelly's definition of social psychological process) the two forms of anticipation are interdependent. The succession of anticipation carries forward the evolving relationship.

According to Kelly (1955), the formation of an impression of an individual's "personality" is not simply a matter of characterizing his or her behaviour on the basis of one's own personal constructs. It also involves making inferences about the psychological processes of the other. Kelly's sociality corollary asserts that "to the extent that one person construes the construction processes of another he may play a role in a social process involving the other" (Kelly, 1970, p.22).

Kelly put forward the theory that an individual's behaviour develops out of his construction and anticipation of events. He proposes a formal statement of his theory in terms of a fundamental postulate and 11 corollaries; a reflection of his background training in mathematics (Kelly, 1955, pp46-60).

#### 3.4.0 Fundamental postulate :

A person's processes are psychologically channelised by the ways in which he anticipates events.

A person's processes do not operate in a chaotic or random manner but rather within a system of

flexible, modifiable, but restrictive pathways that constitute a network.

#### 3.4.1 Corollary I.

Construction corollary : a person anticipates events by construing their replications.

Every event one experiences in life makes an impression on one. One is not necessarily aware of this impression, but it does allow one to control one's future to a certain extent. Given the same or a similar experience, one is equipped to cope with it, in view of what one knows of the previous experience. All people do not react to experiences in the same way. Each person draws what he requires from the experience and uses the knowledge to anticipate future events. His impression is unique. Compare the constructs of a doctor and a traffic officer at the scene of a serious accident during rush hour.

#### 3.4.2 Corollary 2.

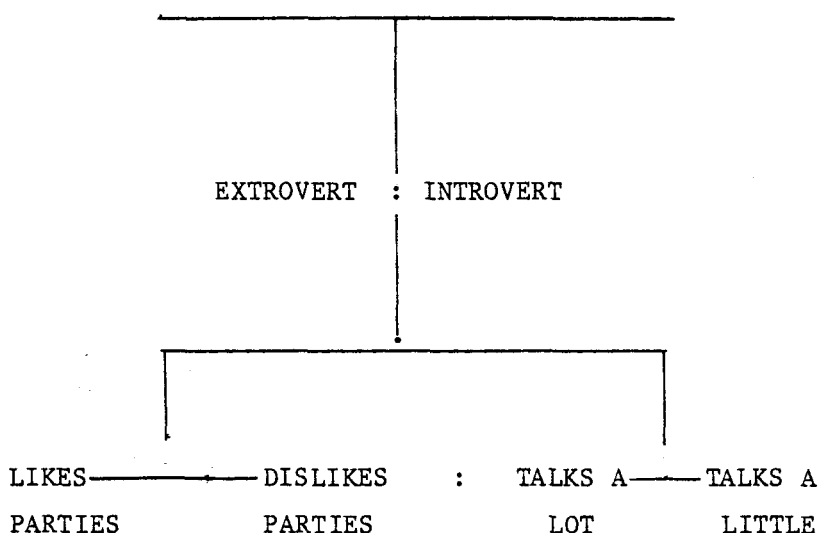
Individual corollary : persons differ from each other in their construction of events.

Each person is unique in his interpretation of events since he is uniquely associated with the event or object. The situation consists of him, as the central figure on the one hand, and the event or object being experienced on the other. Each other person who experiences the same event or object is caught up in just such a unique situation - different, because that which he draws from the experience fulfils his requirements, and his alone.

#### 3.4.3 Corollary 3.

Organization corollary : each person characteristically evolves for his convenience in anticipating events, a construction system embracing ordinal relationships between constructs.

Some constructs are more important than others. Higher order constructs may subsume lower order constructs. According to Kelly, the hierarchy is an ordinal one and there are several ways in which the same constructs may relate to each other.



Depending on the relative importance each individual attaches to each construct, a person will chose one or the other of the two alternatives available to him from the construct he sees relevant to the situation at hand in terms of his general purpose to make sense and fit into the stream of life.

#### 3.4.4 Corollary 4.

Dichotomy corollary : a person's construction system is composed of a finite number of dichotomous constructs.

Each person uses a limited set of constructs, unique to himself. Each construct consists of a pair of opposites. When one experiences someone as powerful, one contrasts powerful with weak or not powerful. Each construct involves a contrast. The construer classifies someone as powerful as a replication of something he has seen before, in so far as the stimulus person is similar to some other person. In Kelly's view, it is impossible to see a similarity without at the same time having in mind a contrast.

#### 3.4.5 Corollary 5.

Choice corollary : a person chooses for himself that alternative in a dichotomized construct through which he anticipates the greater possibility for the elaboration of his system.

According to Kelly, human beings strive to anticipate events accurately in order to predict and control their futures. A way in which we can improve our ability to anticipate events is to extend and define the construct systems of those with whom we interact. Kelly believed that people value a particular pole of a construct not the specific elements or events subsumed under that pole.

#### 3.4.6 Corollary 6.

Range corollary : a construct is convenient for the anticipation of a finite range of events only.

It is obvious that a particular construct cannot be used for every categorization. Each construct is limited in the extent to which it can be used, for example, "happy" can effectively describe a child, less effectively a book, but not a table. In order to derive meaning from a construct it is imperative to know its contrast : right-left.

#### 3.4.7 Corollary 7.

Experience corollary : a person's construction system is composed of a finite number of dichotomous constructs.

A person does not use the same set of constructs forever. He learns from experience. Where his constructs have failed him in his predictions, he can reconstrue. The process of learning leads to a constant revision of constructs, abandoning of obsolete ones, incorporation of more significant ones. Compare, for example, constructs used by a first year student with those used by the managing director of a large firm.



#### 3.4.8 Corollary 8.

Modulation corollary : the variation in a person's construct system is limited by the permeability of the constructs within whose range of convenience the variants lie.

As a person learns from experience and thus revises his constructs, this revision takes place within a framework, which uniquely belongs to each person. A construct is permeable if it can be applied to new events not yet experienced or construed within its framework.

#### 3.4.9 Corollary 9.

Fragmentation corollary : a person may successfully employ a variety of construction sub-systems which are inferentially incompatible with each other.

Persons need not be consistent over time in employing their construction systems provided the inconsistencies are understandable in light of the modulation corollary. All changes must take place within a larger system but they need not be particularly precise. For example, examine a person's definition of what constitutes an act of aggression.

#### 3.4.10 Corollary 10.

Commonality corollary : to the extent that one person employs a construction of experience which is similar to that employed by another, his processes are psychologically similar to those of the other person.

Two people are psychologically similar as a result of the way in which they construe their experiences, and not as a result of their actual experiences' being similar.

#### 3.4.11 Corollary 11

Sociality corollary : to the extent that one person construes the construction processes of another, he may play a role in a social process involving the other person.

This corollary states that one must be able to construe another's point of view in order to relate role-wise to that person. Thus Kelly proposes that each individual develops his own system of cognitive dimensions for interpreting and anticipating behaviour - his own as well as that of others.

As Schneider (1973) notes, this system of interpersonal constructs can be viewed as an implicit personality theory.

There is now ample evidence that individuals exhibit stable idiosyncratic preferences for using particular sets of constructs in characterizing themselves and other persons (Bonarius, 1965; Fager, 1954; Fjeld & Landfield, 1961; Hunt, 1951; Isaacson & Landfield, 1965; Landfield, 1965; Oswalt, 18-974).

For Kelly, the person is only constituted in relations with others. Constructs evolve through interaction with others and obtain their meaning in the context of interaction as well as through their more general and socially determined pre-suppositions. Despite the way in which the repertory grid technique has often been used, construct elicitation is not intended, in terms of the theory of personal constructs, simply as a means of access to what is private and unique to the individual; nor should it be thought of as merely tapping into the templates or verbal labels that an individual uses. Language and construing are not separable. Construct elicitation is considered to be an act of communication which is made possible by its basis in a shared reality. The

sense which can be given to forms of construing (and these may equally well be non-verbal as verbal) rests partly on general pre-suppositions which are understood by the communicating parties and partly on the meaning which is created within the particular relational context of the communication.

### 3.5 Development of construct systems

Salmon (1970) considers the increasing degree of organization, in terms of superordinancy of a system, to be one of the major developmental aspects of construct systems.

Educational growth is not the accumulation of more and more pieces of information, but the development of an increasingly complex structure for organizing and inter-relating ideas (Bannister & Fransella, 1974, p.88).

Bannister and Fransella (1974) point out that there is regrettably little evidence as to the specific processes that take place during the hierarchical development of construct systems. Little (1968) has shown that children move from using physicalistic constructs to using psychological ones. Brierley (1967) has shown that one's psychological constructs increase in complexity with age. There is, however, a great deal to be learned about the ways in which constructs change with time, in organization, in permeability, in form and in content.

Bannister (1965) has shown that people tend to tighten the relationship between constructs when they experience validation and loosen when invalidated.

Runkel and Damrin (1961) showed that teachers' college students who were at the beginning of their training were using a multiplicity of loosely related dimensions in terms of which they viewed children. Half-way through this

training, students had narrowed down their view to a simple and tight view using only a few dimensions in terms of which they viewed children. Towards the end of their training students had again loosened their sub-systems. Success as a teacher was related to the distance moved from loose-to-tight-to-loose rather than being solely one or the other.

Grids applied to subjects aged 6, 9, 13 and 17, indicate that with increasing age, more constructs are used; there is somewhat more equal elaboration of both poles of each construct and there is recognition of more shades of grey (Applebee, 1976).

The effect of training has shown that a student group, as opposed to its instructors, used more concrete description constructs such as age, sex and profession (Lifschitz, 1974).

In the youngest age groups studied so far - eight and younger - appearance and role constructs are used more often than either behaviour or personality constructs. At intermediate ages - from eight to ten - behaviour constructs are used most frequently. During puberty and early adolescence, from twelve to fifteen, the use of personality constructs increases dramatically, and by mid-adolescence, they are the most prevalent of all. Girls tend to employ more personality constructs than boys at every age surveyed in these studies. Barratt (1977, p.351) also indicates that, as children mature, their social construing becomes "more adequately descriptive, less likely to involve a personal frame of reference of greater "depth", and of increasing discriminatory potential ... (and) girls are generally precocious with respect to these transformations". Thus from this standpoint of personal construct theory, social development involves systematic transformations in both the structure and content (Bannister & Mair, 1968) of interpersonal construct systems. A progressive increase in

terms of the number of different constructs that are used to describe people, that is, complexity, is accompanied by a gradual shift of emphasis from a primary concern with appearance, social roles and behaviour to a predominant interest in personality. As Duck (1973) suggests, this process may reflect a general change from viewing others mainly in terms of "stereotypes" to a greater "individuation" and "differentiation" of them as persons.

### 3.6 Role

The concept of role has been discussed in Chapter 2. Salmon (1970) notes that there is a close parallel between Kelly's elaboration of the implications of the sociality corollary and Cameron's (1947) role-theory in that both of these approaches to the study of interpersonal relations emphasize understanding the outlooks of other persons. For instance, Cameron (1947) contends that "the less practised a person is in sharing the perspectives of others the less opportunity he will have of finding out how different from himself other persons can be" (p.167).

Skill in inferring differences between people in terms of the structure and content of these personal construct systems allows one to make a variety of distinctions between their personalities, and it may play a major role in the formation and development of role-relationships.

Landfield (1971) notes that according to Kelly:

The critical factor in the development of productive role interaction or sociality lies in the ability of one or both participants in a dyadic relationship to subsume the points of view of the other person (p.7)

### 3.7 Recent research

Thomas (1977) argues that this form of sociality depends

upon one being able to hold similar and elaborate sets of related constructs simultaneously in one's mind, comparing them, and locating common areas of reference. It is possible that the more constructs an individual is able to bring to bear on social interaction ("cognitive complexity"), the better position he is in to construe it from several different perspectives at once and to make inferences about the points of view of the other persons involved (Adams-Webber, 1969, p.706). In support of this hypothesis, Olson and Partington (1977) found evidence that:

An individual's ability to reconcile simultaneous perspectives in an interaction is directly related to the complexity of organization of the constructs by which he structured his world (p.14).

The index of "cognitive complexity" employed by Olson and Partington also correlates with accuracy in making inferences about the personal constructs of other people.

Kelly's model of interpersonal relations implies that the probability that one person will be able to understand the constructions of another, should increase with the degree of similarity between their personal construct systems. As Eiser and Stroebe (1972) note, "the commonality and sociality corollaries, taken together, predict, among other things, that individuals who are cognitively similar will be able to communicate more effectively with each other" (p.206). On the other hand, Kelly himself (1955, p.99) claims that "commonality can exist between two people who are in contact with each other without either of them being able to understand the other well enough to engage in a social process with him". Thus, according to Kelly, commonality is not a sufficient condition for sociality. He does allow, however, that "commonality between construction systems may make it

more likely that one construction system can subsume part of another" (Kelly, 1955, p.99)

It has been demonstrated by researchers in a series of recent studies (Duck, 1973, 1975, 1977; Duck and Spencer, 1972) that this is indeed the case. These researchers have found repeatedly that friends typically exhibit more similarity in terms of elicited constructs than do pairs of individuals who are not friends. Stringer and Bannister (1979, p.202), and Crockett and Meisel (1974, p.290) point out that interpersonal construct systems develop out of the perceivers' experience with other people and with socially shared interpretations of people's behaviour.

Duck (1973) puts forward his own "filter hypothesis", which implies that, as the basis of a role-relationship expands, there will be a progressive shift of interest away from factual information to a greater concern with understanding one another's psychological processes, that is, "sociality".

### 3.8 "From individuality to sociality"

Within the framework of personal construct theory, an explicit model of interpersonal relations has been derived from the Individuality, Commonality and Sociality Corollaries. Researchers, concentrating on these three principles, have shown that people tend to rely on particular constructs to interpret their social environment ("individuality") and that they can then form more definite and complex constructs. Thus, it is hardly surprising that persons choose as friends other people who employ the same constructs as themselves.

There is now considerable evidence that this form of commonality facilitates the development of role-relationship in general, that is, "sociality".

Probably the most interesting research stemming from

Kelly's theory has been the work of sociality, that is, the ability of people to play roles with respect to each other. There is in Sechrest's (1963) view, a good chance that more intensive investigation of the relationships between people and the way those relationships relate to personality construct systems would have been highly beneficial. Here is an area in which Kelly's ideas might be elaborated into spheres of group relationships and perhaps even international understanding. The Americans, for example, tend to apply the construct: "freedom - slavery" to a great many governmental actions, while Russia may view the same actions in terms of "order - chaos" (Smith 1976). Perhaps it should not be surprising that the two countries disagree so strongly on so many issues.

There has been a tendency to view personal construct psychology, if dealing with relations at all, as relevant only to dyadic interaction. According to Stringer and Bannister (1979) the attention given to the therapist-client relation is partly responsible. In addition, it is maintained that the repertory grid has often been taken as providing information about a set of dyadic relations. Although group processes have rarely been examined through personal constructs there is, in principle, no reason why they should not be. A group could be considered as a semi-connected lattice of relations, constituted through the procedure outlined above.

A collective or group construct system could be construed by an individual or a group in a manner analogous to the construing of one person by another. Equally, the process of construing would constitute the individual-group, or inter-group relation (Stringer and Bannister, 1979, p.xv).

The only valid test of whether two individuals have similar constructions of experience is for them to explore each other's constructs in detail and in depth and to agree what is shared (Thomas, 1979, p.58).



Perhaps if personal construct psychology is properly to serve the needs of social investigation a "complementality corollary" should also be added to Kelly's original system. According to Thomas (1979) it might be framed as follows:

Complementality Corollary : When people share in a common pool of events including each other, but by virtue of their position sample these events differently, their constructions of experience will develop to complement each other. This complementation will produce a social system which exhibits greater complexity of stable organization than exists in the construction of any individual contributing to it (p.66).

Thomas (1979) maintains that the complementality corollary serves to link commonality to the other social corollaries. This corollary allows the concepts of "organization and institution to be introduced into the personal construct psychology approach to social systems" (p.66).

Repertory grid techniques must be expanded to include complementality. The form of the grid must not only contain the possibility of identifying commonality between the constructions of experience, one person to another, but the sum of the grids from the members of a group should reveal system properties not contained in the grids of any one (Thomas, 1979, p.66).

The research which has been considered so far has a distinctively idiographic character in the sense that it involves eliciting personal constructs from each subject individually. This emphasis is dictated by the basic logic of the Individuality Corollary. Bonarius (1965) notes, "the research has shown convincingly that the individual prefers to express himself and to describe others by using his own

personal constructs" (p.26). This general approach to the understanding of "social perception" has not precluded the formulation of so-called "nomothetic" generalizations concerning the way in which psychological construing develops. There is now considerable evidence that, as children mature, (as mentioned on p.91), they employ progressively more "psychological" constructs in describing persons, that is, constructs which refer to personality traits and other psychological characteristics.

Researchers (Barrat, 1976, 1977; Brierley, 1967; Duck, 1975; Little, 1968; and Scarlett, Press and Brockett, 1971), have shown consistently that there is a decrease with age in the relative frequency of usage of constructs which refer to people's appearance (for example, "she is tall"), social roles (for example, "Bill fights a lot"), while there is a corresponding increase in the use of personality constructs (for example, "Mary is quite shy").

An analysis of political construing is proposed by Du Preez (1972) in his examination of the constructs used in South African parliamentary debate. He shows how, in debate in the South African parliament, parties have used superordinate constructs which are not directly relatable. The Nationalist Party has centred its reaction to particular concerns and events around the construct: "survival-non-survival" for the White race (in both cultural and physical sense). The United Party was, during its existence, largely trying to make sense of policies and proposals in terms of a "cost-effectiveness, economics" construct while others have been talking in "moral-humanitarian" terms. Du Preez shows how "the facts" for each group were determined by their modes of construction. In addition to analyzing change over a period of twenty years (for example, the Nationalist change from a "racial" to a "national" mode of construction) Du Preez has shown that there was a clash between these political groupings that cannot be resolved in a logical debating

sense. The very superordinate constructs of the debate (their constructs of "the nature of identity" occupy different "universes of discourse" (Stringer & Bannister, 1979, p.25).

## CHAPTER 4

### I M A G E

The essence of man is not an abstraction inherent in each particular individual. The real nature of man is the totality of social relations (Marx, 1964, p.68).

#### 4.1 Introduction

Image is a concept that has been used for a number of years to describe the psychological meanings attached by consumers to objects such as products, brands and companies, and by laymen to nations, organizations and countries.

The role of image in economic activities and other areas of man's interest has been discussed by Boulding (1956). Boulding theorized that the behaviour of a human being is not directed by mere knowledge and information but is the product of the images that a man perceives. He argues that we function or react, not in response to what is true, but to what we believe to be true. He asserts further that we use subjective values and knowledge to mediate between ourselves and the world around us.

The human mind can handle only a certain number of complex situations and stimuli; therefore, it attempts to over-simplify circumstances and thus abstracts only a few meanings that appear salient. Boulding uses the example of combining all of the traits of a nation into a simple cartoon character such as "John Bull" (England) or "Uncle Sam" (United States). These simple symbolic images are used to summarize a vast complexity of values and meanings. By personalizing

these symbols or objects, an avenue for interaction with them is allowed. Hence grounds are found by humans to continue to either like or to dislike these symbols in a manner similar to liking or disliking a person. Boulding believes that the concept of image is an important variable in the functioning of human behaviour:

The first proposition of this work ...is that behavior depends on the image ...the image is built up as a result of all past experience of the possessor of the image (Boulding 1956, p.6).

Images serve as screens for the selective reception of new messages, and they often control the perception and interpretation of those messages that are not completely ignored, rejected or repressed. At the same time, however, new messages sometimes change the images that the individual already holds as well as the images held in the common culture and communication system of a community.

The broader concept of image can be directly linked with Kelly's (1955) theory of personal constructs. Since man cannot handle all the incoming signals, he simplifies his perceptual world. According to Kelly, his "construction" of the social world takes place through relatively few perceptual channels or constructs. For Kelly a person is constituted only in relation to others: "constructs are available through interaction with others and obtain their meaning in the context of that interaction as well as through their more general and socially determined pre-suppositions" (Stringer & Bannister, 1979, p xiv).

There is now a large amount of evidence that individuals do have stable idiosyncratic preferences for using particular sets of constructs in characterizing themselves and other

persons (Bonarius, 1965; Fager, 1954; Fjeld & Landfield, 1961; Isaacson & Landfield, 1965; Landfield, 1965; Oswalt, 1974).

Since such processes can be shown to be operative and the mechanisms have been hypothesized to exist in the reticular activating system of the brain (Schultz, 1965), it is reasonable to assume that they play a role in determining the nature of the image which an individual has of an object, company, or a department or division within a company. If the incoming signals are filtered and integrated in some structured way it may be reasonably assumed that this process will play a role in determining the resultant image.

Image can be seen as a joint product of the characteristics of the object and the characteristics of the perceiver. One can use the same descriptive dimensions to characterize the image and the object and therefore move more readily from the nature of the object to the perception of the beholder. It thus becomes possible to integrate within the same conceptual scheme, for example, the public image of an organization and the images of the organization held by its members.

Martineau (1957) has referred to the concept of image as: "the total set of attitudes, the halo of psychological meanings, the association of feelings, the indelibly written messages over and above bare physical qualities" (p.146).

Kelman (1965) has defined an image as "the organized representation of an object in an individual's cognitive system ...it is the individual's conception of it, associated with his memories, expectations, generalized beliefs and the like" (p.24). This definition resembles Lippman's (1954) discussion of the formation of pictures in one's head, or "stereotypes" in order to impart meanings to things.

#### 4.2 Image as used in marketing

Martineau refers to the corporate image as "a kind of stereotype...oversimplification...people are continually acting toward the company on the basis of imagery - not on the basis of facts and figures" (1960, p.11).

Arons (1961) has proposed a definition of "store image" in conjunction with his study of how television viewing influences perceived "store image". He stated that image was "a complex of meanings and relationships serving to characterize the store for people ..." (p.1).

Gardner and Levy (1955), also working in the field of marketing, emphasize that an image involves more than the literal or functional meaning of an object. In one of their early statements on the subject, for example, they note that a newspaper means more to its readers than the various attributes of its production.

Furthermore, anyone can readily observe that different papers generally have what we call different personalities ... These differences appear in many ways; selection of news, handling of particular stories, choice of editorial content. Thus they represent complex systems of values and of judgements, applied to the daily process of getting out a paper (1955, p.35).

These deeper meanings ascribed to various marketing objects are often referred to as the "personality" of the object, and are best represented as the symbol of what that object represents in society. Thus, a brand name is itself considered a complex symbol representing a variety of ideas and attributes, about which there is a body of associations which it has acquired as a public object over time.

Companies spend many millions of rands (dollars) on establishing, improving and promoting their "corporate" and

brand images every year. There are many articles in marketing and management journals to testify to this fact. Other researchers who have worked in this area include Frost and Braine (1967), Polovin (1975) and Polkinghorne (1976).

#### 4.3 Image as used in the study of international relations

Kelman (1965) has attempted a socio-psychological analysis of international behaviour. He focuses, in part, upon how individuals view their own nation, other nations, international systems and the relations between these groups. The relevance of Kelman's work to this study is his emphasis on image research, using a nation as an image object and as a reference group.

Kelman uses the term "image" to refer to the organized representation of an object in an individual's cognitive system (p.24). The core of an image is regarded by Kelman to be the perceived character of the object to which it refers - the individual's conception of what this object is like. In his view, image is an inferred construct, however, rather than a mere designation of the way the object is phenomenally experienced.

Scott (1965) reviews personality factors and demographic variables that are associated with the particular content and structure of images held by individuals. He shows that by studying the ways in which national and international images fit into the personality and value structures of different individuals and how these are distributed across different subgroups of the population, it is possible to gain considerable insight into the psychological and social processes out of which such images typically develop.

Within the framework of cognitive theory Scott regards the image of a nation (or of any other object) to constitute "the totality of attributes that a person recognises (or imagines) when he contemplates that nation" (p.72).



Scott (1965) shows in his review of research in this area that xenophobic attributes tend to be associated with feelings of threat from the international environment and also with the advocacy of international policies that are competitively, rather than co-operatively, orientated. Favourable characteristics tend to be attributed to liked nations and unfavourable characteristics to disliked nations. He maintains that the relationships found reflect at least two basic kinds of psychological processes: tendencies toward cognitive balance, which involve differential perceptions and affect within the same person, concerning the various nations, objects that he recognises; and interperson differences in tendency to be favourably or unfavourably disposed toward all foreign nations.

#### 4.4 Image as used in organizational analysis

Ziller, Long, Romana and Reddy (1968) suggest that the self-concept is more accurately described as the perception of self in relation to significant others. They propose that social stimuli are screened and translated into personal meaning through crude topological mappings of the self in relation to significant others (self-other schemes). In the theory of self-other orientation it is proposed that a person develops cognitive or perceptual maps (images) while continually making social comparisons with others.

While a person's image of the world is unique to him, it contains many assumptions shared by others because of common experiences, background and purposes. In this regard, Berger and Luckman (1966) have said that "reality is socially constructed" (p.1).

Sherif and Sherif's (1966) social-psychological framework for studying intergroup relations suggests that a new member of a group acquires, in time, a conception of his place in the existing scheme of things within the group. He learns

where his group stands in relation to other groups (the "we" - "they" distinction) and how he, as a member of his own group should act towards members of other groups. Thus, by becoming a member of a group, he acquires and develops a set of images or stereotypes of other groups. These images of other groups form the basis on which he and the members of his group behave toward other groups.

Using one group as a reference group, individuals make continual comparisons and contrasts with other groups. A person's group membership helps him to establish both favourable and unfavourable images of his own group and of other groups. Such group membership also helps to define the superiority, equality or inferiority of his own group, a definition which has consequences for both orientations toward, and potential interaction with, other groups. This may be compared with Rice's Model of the organization.

The image of a company is the end result of a person's experiences, recollections and impressions of the company. Spector (1961) defines the image of a company as "the sum total of perceptions of the corporation's personality characteristics" (p.47).

A variety of factors tend to induce the development of organizational images for organizational units. These images, which tend to be shared by unit members, include such factors as common experiences, shared information, role expectations, commitments, interactions and general normative processes within any organization.

A formal organization may be seen as a complex of overlapping images developed by members of various organizational sub-units to describe their own and other units.

Dividing an organization into sub-units often results in sizeable variances in intergroup perceptions as a result of differences in information received, sub-group activities and organization-sets.

March and Simon (1958), with a particular interest in decision making, explore some of the factors in sub-group goal formation. They point out that:

- human rationality is so limited or bounded that no individual can respond to anything as complex as the total organizational environment;
- problems or sub-goals are therefore assigned to different sub-groups and internalized by the sub-group members. These sub-group members tend to ignore the goals of other sub-group's and other facets of the goals of the whole organization.

March and Simon also claim that there is a tendency for members of a sub-group to evaluate their organizational contribution only in terms of their sub-group's goals, even when these are in conflict with the overall goals of the organization.

March and Simon then identify three cognitive mechanisms which reinforce this practice of selective perception and sub-goal persistence. The first of these is located within the individual decision maker. It is the tendency of individuals to see things that are consistent with their established frame of reference, while filtering out or re-interpreting inconsistent information. The second cognitive mechanism is located within members of the sub-group where the content of in-group communication tends to generate information that is compatible with the existing sub-group perceptions. The third cognitive mechanism is in the task

environment of the sub-group. Division of labour results in selective exposure to differing task environments - a customer environment for salesmen, a banker environment for finance men.

Lawrence and Lorsch (1967) have also focused on the orientation differences among formal departments. They use an organization perspective which views the organization as an open system, continually coping with the external demands of its task environment. They assume that the environment of the organization determines the character and degree of its differentiation, and the mode of its integration. They describe the internal relationships of members of the organization as being influenced by the nature of the task being performed, by the formal relationships, rewards and controls, and by the existing ideas within the organization about how a well accepted member should behave.

According to Lawrence and Lorsch these internal factors must be integrated if the organization is to perform effectively. One of the concerns of Lawrence and Lorsch is inter-departmental differentiation. Using a cognitive approach they define differentiation as "the difference in cognitive and emotional orientation among managers in different functional departments" (p.11).

They suggest that managers in functional departments performing different activities can be expected to differ in goal, time and interpersonal orientation.

Furthermore, the formal organization structure will typically differ between departments and between organizations. Thus, it can be expected that "because members of each department develop different interests and differing points of view, they often find it difficult to reach agreement on integrated programs of action" (p.11).

The model building of Lawrence and Lorsch's (1967) involves considerable analysis of managers cognitive or perceptual views of internal organizational matters.

Cartwright and Zander (1963), in working towards a definition of groups and group membership, focused on perception from the group members' point of view; they proposed that group members have a collective perception of their unity.

Scott (1962) implied that, if people are exposed to a common environment (in this case belonging to the same organizational group), in certain respects their cognitive structures would be expected to develop similarly.

Scott used the term 'cognitive structure' to refer to the "individual's phenomenological representation of himself and the world - the set of ideas maintained by him and relatively accessible to conscious awareness" (p.87). Neisser (1967) used the term to refer to "complex organized systems of stored information" (p.286). These organized systems control processes whereby stimuli are selected, reduced, stored, recovered and used as a basis for behaviour.

The complexity component of an organizational image is the number of facets or aspects of a group that are perceived by its members. The complexity of self concerns the degree of differentiation of the self-concept or, in Lewin's terms, the number of parts composing the whole. A measure of a cognitive style closely associated with complexity is Rokeach's (1960) dogmatism scale.

Cognitive complexity-simplicity can be seen as one basic attribute of cognitive structure. Some individuals are said to perceive objects (other persons, groups or nations) simply; that is in terms of a few large, general, vaguely defined

categories. More complex perceivers view objects in terms of a large number of more precisely defined categories. Koenig and King (1964) report that cognitive simplicity is positively correlated with out-group stereotyping. Scott (1962), using nations as objects, has reported that cognitive complexity was positively related to cognitive flexibility (the ability to reorganize categories).

In referring to structural attributes of cognition, Scott uses the term "differentiation" to refer to the number of distinct cognitive elements or ideas.

In comparing cognitive and social structures, Scott suggests that the property of differentiation can be applied analogously to both systems. He further proposes that differentiation can refer to the number of distinct ideas an individual holds or to the degree of role specialization in social structures.

Other writers have also concerned themselves with differentiation and integration. Fayol (1949), Gulick (1937), Mooney and Reiley (1931), Urwick (1943) concern themselves with how best to divide the tasks of an organization and how to obtain integration. In explaining differentiation (division of labour), they emphasize dividing the organization into departments or groups on the basis of specialized knowledge. Lawrence and Lorsch, as part of a research study, define differentiation "as the state of segmentation of the organizational system into sub-systems, each of which tends to develop particular attributes in relation to the requirements posed by its external environment" (1967, p.4).

It has been shown that complexity is one of the important components of organizational images held by members of a group (Hall, Haas & Johnson, 1967).

Stagner (1956), investigated union-management relations using perceptions as a focus. He suggests that "a person's perception of issues involving union and management can be predicted with fair accuracy simply by knowing his membership in certain significant groups" (p.207).

Smith (1978) used repertory grids to evaluate the effects of training in an organizational setting.

The above writers mention other case studies of perceptual differences between such industrial groups as line and staff, sales and manufacturing, engineering and maintenance, headquarters and branch.

#### 4.5 Image and phenomenology

The phenomenological approach is valuable for the study of organizations for as, Litwin and Stringer (1968) have observed, "the realities of the organization are understood only as they are perceived by the members of the organization" (p.42).

Phenomenologists believe that an individual's apprehension of objects and events, rather than the stimuli themselves, is the most important determinant of human behaviour. This approach assumes that a person behaves on the basis of his perceptions of the world rather than because of the stimuli themselves.

"Image" is closely related to Lewin's fundamental concept of "life space", which is defined as "the totality of facts which determine the behavior of an individual at a certain moment" (Lewin, 1936, p.216).

Lewin (1936), an influential phenomenological psychologist, used topology to help explain individual behaviour. Topology has been defined as the general science of spatial relations which is based on the relationship between the "part" and the "whole".

When one speaks of an image as an organized representation of an object, one does not wish to imply that all images are consistent and well defined. The term "organized" is merely meant to convey that images have some coherent structure, that there is at least some tendency to relate different impressions of the object to each other so that they form a unified whole. In other words, the image is not just an accumulation of discrete components, but a grouping of these components into a more efficient structure. This implies that there will be some push toward consistency - among the elements that constitute the image, as well as between the cognitive and affective components. The degree of consistency of images, however, can vary widely; the representation of an object can be coherent and organized even though it contains contradictions and ambiguities.

This leads us to a further qualification. Neither the view that images have some coherent structure, nor the emphasis on the perceived character of the object, is meant to restrict definitions of images to conceptions that are clearly articulated and conscious.

Many components of an image may be the products of direct and indirect experiences that the individual cannot recall; these components may be vague and incapable of verbalization, but they may nonetheless play an important role in the individual's conception of the object and his behaviour toward it. Thus one is interested not only in the individual's verbalizations about what the object is like, but also in the conceptions of the object that are implicit in the ways in which he relates himself to it. It follows that, in the assessment of images, one would really want to supplement the individual's phenomenological descriptions of the object with observations of (or questions about) his behaviour toward the object by means of certain indirect devices. On the basis of



these one can then make further inferences about the images that govern his relationship to the object.

#### 4.6 Conclusion

It is difficult to separate the notions of attitude and image, especially since the same instruments have been used to measure both. The literature on attitude theory and measurement refers primarily to individual attitudes. For example, Krech and Crutchfield (1948) define an attitude as "an enduring organization of motivational, emotional, perceptual and cognitive processes with respect to some aspect of the individual's world" (p.152). When psychologists talk of social attitudes they refer to the tendency of individuals to respond in consistent fashion to social stimuli.

In selecting national and international images as one of the two major foci of his study Kelman's intention was not to be restrictive, to use image in a very precise way that would differentiate it sharply from such related concepts as attitude and opinion; rather, the concept has been used in a way which is broadly representative of the whole family of attitudinal variables concerned with the conception that individuals have of their own nations, of other nations, and of the international system as a whole. Directly linked to those conceptions are a variety of attitudes, opinions and beliefs, with varying degrees of generality; for example, general attitudes toward conciliation vs. belligerence in international affairs, or to national sovereignty, or international organization, and opinion on specific foreign policy issues.

Image and attitude are usually treated as intervening variables. They are considered the mental states which intervene between some external stimulus and the consumer's overt, manifest, or behavioural response.

Organizational theory has few principles upon which there is general agreement. Nevertheless, there exist certain theoretical perspectives which are useful in the building of a conceptual scheme or model for the study of organizational images. Contributions to it originate in diverse disciplines - anthropology, sociology, psychology, social psychology, political science, and economics, amongst others.

Image is an aggregate concept, to be measured somehow by combining the viewpoints of many. Meyers (1968), for example, has considered an object's public image to be measurable by averaging the attitudes of a group of people toward the object.

Image is also a relative concept. Images are not held alone in a vacuum, but take on meaning only in relation to images of other objects. Images toward objects have been measured by averaging attribute possession scores for each object, weighted by an individual's perceived utility for the attributes (Rosenberg, 1956). Thus an image of a single object presumably can be measured. On the other hand, it may be argued that images must be measured for several objects at once to obtain meaningful information. The techniques of multidimensional scaling emphasize the inter-relatedness of objects and are therefore a logical choice for the measurement of image.

## CHAPTER 5

### HYPOTHESES, DESIGN, METHODOLOGY

" ...all sciences arise as refinements,  
corrections of common sense"

(Oppenheimer, 1959, p.128).

#### 5.1 Introduction

In this chapter the roles of hypotheses in scientific research and theory building are discussed. The general research questions of this study are then outlined and the specific hypotheses which flow from these questions are formulated. The research design is discussed in detail and the way in which the design was executed is discussed under the heading "Methodology".

#### 5.2 Hypothesis generation

Hypotheses are often developed by researchers in the process of investigating a particular field or problem. These hypotheses may arise logically, either inductively or deductively, but they may equally well arise out of intuitive feelings or hunches which a researcher may have. Jung (1959) has discussed in great depth the role of the subconscious in problem-solving, indicating how, for example, dreams play a role in the problem-solving processes of the mind: Kekule solved the shape of the benzene molecule after dreaming of a snake shaped in the form of a hexagon.

Romer (1973) feels that scientific theories begin with an act of imagination. Oppenheimer in a similar vein, maintains "We may well say that all ideas that occur in common sense are

fair as starting points, not guaranteed to work, but perfectly valid as the material of the analogies with which we start" (1959, p.134).

James (1896) defines an hypothesis as "... anything that may be proposed to be one's belief" (p.465). According to James hypotheses can be classified according to the following schema:

#### Category A

This categorization involves living or dead hypotheses. A dead hypothesis might involve asking most Westerners to believe in the Mahdi - a request which "... makes no electric connection with (their) nature - it refuses to scintillate with any credibility at all" (p.462). That same hypothesis might, however, be a live hypothesis to an Arab - "it is among the mind's possibilities" (p.463). According to James the essential point is that "... deadness and liveness in an hypothesis are not intrinsic properties, but related to what the individual thinks" (p. 463).

#### Category B

The choice in this category is between "momentous" and "trivial" hypotheses. James defines trivial as that "wherein the opportunity is not unique, ...the stake insignificant, or when the decision is reversible if it later proves unwise" (p.463).

Cawood (1977) in an excellent exposition of the nature of hypotheses, proposes an extension of Category B into:

momentous - of major significance for the  
world

important - significant to a particular  
field of enquiry

interesting - with some significance to some  
researchers in a field

trivial - where even if confirmed the  
hypothesis would be of  
questionable value to other  
researchers.

If it is permissible to be prescriptive, then the requirements of any hypothesis should be that it is a living one, that it ought to be plausible and that it ought to have some connection with the researcher's interests.

An hypothesis need not be a forced option or a momentous one. Very few hypotheses are momentous in terms of making an advancement in science. Most hypotheses contribute to theory-building by way of being confirmatory. Cattell (1966) justly maintains that the role of formal hypotheses is often, in fact, magnified by text books.

Tukey (1969) points out that whilst confirmatory data-analysis is important in the hypothetic-deductive sense, one should be careful that it does not become mere sanctification.

We ought to try to calculate what will help us most to try to understand our data, and their indications. We ought not to be bound by preconceived notions - or preconceived analyses (Tukey, 1969, p.83).

Tukey puts forward a strong case for the role of exploratory data analysis:-

In exploratory data analysis there can be no substitute for flexibility, for adapting what is calculated - and, we hope, plotted - both to the needs of the situation and the clues that the data have already provided (p.90).

The hypotheses proposed in this thesis are living, since they have real meaning to the researcher's interests and they are important since, in terms of middle-range organizational theory, they apply to "limited ranges of data and consolidate segregated hypotheses which may be available for consolidation with other theories" (Weick, 1974, p.357). The hypotheses are formally derived and are meant to be confirmatory; however, a fair part of the work is also exploratory.

The hypotheses are derived from interest of the author in the perceptual categories which managers naturally use in assessing each other's performance, the structure of these categories, and the relationships which exist as a result of role-perception in organization.

### 5.3 The principal research questions

- What constructs (dimensions) do role occupants i.e. senior managers, in interaction with each other in organizations, typically use in evaluating each other as managers?
- Does the integration of such constructs occur in any meaningful way or pattern, that is, what are the cognitive structures or perceptual maps which make up the phenomenological world of organizational participants and which thereby define much of the content of the organization?
- Do the perceptions of the role-occupants in the major functions, that is, marketing, production, finance and personnel, differ in terms of the primary factor structures identified?

#### 5.4 The principal research hypotheses

Hypothesis 1 - Whatever the constructs are that managers use in the assessment of other managers, the patterning of such constructs will be simplified into relatively few (2 or 3) channels or filters. A manager's perceptual construction of the interactive role-set (his cognitive map) will display patterning or structure which simplifies the total repertoire of evaluative dimensions available to him.

Hypothesis 2 - The factor structure which emerges from the analysis of these constructs will display characteristics of potency, empathy and managerial competence.

Hypothesis 3 - The perception of managers in the functions marketing, production, finance and personnel will be relatively consistent in the companies of a particular industrial sector in terms of the level of decision-making and in terms of the strategic contingencies affecting resources at a particular point in time.

Hypothesis 4 - In terms of the "strategic contingencies theory" (Pfeffer & Salancik, 1978) of power-acquisition the staff function of personnel management will be perceived markedly differently from the other functions. Personnel managers in the firms will be perceived to be relatively low on the potency dimension but relatively high on the empathy dimension.

Hypothesis 5 - The staff function of accounting, particularly at the D-band of decision-making (see 5.5.1)

will also be perceived to have a weaker power-base than the other functions at equivalent levels.

Hypothesis 6 - Managers at the E-band decision-making level will display cognitively more complex patterns of perceptual structuring than those at the D-band level.

Hypothesis 7 - Finance and production managers will be perceived to be relatively high on the potency dimension, but relatively low on empathy.

Hypothesis 8 - Finance and marketing will be perceived to be relatively higher on the potency dimension than production and personnel.

## 5.5 The Research Design

In this study an attempt is made to comprehend the psychological processes by which managers, in interaction with each other perceive and organize stimuli related to the function's which they fulfill in the organizations involved.

Researchers have shown in the area of both physical and social perception that man has a general tendency to organize perceptually any stimulus field. In this thesis an attempt is made to examine the perceptual organization within a role-set of managers who are constantly in interaction with each other in an organizational setting.

It has been hypothesized that managers will simplify their perceptual world by reducing a large number of stimuli to a simple evaluative structure, as is depicted in Figure 5.1.



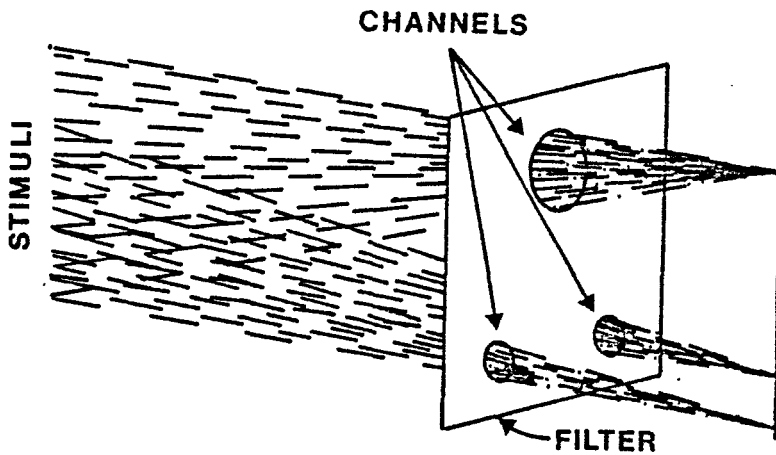


Figure 5.1  
Perceptual organization of a stimulus field

It has been hypothesized further that the evaluative dimensions utilized by managers may be identified, that some of these dimensions will be used more frequently than others and that, despite the availability of a fairly large repertoire of dimensions, the structuring of relationships among these dimensions will display some commonality or patterning (Figure 5.2).

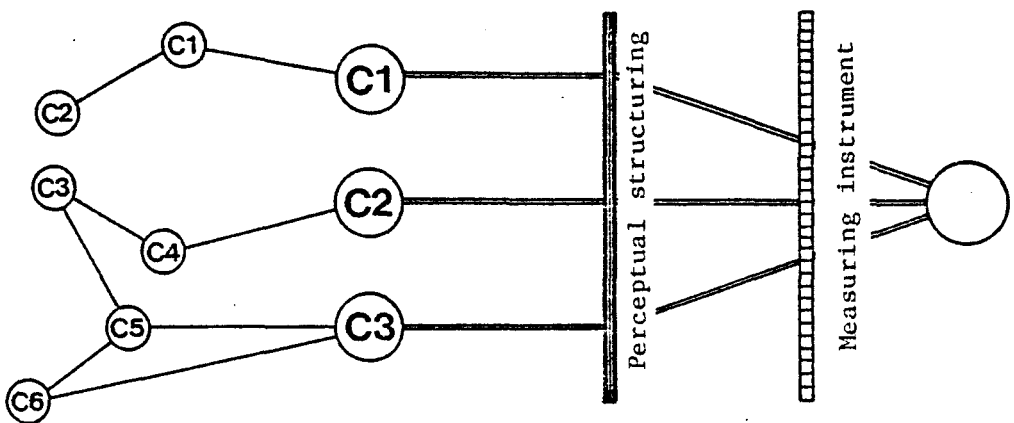


Figure 5.2  
Ordering of constructs (Model adapted from  
Kerlinger, 1964)

In developing the research design an attempt was made to achieve goodness of fit between the theoretical background and structure of the thesis and what was pragmatically possible to achieve in field research.

5.5.1    The conceptual design

In the context of organization certain organizational design variables, for example, level of organization and role (function), will affect the perception of managerial positions, serving to dilute the effect of individual differences.

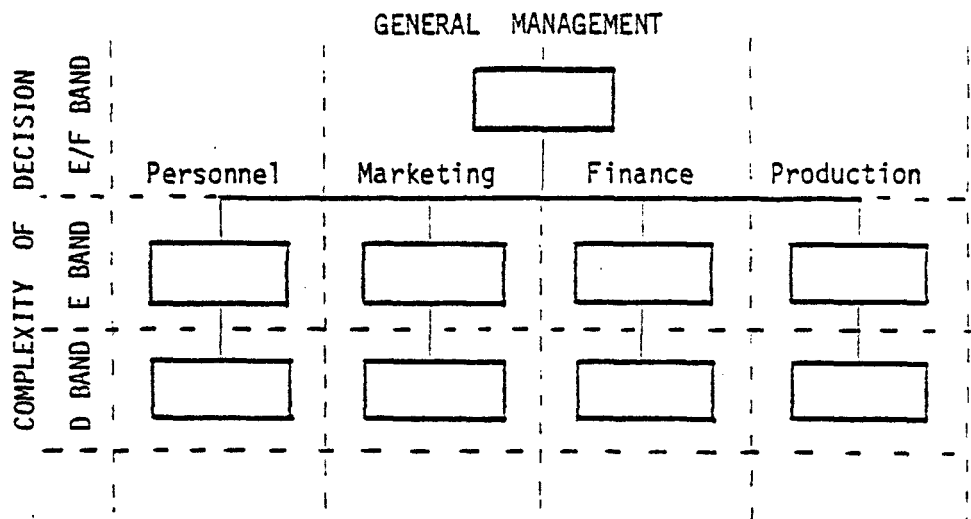


Figure 5.3  
The role-set

Paterson (1972) has proposed a hierarchical decision-making model of organization which differentiates an organization on a vertical basis into six levels (Figure 5.4).

| Band | Kind         | Title             | Grade | Sub-grade     |
|------|--------------|-------------------|-------|---------------|
| F    | Policy       | Top management    | 11    | Co-ordinating |
|      |              |                   | 10    | Policy        |
| E    | Programming  | Senior management | 9     | Co-ordinating |
|      |              |                   | 8     | Programming   |
| D    | Interpretive | Middle management | 7     | Co-ordinating |
|      |              |                   | 6     | Interpretive  |
| C    | Routine      | Skilled           | 5     | Co-ordinating |
|      |              |                   | 4     | Routine       |
| B    | Automatic    | Semi-skilled      | 3     | Co-ordinating |
|      |              |                   | 2     | Automatic     |
| A    | Defined      | Unskilled         | 1     | Defined       |

Figure 5.4  
Six levels of decision-making and eleven job grades

#### DEFINITION OF BANDS

##### Band F - Policy-making decisions

Decisions framing policy are regarded as being superior to any other decisions. The limits are very wide and in many cases are only specified by the laws of the land.

##### Band E - Programming decisions

Within the limits set by policy the execution is broadly planned or programmed.

#### Band D - Interpretive decisions

The limits of interpretive decisions are set by the programme, plan or budget. The interpretive aspect comes from the choice of a best decision out of a spectrum of possible decisions, the limits of the spectrum being set by the programme. These decisions often involve determining the best use of available manpower and machines to achieve the targets agreed upon in the programme.

#### Band C - Routine decisions

The rule having been set by the interpretive decisions, execution begins. What is to be done has already been decided and the next level of decision - routine - is the choice of the way in which it is to be carried out. People taking these decisions can decide which process to use. They know the operations, that is, what to do, where and when.

#### Band B - Automatic Decisions

This involves work in which the processes are defined and freedom of choice is restricted to the operations. Within the constraints of the process - the "how" - the worker can decide "where" and "when" he carries out the operations that constitute the process.

#### Band A - Defined decisions

The decisions can be defined and the worker is left with little choice other than variation in control of the elements of an operation.

The conceptual role-set model of Katz and Kahn (1978) discussed in Chapter 3 (horizontal differentiation) was combined with Paterson's (1972) decision-making model (vertical differentiation)

to form the entity of study; the role-set of managers at the D, E and F levels of an organization.

The principal objective of this study is to examine the cognitive processes and maps of managers in interaction with each other.

#### 5.5.2 The measuring instruments

Four main measuring instruments were used to examine perception within the role-set:-

- A "Kellian" 10 x 40 Repertory Grid based on constructs derived from 50 managers in 5 companies and 5 discussion groups and applied to a sample of 90 managers - 10 companies x 9 managers (Appendix 2).
- Holzbachs (1974) version of French and Raven's (1968) Bases of Power Instrument as a supplementary analytical instrument (Appendix 3).
- Semi-structured interviews conducted with managers in the above companies (Appendix 4).
- Biographical instrument (Appendix 5).

##### 5.5.2.1 The 10 x 40 Major Repertory Grid

The Role Construct Repertory Test has been used extensively as an idiographic instrument by clinical psychologists and has been used at the nomothetic level by researchers applying the instrument in areas other than the clinical domain. By reducing the subject's responses to a set of binary choices, Kelly laid the foundation for nomothetic analysis of grids in which subjects (elements) could be compared on common dimensions (constructs). The reliability and validity of the Repertory Grid have been the subject of investigation by a large number of researchers. Vernon (1964) and Fiske (1973), after surveying research in the area, have concluded that there is a particularly close

relationship between the Repertory Grid technique and the area which it is designed to explore. Further reviews on the use and significance of the technique have also been conducted by Adams-Webber (1970), Bannister and Mair (1968), Bonarius (1965), Crockett (1965) and Slater (1976). These researchers have demonstrated variously that the reliability of the grid ranges from 0,15 to 0,91 with a mean correlation across the studies of 0,53. Slater (1972) argues that it is debatable, at the nomothetic level whether it is appropriate to use conventional psychometric techniques to investigate the consistency and significance of grids. Bavelas, Chan and Guthrie (1976) in one study show that the grid technique does not necessarily meet more rigorous criteria of validity as defined by Campbell and Fiske (1959). Yet Fiske (1973), as has been mentioned, has praised the particularly close relationship of this form of test to the personality theory it is designed to explore.

The reliability of the particular grid (10 x 40) developed for this study (described in 5.6) was determined after the constructs had been derived and the grid constructed. The grid was administered to 52 part-time M.B.A. students of the Graduate School of Business Administration of the University of the Witwatersrand. These students were all managers functioning in business organizations at similar levels and functions to those who were eventually to be included in the final study. Proportionately, there were more managers in the D band in the test-retest reliability study than in the actual study. However, it is virtually impossible to ask 50 senior managers in organizations to take part in a reliability study. They just would not have the time. The identical grid was re-administered to the same group of students three weeks later, and the test-retest reliability determined using Pearson's *r*. The consistency of the component measures were the focus of

this study and were determined for the first four components. These four components normally account for some 80% of the variance.

| <u>COMPONENT</u> | <u>r</u> |
|------------------|----------|
| 1                | 0,78     |
| 2                | 0,80     |
| 3                | 0,76     |
| 4                | 0,58     |

Further characteristics of the instruments are discussed in Chapter 6 under the heading: 6.3 "The behavioural measures and their correlates".

#### 5.5.2.2 Bases of Power Instrument

Holzbach's (1974) Attributed Power Index was used in its conventional form as a supplementary measuring instrument to attempt to define more clearly the nature of the first component often found to be concerned with Potency (Osgood et al, 1957) Schein and Hall (1967), Cogill (1975). This instrument has been documented and previously validated by factorial techniques, (Holzbach 1974). Templar (1980) used the instrument in a study of the effect of compensation as a power base and found it had relatively high reliability coefficients for a research instrument. The sub-scale correlations were Expertise 0,82, Coercive 0,62, Reward 0,80, Legitimate 0,66, Identification 0,73.

In this study the format of the Holzbach instrument was changed from that of its traditional one - Likert type scale - to a semantic differential one to correspond with the main Kellian grid format. The results were not analyzed, however, within a Kellian framework since the constructs had not been derived in the same way, neither did the bipolar opposites (adjectives/phrases) necessarily represent Kellian constructs.

#### 5.5.2.3 Semi-Structured Interviews

These were also used as supplementary instruments to aid in the interpretation of results obtained, especially for analyzing marked deviations or anomalies within the cognitive maps. This instrument was regarded to be primarily descriptive in nature and no reliability or validity data can be provided.

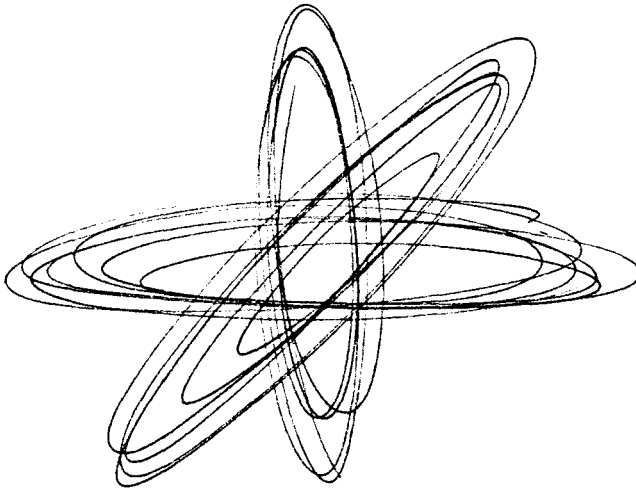
#### 5.5.2.4 The biographical instrument

This information was collected, primarily to describe the sample and investigate on an exploratory-descriptive basis the nature of relationships between certain biographical variables and the phenomena being investigated. This data was found to be useful in explaining some "anomalies" in group (role-set) perceptions.

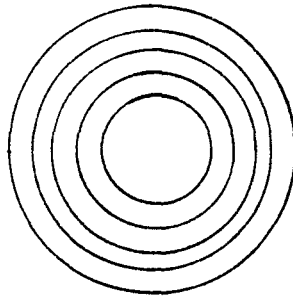
The total set of behavioural observations derived from Managers in each company for the Kelly Repertory Grid above is 3 600 and for 10 companies is 36 000. The number of measures of psychological processes involved, based on the above data, is considerable. Apart from the "cognitive map" which may be plotted showing the relative positioning of the role-incumbents, a principal components analysis for each manager is derived, as well as for each company. The measured real world model derived is based on some 50 000 correlation co-efficients. This model is referred to as "the real world model" of measured grids.

This real world model is then tested against a synthetic or quasi-model generated from random numbers (quasi or experimental grids) for a sample of 90 grids of the same dimensions (10 x 40) as those applied to the managers in the 10 companies in order to determine the statistical validity of the real world model (Fig 5.5). This synthetic or quasi-model is based on the synthesis of the relationships derived from some 70 200 correlations. The logic underlying this model is described in Chapter 6.





- a) Measured real-world model of the way in which managers construe their role-set.



- b) Synthetic model of the way in which role-construction would take place in the absence of perceptual mediation.

Figure 5.5

Measures of cognitive complexity, bias and variability are also derived. The evaluation of the above design is further enriched by interpreting data derived from French and Raven's (1968) Bases of Power framework using the Holzbach (1974) Attributed Power Index as well as from semi-structured interviews conducted with the managers concerning the personnel management function in particular.

### 5.5.3 The sample

The primary objective of this study is to examine the cognitive maps of managers in interaction with each other with particular reference to the personnel function. It was thus necessary to define as the universe of study a role-set of managers in interaction with each other which included the personnel function. In addition to the importance of having an interactive role-set it has been shown in Chapter 3 that the judgements of individuals of each other are more accurate and subject to a higher degree of differentiation when such people are in interaction with each other. It is for the above reasons that role-sets of managers who may be defined as the dominant coalition were chosen as objects of study rather than managers randomly selected from different firms but not in interaction with each other. Since it is one of the prime objectives of this study to examine the perception of the personnel manager in relation to other managers in an organization, companies in which these managers worked were chosen using a set of random numbers applied to members of the Institute of Personnel Management (IPM). This list contained as of August 1979, 5 300 members. An attempt was made to obtain a listing of companies from the Bureau for Market Research which was more comprehensive than that of the IPM in terms of overall companies. However, it was found that the list did not indicate whether or not a particular company had a personnel department. For this reason the IPM list was chosen in preference to the Bureau for Market Research. A limitation of the study could possibly be in terms of the fact that the results could be generalized only to companies which belonged to the IPM. However, it is not differences in companies which is the independent variable but differences among managers in

different functions.

In order to define some limits to the study the companies selected were limited in a number of ways which could have bearing on an interpretation of the results:-

5.5.3.1 Companies had to be industrial manufacturing companies having the four major functions namely personnel, production, finance and marketing represented by at least two organizational levels. It was reasoned that service and other organizations could be sufficiently different so as to affect the underlying dynamics.

5.5.3.2 Company size was limited to companies employing between 500 and 2 000 employees (medium-sized companies).

The organizational structure of companies in this category is relatively mechanistic and not complex. Where organizations employ less than 500 employees, part of the organization structure is often missing. Either there are not two levels of the function and one person performs both the D and E level functions or one of the functions, for example, the personnel function is performed by other line-managers. Organizations employing more than 2 000 employees are often structurally more complex, with a number of people performing each role at a particular level. Limiting the company structures within the above parameters would, it was reasoned, serve to control the influence of certain

extraneous variables on the independent variables which were to be studied.

5.5.3.3 Companies were chosen from the major (Pretoria, Witwatersrand, Vereeniging) South African industrial complex. There are no variables within the domain of study which could affect the structure of relationships being examined differentially between the chosen industrial complex and other industrial complexes in South Africa. It appears highly unlikely that living at the coast, in Newcastle or Uitenhage would lead to evaluative constructs or factor structures among managers which would differ from those in the Witwatersrand area. It could be argued that persons who live at the coast or in Newcastle possess personality characteristics, attitudes or outlooks in life which differ from those in Johannesburg. It is argued, however, that these possible differences would not be detected amidst the strength of the more dominant signals in the system. It may also be contended that the effect of other variables such as the differing cultural mixes in a management team may serve to confound the effect of any possible regional differences. Finally, this study is concerned with relative differences or positions of managers in a role-set. If geography is a differentiating independent variable then its effect will not operate differentially within a role-set, but across role-sets.

An important economic consideration had to be

taken into account as well. Each manager had to be interviewed, in addition to completing a questionnaire. Hence each of 90 managers was visited at least twice, involving some 180 trips within the Pretoria-Witwatersrand-Vereeniging complex. A number of appointments were postponed, considerably increasing the total number of trips involved.

In randomly selecting 10 companies, 90 managers were included in the sample. The behavioural characteristics and psychological processes of these 90 managers were compared firstly with a theoretical model to test for statistical significance of the main hypothesis. Thereafter the grids of the managers and companies were examined on both a comparative and an exploratory basis for further structure and relationships.

#### 5.5.3.4 Characteristics of the sample

The sample drawn possessed the following characteristics as depicted in Table 5.1.

TABLE 5.1: Descriptive summary of participating companies.

| Company | Number of employees | Geographical location |
|---------|---------------------|-----------------------|
| A       | 733                 | VEREENIGING           |
| B       | 1850                | BOKSBURG              |
| C       | 520                 | ISANDO                |
| D       | 648                 | LUIPAARDSVLEI         |
| E       | 933                 | ISANDO                |
| F       | 784                 | BENONI                |
| G       | 957                 | SPRINGS               |
| H       | 631                 | ELANDSFONTEIN         |
| I       | 789                 | RANDBURG              |
| J       | 1382                | VEREENIGING           |

## 5.6 Methodology

### 5.6.1 Generating the constructs

According to Kelly (1955) the method by which man attempts to predict and control his environment to his own comfort is through his thought processes. In other words, experience of life, being an integral part of an individual's learning allows him to structure his observations into a model of personal constructs which are strong determinants of his ability to anticipate future events.

The value of constructs lies primarily in their predictive value in coping with environmental situations. However, a person will tend to broaden or narrow the array of contexts in which he will use his constructs when reacting to changes in the environment. Constructs very importantly impose a limit on people's ability to interpret and regard things meaningfully. Therefore predictions of people with respect to the environment differ greatly in depth and complexity, depending on their construct development. In short, a construct leads to a prediction which, of course, may or may not become a reality.

Constructs are highly integrative in nature. This means that the measurement of an object on one construct will have a strong effect on its meaningful positioning on all the other constructs which come into the picture. The term "picture" is very apt since it reflects a mosaic of a person's overall perception towards a particular object and the constructs are the pieces that make up the whole. Personal construct theory underlies the use of the Kelly Repertory Grid Technique.

Use of the Kelly Grid eliminates the subjectivity in selection of constructs as these are generated by the respondents themselves. The technique does not require a large sample for deriving the constructs.

Constructs were developed for this study by interviewing 50 managers in the production, finance and marketing functions from 10 different companies falling within the sampling constraints defined under 5.5.3. Each manager was interviewed and the constructs elicited by the standard Kelly Repertory Grid procedure.

#### 5.6.1.1 Introduction

To put the respondent at ease; SAY:-

"The purpose of this study is to find out how people in different functions see each other, how observant they are in noting differences between people in different functions and how they describe these people".

"When interacting with superiors, subordinates and peers in the same function or in different functions, one forms judgements with regard to how they behave in the work situation along different behavioural dimensions, for example, cautious or impulsive, energetic or lethargic".

#### 5.6.1.2 Triad groupings

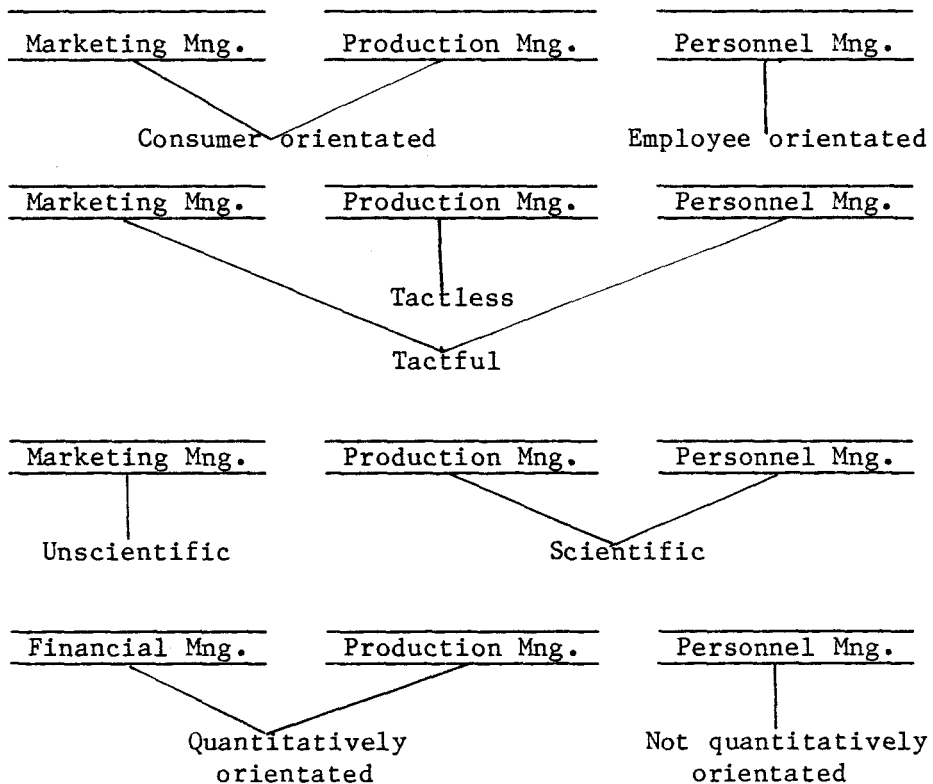
From the set of 9 cards each entitled according to one of the managerial roles, take three cards, place them in a row - evenly - in front of the respondent, and apart from the other cards. Say:-

Question 1.

"Please look at these three cards. I would like you to tell me any way in which two of these managers are similar and yet different from the third in your organization. It may be in any way of which you can think".

Record construct on a recording grid in respondent's own words. Repeat procedure until responses cease. Then choose three other cards randomly and repeat procedure until all cards are used up.

The following pictorial representation indicates how constructs may emerge using the above process:-





The number of constructs elicited ranged between 12 and 56 per manager. After a series of interviews the constructs generated by the Kelly Grid Analysis began to overlap. A logical sample size for this part of the study could not be fixed prior to the research programme as it is impossible to foresee at what stage new constructs would cease to arise. It was found after 32 interviews that no further constructs were being generated and the remaining 13 interviews were conducted to check whether this was true. No dissimilar constructs arose from the latter. The results of these interviews were kept for a frequency analysis of the constructs. The 40 most frequently occurring constructs were chosen on a priori grounds for inclusion in the study. Consideration was given to analysing the data using the WORDS procedure of Iker and Klein (1974). It was decided, however, that the stripping process whereby prepositions, and irrelevant parts of speech are removed from the phrases may affect the semantics of the constructs sufficiently to depart from the underlying nature of personal constructs as defined by Kelly (1955).

The list of constructs finally derived can be found in Appendix 2.

#### 5.6.2 Applying the measuring instruments

Once a company had been drawn as part of the sample, the researcher approached either the personnel manager or the managing director of the company for an interview to discuss the feasibility of conducting the

study by first, telephoning him personally and secondly, by posting a letter (Appendix 1).

An appointment was then set up with the person concerned and the detail of the project was discussed. At this interview the researcher explained the nature and objectives of the study and stressed the anonymity of the data source, both from the point of view of the company as well as that of the individual participating managers. Any questions which were raised were dealt with and the general agreement of the senior executive was obtained from the company's point of view. The researcher had then to request the Managing Director (in four cases, initially through the Personnel Manager) to obtain the consent of the 8 managers reporting to him. It was essential that all 9 managers in the respective role-sets agreed to participate in the study in order to ensure its success.

Once the consensus of 9 managers in each of the 10 companies had been reached, the job titles of these managers were obtained and entered on to the standard format questionnaire (Appendix 1). The researcher then arranged to distribute the questionnaires and explain the nature and objectives of the study to each participating manager. A time was set up for an interview with each manager and a return date established for the questionnaire which was completed by the manager in his own time.

Of the 15 companies which were drawn, utilizing the sampling strategy outlined in 5.5.3, four companies decided not to participate. Reasons were given in each case : two were too busy to devote the time, one was "not interested in research" and one was

not prepared to participate unless the company could obtain its own specific feedback. The researcher explained to each company that only the overall results for all companies could be fed back and that anonymity could not be guaranteed if the company were to receive its own results. This would have an effect on the quality of the responses given. The reaction of the senior executives and the top management team to the study was varied but generally very positive. Seven of the ten companies willingly participated, and accepted both the content and process openly. Two of the companies accepted the study but were highly defensive, posed many questions and regarded the study as highly secretive. In one company the managing director was not partial towards the study but was prepared to participate when his management team put the case to the vote and outvoted him.

Data collection took 18 months in elapsed time and presented some of the most interesting, and at times, frustrating experiences. During the process of data-gathering the researcher learned a great deal about the companies concerned. Many postponed and re-scheduled appointments were the difficult aspects to deal with, but only in a single instance did the researcher find a member of the sample particularly unco-operative. In a few cases it took up to three months to track down a particular member of a team, but in each case these were very busy and hard-pressed managers.

The data was coded, entered by computer terminal into files and analysed as each company was completed. Data was coded and entered in a manner which would optimally facilitate the analysis which had to be

performed in terms of the INGRID, GRIDAV and DELTA programmes (Chapter 6) developed by Slater (1976) and the SPSS package (Nie, Hull, Henkins, Steinbrenner and Brent, 1975).

DATA ANALYSIS TECHNIQUES

The conceptual grid... is (therefore) a premathematical representation of an individual's psychological space, and it is designed to set the stage for a mathematical analysis of that space. As we see it, it is essentially multidimensional in character (Kelly 1955, p.304).

6.1 Introduction

In the present study organization structure is approached from the perspective of the role-occupant (role player) in the organization. The unit of analysis is the role-occupant and the relations which are analyzed are expressed in terms of the role perceptions among role-players in organization.

As discussed in Chapter 1, one level of organizational analysis takes entire organizations as its basic unit whereas another uses individuals in the organization. Perspective usually has implications for the level of analysis adopted but it is more general than this. Depending on the researcher's perspective, it is possible to have different structural interpretations of the same thing. For most firms, for example, we can speak of their financial structure, the structure of their work tasks, their market structure, or even between organizations, their industry structure. It is misleading, therefore, to speak of "the structure of an organization". All organizations possess structure but a particular characterization of structure always presumes some perspective and level of analysis.

Structure consists not only of the elements but of relationships between elements as well. Relationships are simply forms of interaction or combination. They may be specified in many different ways, both quantitatively and qualitatively. In whichever way these elements and relationships are elaborated, they are both necessary for any structural description of an organization.

Two types of relationships exist between people in an organization. The formal organization, symbolized by the organization chart, includes authority, work-related communication and succession relationships. These relationships are highly formalized and official in nature, especially in the form of written documents such as organograms, job descriptions, manpower succession plans. On the other hand, the informal organization consists of interpersonal relationships such as liking or disliking, casual communication, power, trust and prestige.

The approach taken in research on the formal structure of organization is well reflected in Blau's (1970) statement that "the fact that members of a collectivity are differentiated on the basis of several independent dimensions is the foundation of the collectivity's social structure" (p.203). Although the structural dimensions mentioned are defined in terms of people, or positions which are people at a given point in time, the level of analysis is usually that of the organization. Levels of differentiation are compared across organizations. It is important to note, however, that if one takes the individual as the unit of analysis, people are related to each other along these same dimensions within the organization, and this is the formal structure.

Both formal and informal structure exist in an organization at the same time. The thrust of most comparisons of formal and informal structure, originating with Barnard's

(1938) work is that the formal exerts a dominant influence over the informal. In fact, the informal is usually taken as something of a residual category, representing all relationships not accounted for by the formal structure. Greater emphasis on either the formal or informal or subordination of the informal side in this manner however, can be misleading. It is far more reasonable to assume that over time the informal will influence formal structure. If one focuses, for example, on criterion variables, such as measures of job performance, the most tenable hypotheses are clearly ones in which both formal and informal structure have interactive effects. Neither formal nor informal structure is really a "type" of organization social structure but is rather a description of various facets of that structure. The best characterization of organization structure is one which omits any rigid dichotomy between the formal and the informal. When perceived from the perspective of the individual in the organization it is assumed, as Weick (1969) does, that:

There are processes which create, maintain and dissolve social collectivities, that these processes constitute the work of organizing and that the ways in which these processes are executed are the organization (p.1).

What is being emphasized is that the content of organization, viewed from a phenomenological standpoint, is what organizational participants experience, not necessarily what managers or organization theorists define it to be.

## 6.2 The measurement of social structure.

### 6.2.1 Rank order.

In attempting to measure, analyze and interpret the above phenomena the most common approach has been to rank the members of a group or simply to categorize them on some dimension such as status, leadership,

control of resources, personality or ability. Rank orders of individuals or groups of individuals on these dimensions are then related to other variables. However, such differentiations along single dimensions are not highly structural in nature. They do not represent the pattern of relationships between individuals but, at most, are summary measures based on this structure. Research conducted in the late 1960's, for example by Hollander and Julian (1968) advocated a "transactional" approach that would emphasize the exchange relationship between leaders and followers. Gibb (1969) saw leadership as a concept applied to the "interaction" of two or more people. Limerick (1970), Bales (1950), and Paterson (1972) see leadership in terms of facilitative behaviour which is distributed throughout the group and which may be displayed by persons playing different roles. Unfortunately such thinking has been generally slow to replace the prevalence of the ranking approach in organization research.

#### 6.2.2 The sociogram

Another earlier category or type of research in this area is that of the relation: "A chooses B". This approach received particular interest during Moreno's (1934) pioneering studies in institutional settings, and led to the development of the sociogram.

The sociogram displays a picture of the group. A major problem with sociograms, however, is that they are arbitrary. From a given set of data there is a definite number of possible diagrams, many of which could yield very different representations of group structure.



If the interest in a study is on the codified formal structure, research should be directed at relevant documents and authoritative statements. Results should not, however, automatically be assumed to apply to the actual social structure, as frequently occurs in the comparative literature. The locus of actual social structure can be approached differently. Social structure exists both as the shared perceptions that individuals have of people in their organization and as patterns of interaction.

### 6.2.3. Multivariate analysis

Two approaches to the analysis of behavioural science data can be distinguished (Shepard, 1969). The more traditional approach is orientated towards the detection and statistical evaluation of patterns of a given hypothesized form. The other is orientated toward the problem of discovery of new patterns. The discovery pattern is one of pattern recognition. The aim is to uncover structure in the data. The approach is similar to that adopted by Tukey (1969) mentioned in Chapter 5. Shepard suggests that data analyses of this kind be matched to the human abilities needed to comprehend them. He argues that a visual mode of representation of the results would be most effective.

The set of statistical techniques of which such a methodology might be composed are cluster analysis, factor analysis and multidimensional scaling. Recent developments in multidimensional scaling offer a greater possibility of truly revealing underlying social structure.

Shepard's thinking is highly congruent with that of Daft and Wiginton (1979) and is also the mode of approach adopted in this study.

In the theory of multidimensional scaling, social structure may be described by way of a summarized description of a large number of attributes or variables. In the mathematical context, and consistent with Osgood, Suci and Tannenbaum's (1957) postulated semantic space, each variable is represented by an axis in multidimensional space, each such axis being orthogonal to all other axes. Each respondent by way of his evaluations of variables, is allocated a unique position in the multidimensional space. More formally:

If  $p$  measurements have been made on  $N$  - individuals, the test space model represents each individual as a point in a  $p$ -dimensional Cartesian space. The  $p$  variates become the  $p$  orthogonal axes spanning the space (each axis at right angles to all the others). Each point representing an individual has a location determined by taking the  $p$  scores for the individual as Cartesian co-ordinates (Cooley & Lohnes, 1971, p.8).

Raw data are presented in the form of a matrix of dimensions:  $n$  columns (elements) by  $m$  rows (variables). Since respondents are required to evaluate a large number of variables and since these variables require simultaneous analysis if they are to be of use for valid inference, an analytical algorithm is required that is capable of handling a large number of variables simultaneously. Since bivariate techniques are inadequate because only two variables can be studied at a time, and thus possible important relationships with other variables might be disregarded, a method of multivariate data analysis is required.

In general, multivariate analysis is a branch of statistics concerned with analysing multiple measurements that have been made on one or several samples of individuals.

An important distinction which supports the use of multivariate techniques is that the multiple variates are considered in combination, as a system of measurement. The basic assumption on which the mathematical model of multivariate statistical procedures is based, is the multivariate normal distribution.

There is a number of multivariate techniques available to the researcher, the particular choice usually being dictated by the nature of the data base. For instance:

Regression analysis is to be differentiated from correlation analysis in that the former assumes fixed values for the predictor (independent) variables, whereas correlation analysis assumes that both criterion (dependent) and predictor variables are random variables. With respect to objectives, in regression the approach emphasizes prediction, whereas in correlation it focuses on measuring the "strength" of the (linear) relationship (Green & Tull, 1970, p.343).

A commonly accepted basis of classification is to separate dependence models from interdependence models.

Kendall (1957) has utilised a classification that places each procedure in a quadrant of a lattice depending on how many sets of variables and how many populations are included in the design. See Figure 6.1.

In dependence, one (or more) of the variates is selected for us by the conditions of the problem and we require to investigate the way in which it depends on the other variates - the so-called but badly-named "independent" variates. The regression of one variate on others or the variance analysis of a set of yields in a factorial experiment are of this type.

In interdependence we are concerned with the relationship of a set of variates among themselves, no one being selected as special in the sense of a dependent variate. The analysis of functional relationships, correlation and component analysis fall into this group. (Kendall, 1957, p.6).

| <u>Populations</u>                                                                              |                                                                    |
|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <u>One population</u>                                                                           | <u>Two or more populations</u>                                     |
| Principal components<br>Factor analysis                                                         | Multivariate analysis<br>of variance<br><br>Discriminant functions |
| Q1                                                                                              | Q2                                                                 |
| Q3                                                                                              | Q4                                                                 |
| Polynomial fit<br>Multiple correlation<br>Canonical correlation<br>Multiple partial correlation | Multivariate covariance                                            |

Figure 6.1  
Classification of Multivariate Procedures  
(Cooley & Lohnes, 1971, p.7)

An excellent and far more descriptive summary of multivariate classification has been designed as a paradigm by Sheth (1971) adapted from Kendall (1968) and is shown in Figure 6.2. The particular procedure to be selected requires an examination of Figure 6.2. and a comparison with the data-type generated - in this study by the grid. The grid by itself has no dependent variable(s), hence one of the interdependence methods will be required for analysis of the data.

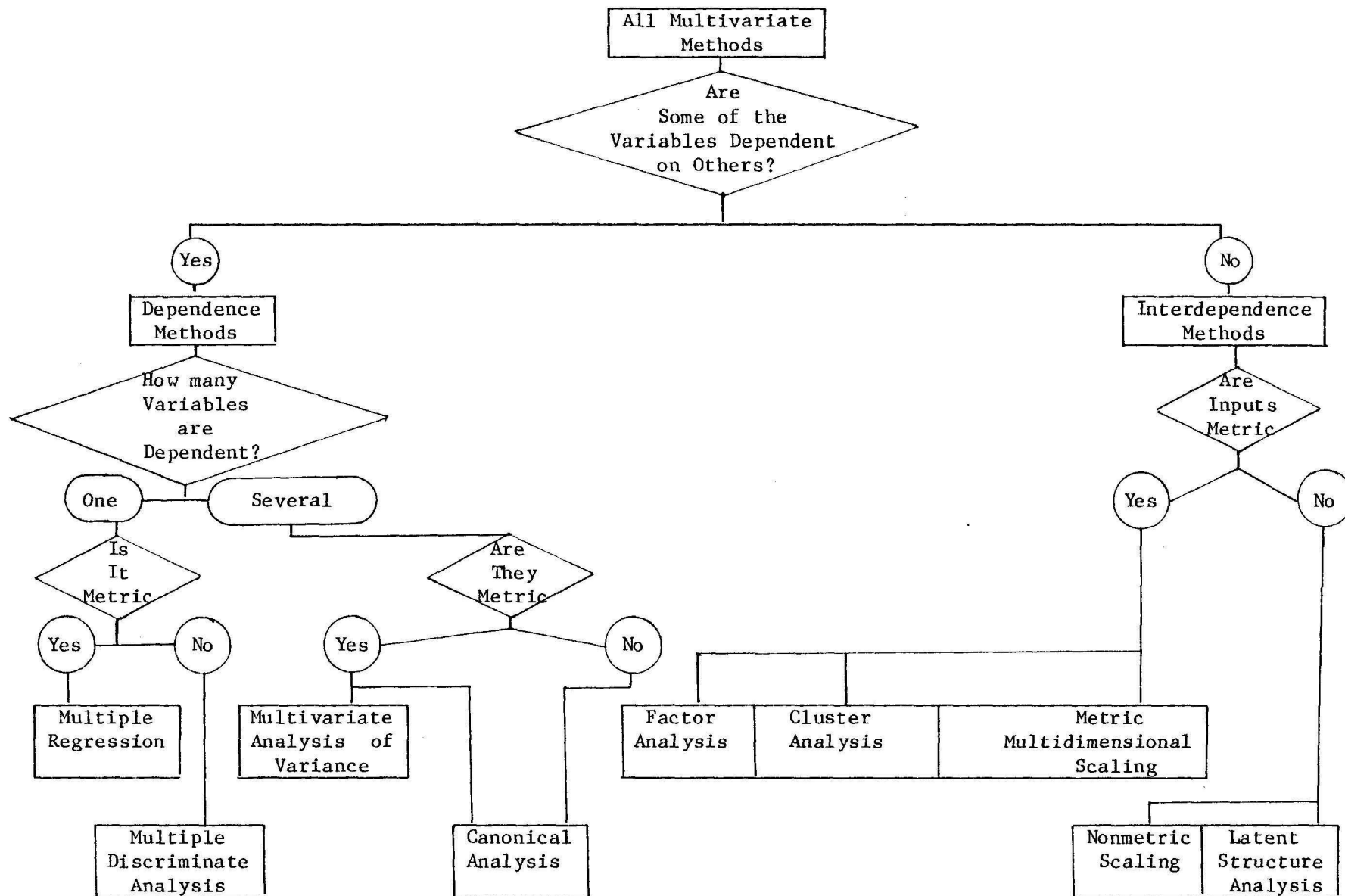


Figure 6.2  
A Classification of Multivariate Methods  
(Sheth, 1971, p.15)

The seven point bipolar scale used in the grid has been assumed to be of equal intervals, hence the data base is assumed to be metric. The required technique will therefore be a procedure that analyses multivariate, interdependent metric data. Examination of Figure 6.2 shows that the procedures available are: factor analysis, cluster analysis, and/or metric multidimensional scaling.

In factor analysis and cluster analysis no attempt is made to separate variables in advance into criterion and predictor sub-sets. In factor analysis one is concerned with the whole dependence structure and the possibility of summarizing the columns of the data matrix by a smaller set of linear combinations of the original variables. In cluster analysis, focus is on the objects rather than the variables. "In this class of techniques one attempts to partition the rows of the data matrix into subsets consisting of objects that closely resemble one another over the whole set of variables" (Green & Tull, 1970, p.328).

#### 6.2.3.1 Factor analysis

Since the substitution of a reduced number of concepts and laws (relations) for a vaster set of particulars ("chaos") is the aim of all science, factor analysis is one of the most direct, universally applicable, and representative of scientific methods (Cattell, 1966, p.175).

Factor analysis is a method for determining the number and nature of the underlying variables among large numbers of measures. More succinctly, factor analysis is a method for determining  $k$  underlying variables (factors) from  $n$  sets of measures,  $k$  being less than  $n$ .

Factor analysis serves the cause of scientific parsimony... A factor is a construct, a hypothetical entity that is assumed to underlie tests and test performance (Kerlinger, 1964, p. 650).

To clarify the concept and illustrate the rationale of factor identification, an excellent illustrative example is provided by Kerlinger (1964).

The most eminent of mathematicians and behavioural science researchers have yet to reach agreement on which is the most useful of the factor analytical algorithms available and their justified application to research. The application of the technique to a large number of variables from which ten or more factors may be extracted is made possible only by the advent of high speed computer data processing techniques requiring extremely sophisticated programming.

To summarize the procedure in the most simplistic terms:

- (1) A number of subjects is tested on a number of variables.
- (2) The raw scores are presented as a matrix from which a correlation matrix is computed.
- (3) Scores are plotted in a multidimensional space, the number of dimensions (and hence orthogonal axes) being equal to the number of variables.
- (4) "Correlated" variables are grouped together as factors by successively reducing the dimensionality of the space.

The final aspect of the factor analysis relies on the judgement of the researcher. That is, he is presented with various numbers of factors and factor loadings, and is required to judge which variables are relevant to the factors, and ascertain the underlying meaning of the particular variables that have been grouped together. Formally:

The primary result of factor analysis is a factor matrix  $F$  which contains coefficients of relationship between the original variables and the defined factor variates. (These)... are called factor loadings. The nature of the derived factors can be interpreted or inferred from examination of the nature of variables most highly related to each factor as contrasted with variables not so related. Factor scores are composite variables that represent the status of individuals on factor dimensions. (Overall & Klett, 1972, p.89).

It is important to stress that there is no golden rule for deciding how many factors to choose from a given set of factor analyses - although there are several rules of thumb. These include Kaiser's (1974) "Little Jiffy 2" and a Joreskog significance test (Joreskog, 1963). Another is to consider the incremental value of any additional factor after, say, 75 per cent of the variance is accounted for. However, it has been argued that "proportion of variance accounted for" has little real meaning in factor (as opposed to components) analysis.



There is no escaping the need to examine the subjective psychological meaningfulness of factor solutions, to determine the optimum number of factors. The rules of thumb are nothing more than rough guides. Indeed, it could be argued that this subjectivity of criteria is a powerful advantage offered by the technique.

#### 6.2.3.2. Components Analysis

Procedures used to factor-analyze a correlation matrix can have each factor based upon the correlations among the total set of variables. The most widely used of this kind of procedure is that of principal factors. Several characteristics make the principal factor solution desirable as an initial set of  $n$  factors. The basic principal factor procedure can be applied in different situations to slightly different correlation matrices. If it is applied to the correlation matrix with unities in the diagonal then principal components result. Principal component analysis involves the extraction of principal factors from the component model. The principal factors are extracted from the correlation matrix with unities as diagonal elements. The factors then give the best least-squares fit to the entire correlation matrix, and each succeeding factor accounts for the maximum amount of the total correlation matrix obtainable. Since the main diagonal is unaltered, an attempt is made to use the procedure to account for all the variance of each variable and it is thus assumed that all the variance is relevant.

### Principal components of the grid.

The matrix of deviations, D has, as for the grid from which it was obtained, a row for every construct and a column for every element. D is a matrix with n rows and m columns. In every row under every column there is an entry which is a number expressing the difference between the mean rating and the rating found for the element on the construct concerned. It is positive if the rating is above the mean for the element and negative if below the mean. The sum of the entries in each row is 0.0 and the sum of the squares of all the entries in all the rows is V.

In terms of Cartesian geometry the column of entries for an element gives its location in a space where there is an axis for every construct, so the complete table defines the dispersion of the elements as a scatter of m points in the construct-space, which has n dimensions (Slater 1972, p.10).

The derived table can also be read row by row and the entries for a construct allow it to be located as a point in a space with an axis for every element. The complete table also defines the dispersion of the construct as a scatter of n points in an m - dimensional element space.

Principal components analysis provides a common co-ordinate system for the two dispersions and thus establishes the connection between the two techniques.

According to Slater (1972) the most important advantage of the principal components analysis is that the components form an ordered series, each accounting for an independent part of the total variation from the largest to the least.

In this respect principal components analysis is unique. No axes other than those of the components can be used to analyze the total variation in this orderly way; any rotation of the axes sacrifices the advantage (Slater 1972, p.10).

The scale which shows the greatest amount of variation is the axis of the first component. The amount of variation shown on it is given by the LATENT ROOT which is a sum of squares accounting for part of the total variation,  $V$ , about the construct means. The proportions in which the ratings for an element on the constructs should be combined to obtain its measurement on the scale of the component are given by a set of coefficients, one for each of the constructs, listed under the heading CONSTRUCT VECTOR. The measurements themselves are listed under the heading ELEMENT LOADINGS.

It is also possible to relate a component directly to the elements and define it in terms of an ELEMENT VECTOR from which CONSTRUCT LOADINGS can be derived.

A principal component is thus defined by its latent root, its construct vector and its element vector.

The latent root is a single numerical quantity which must be positive or zero; and the sum of the latent roots of the components is equal to  $\sqrt{V}$ .

The construct vector is a set of coefficients, one for each of the constructs. The coefficients are normalized (the sum of their squares equals 1,0).

The element vector is a normalized set of coefficients in a similar manner.

The element loadings for a component can be obtained from the element vector by multiplying the coefficients by the square root of the latent root. Multiplying the coefficients in the construct vector by the same quantity gives the construct loadings.

Three or more components may be needed to complete an exhaustive analysis of the component space. However, it is unusual to find much variation left in an individual grid after three components have been extracted.

Perhaps because people see the world about them in a three dimensional space their construct systems extending over the same range of convenience do not usually afford much more than three dimensions for the relative

evaluation of one set of elements. Osgood is deeply committed to a particular formulation of this opinion that evaluative systems are three dimensional (Slater 1972, p.12).

The suitability of the technique as an aid in achieving the stated objectives of this dissertation becomes evident. An analytical technique is required which will reduce the large number of constructs to a few basic dimensions of psychological meaning. The development of the grid culminates in a theoretical multidimensional space. Component analysis is a technique designed to collapse precisely such a multidimensional space into a few underlying related variables: the image dimensions or cognitive map required.

Relevant segments of a series of programmes written by Slater (1972), were utilized for the analysis of data obtained from the grid technique. Two programmes in the series were rewritten, one by Mauer (1976), (GRIDAV) and one by Cogill and Clarke (1980) (RANGRID). A new programme (GRAPH PLOT) was also developed to plot graphically the output from the above programmes (Cogill and Clarke, 1980).

#### 6.2.3.3. The analysis of a single grid - INGRID.

This programme which is central to the whole package called GAP (Grid Analysis Package) (Chetwynd, 1974) is an adaptation of a standard principal components analysis. In addition to the principal component analysis the programme gives information about the relationships between the elements, between the

constructs and their interrelationships, and also gives details on bias and variability. (Individual grid analyses were conducted for each of the 90 managers.) The output lists the analysis in detail and an example is provided in Appendix 6.

6.2.3.4. The analysis of multiple grids - GRIDAV.  
Slater's (1972) SERIES rewritten by Mauer (1976).

Grids may be compared in several ways depending on whether they are matched by element, by construct, or by element and construct.

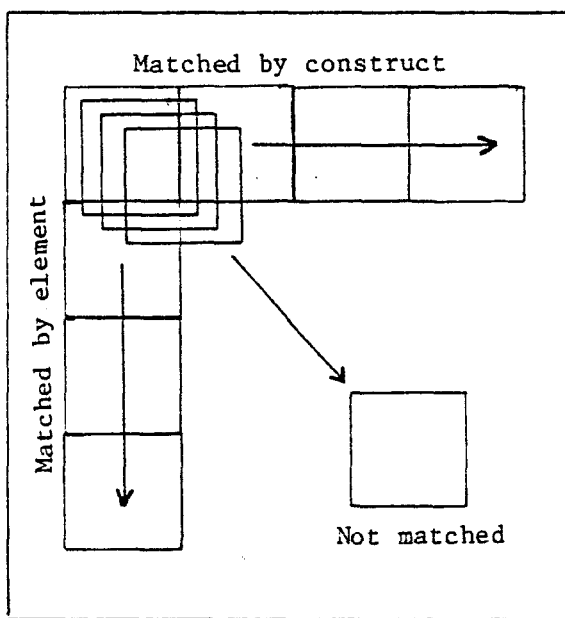


Figure 6.3

Alternative ways of assembling  
grids for analysis. (Slater 1976)

Grids which are matched by elements but not by construct can be assembled lengthwise (Figure 6.3), other alternatives excluded. Similarly, grids matched only by construct can be assembled sideways but not according to any other alternative. Grids with no elements or

constructs in common can only be compared in terms of their formal properties, whereas grids matched by both elements and constructs, as they are in this study, can be compared in a three way array. Gridav analyses were conducted for each of the 10 companies as well as for the 10 combined. Gridav output for company B is presented in Appendix 7.

6.2.3.5. The analysis of random or quasi grids - RANGRID.  
Slater's GRANNY (1972) rewritten by Cogill and Clarke, (1980).

The results derived from grids will be a function of the dimensionality of each grid or of each set with identical characteristics. Hence very small grids with few elements ( $m$ ) and constructs ( $n$ ) will lead to simpler models or outcomes of the social construction of a perceiver's world. Large grids will lead to more complex outcomes. This is because the number of components derived is equal to  $m-1$ .

Since each grid of given dimensionality has characteristics of its own, any comparative analytical or inferential processes will have to take into account the distribution appropriate to a grid or set of grids of similar dimensions.

Slater developed a programme to study the properties of such arrays. This program has not been available in South Africa and a similar version was developed by Cogill and Clarke.

The programme generates  $n \times m$  arrays of random numbers and treats them as if they were grids with  $n$  constructs and  $m$  elements. An abbreviated form of the principal component analysis used in INGRID for experimental grids is then applied.

The Fortran Function RANF(X) is used to generate series of random numbers (1 to 7) starting from a seed. Although the series is predetermined by the seed, the user cannot anticipate what it will be before starting it, nor tell from its output up to any point how it will continue thereafter.

The crucial aspect in the use of random or quasi grids is that the researcher can be sure that "the processes involved in forming random grids are independent of whatever psychological processes generate the sets of numbers in experimental grids"(Slater 1976, p.129).

Summary statistics of selected measures provided by the INGRID and GRIDAV programmes are also provided.

The output for 100 random grids depicting certain aspects of the distribution and behaviour of the grids is given in Table 6.1.

The output (polar co-ordinates) of RANGRID can also be used as input for GRAPHPLOT to examine visually the relationship of the elements to each other. Such analysis is most useful in determining whether or not the dimensionality of the grid itself could have had any structural, biasing or artifactual effect on the results produced.

Figures 6.4 to 6.6 are graphical plots obtained from the random grid process for an individual grid whereas Figures 6.7 to 6.9 represent the analysis of 90 random grids by the same process. Figures 6.10 to 6.12 are the graphs plotted for the first three components for one manager from the study.



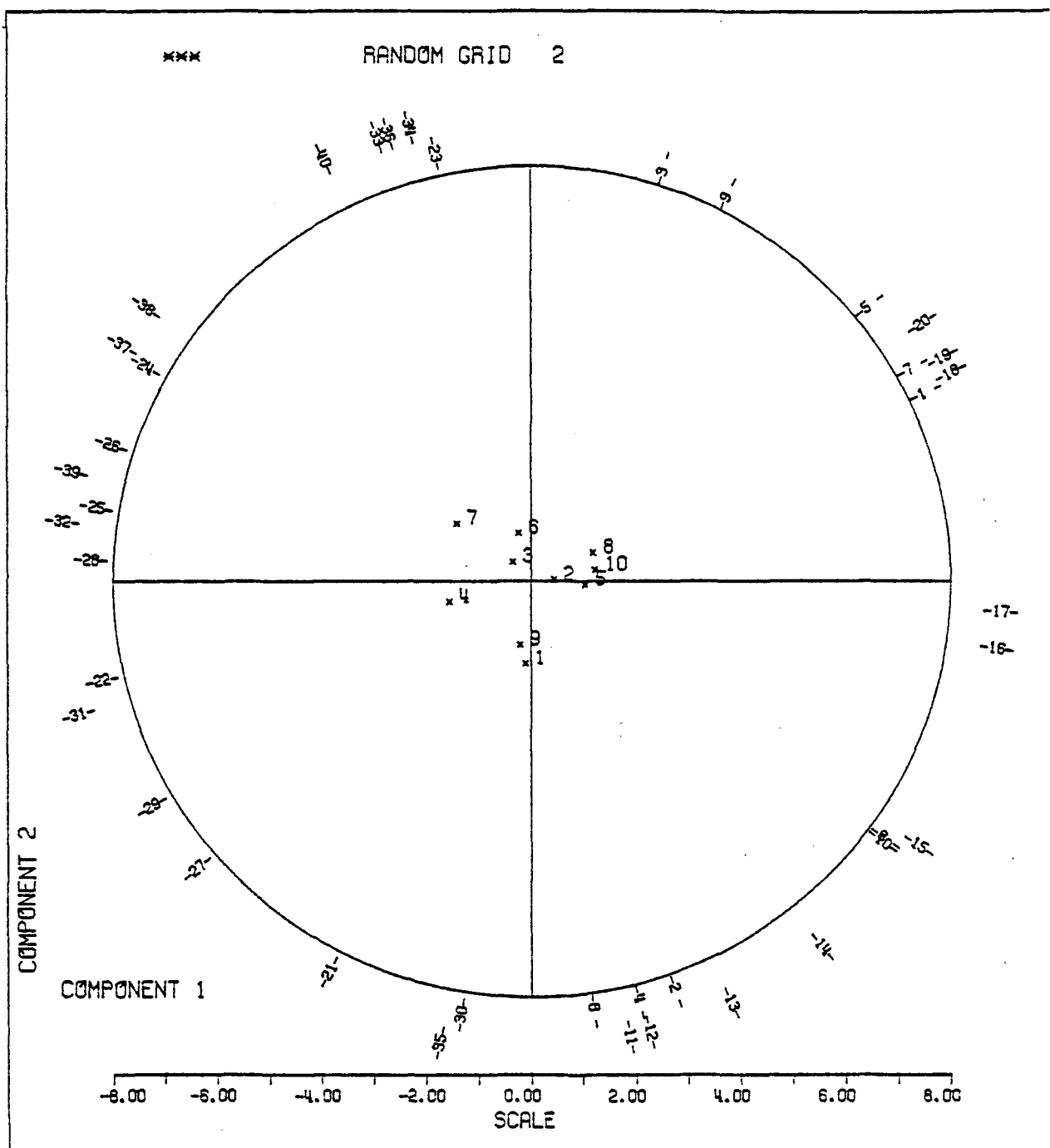


FIGURE 6.4

Random grid plot for one grid: components 1 and 2. Note lack of structure.

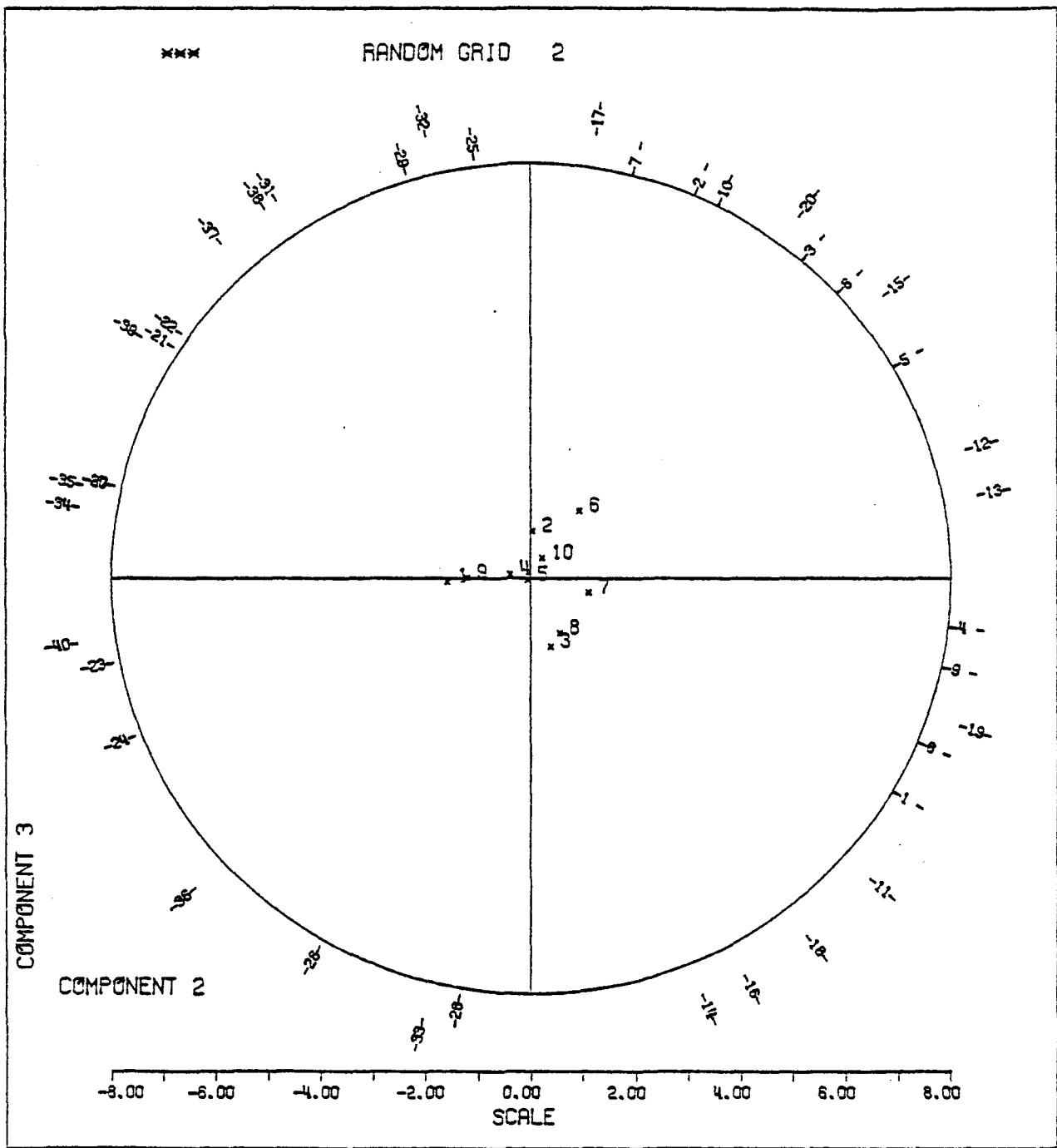


FIGURE 6.5  
Random grid plot for one grid: components 2 and 3.

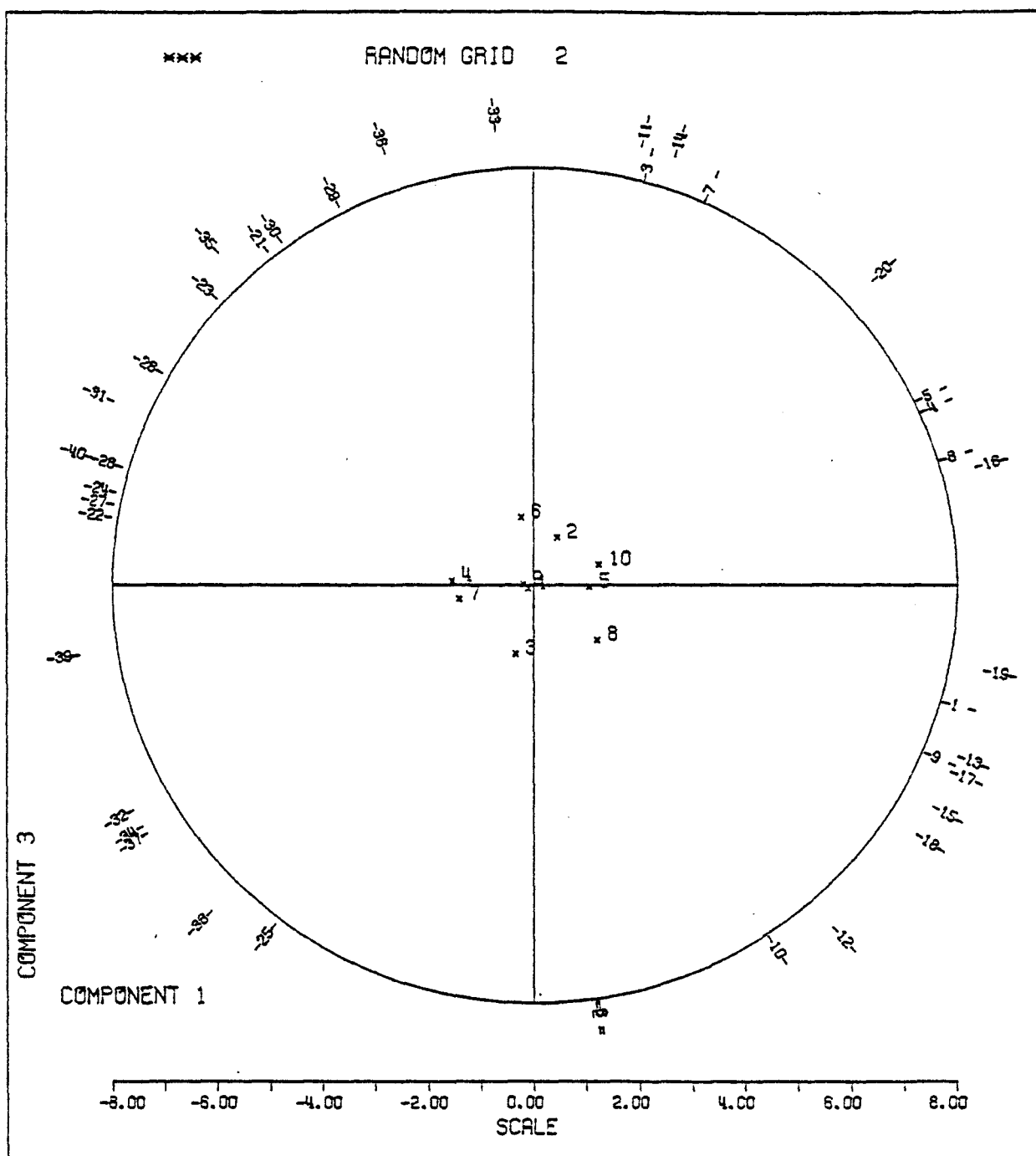


FIGURE 6.6  
Random grid plot for one grid: components 1 and 3.

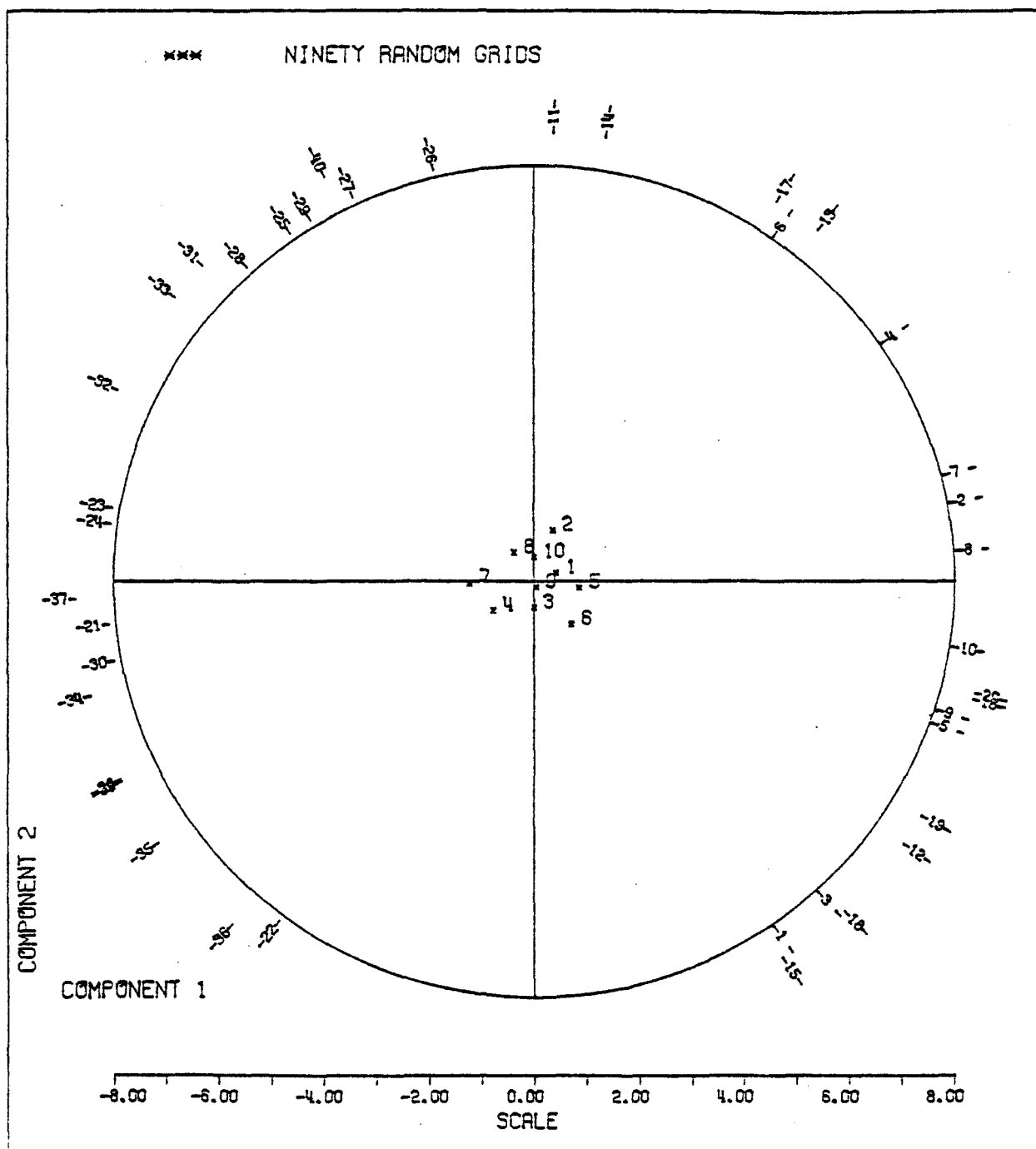


FIGURE 6.7

The dispersion of 10 elements in construct space: components 1 and 2. Note the complete lack of structure. The elements virtually form a circle corresponding to the model proposed in Figure 5.5

(b), p.128.

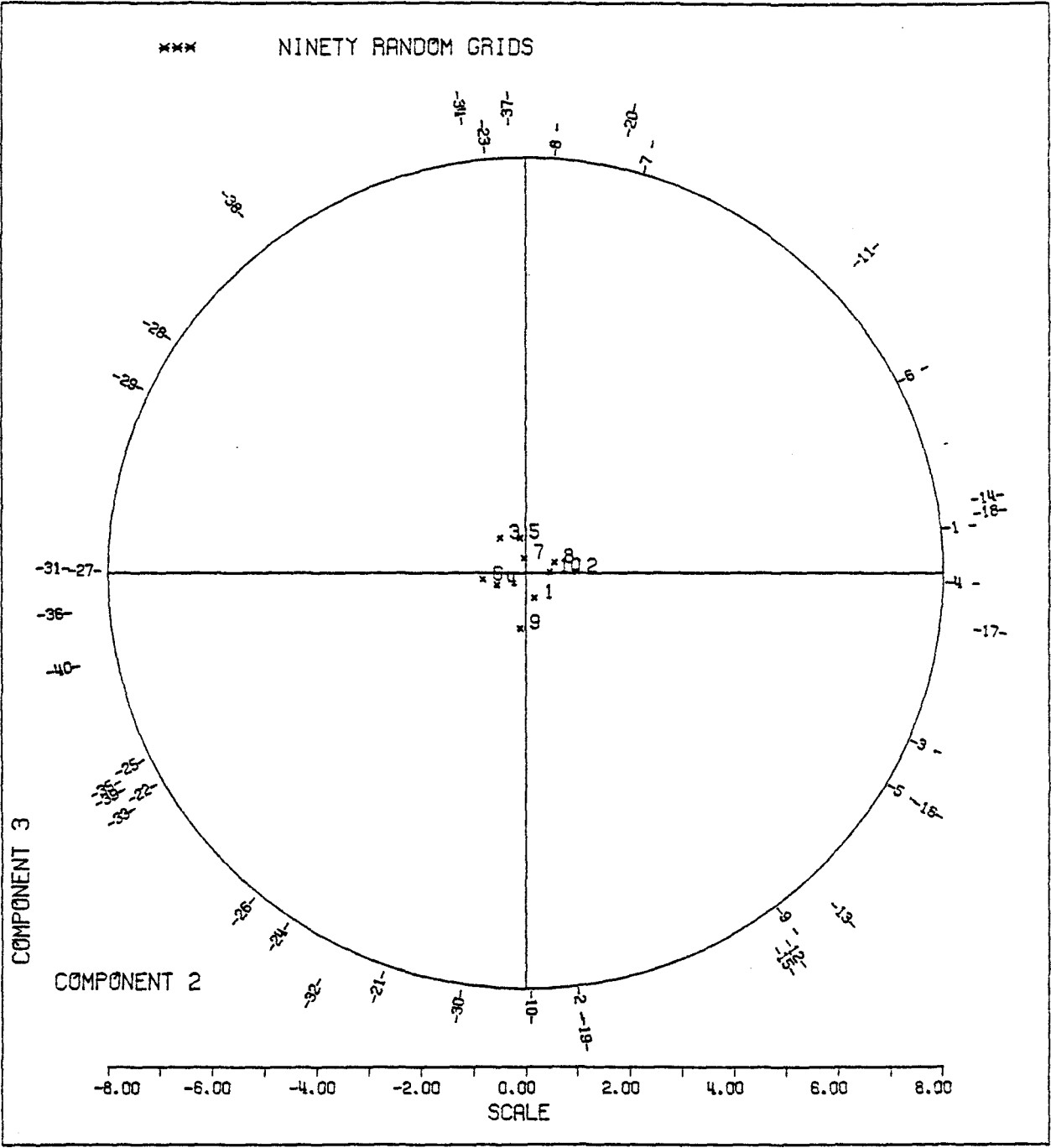


FIGURE 6.8  
The dispersion of 10 elements in construct space:  
components 2 and 3.

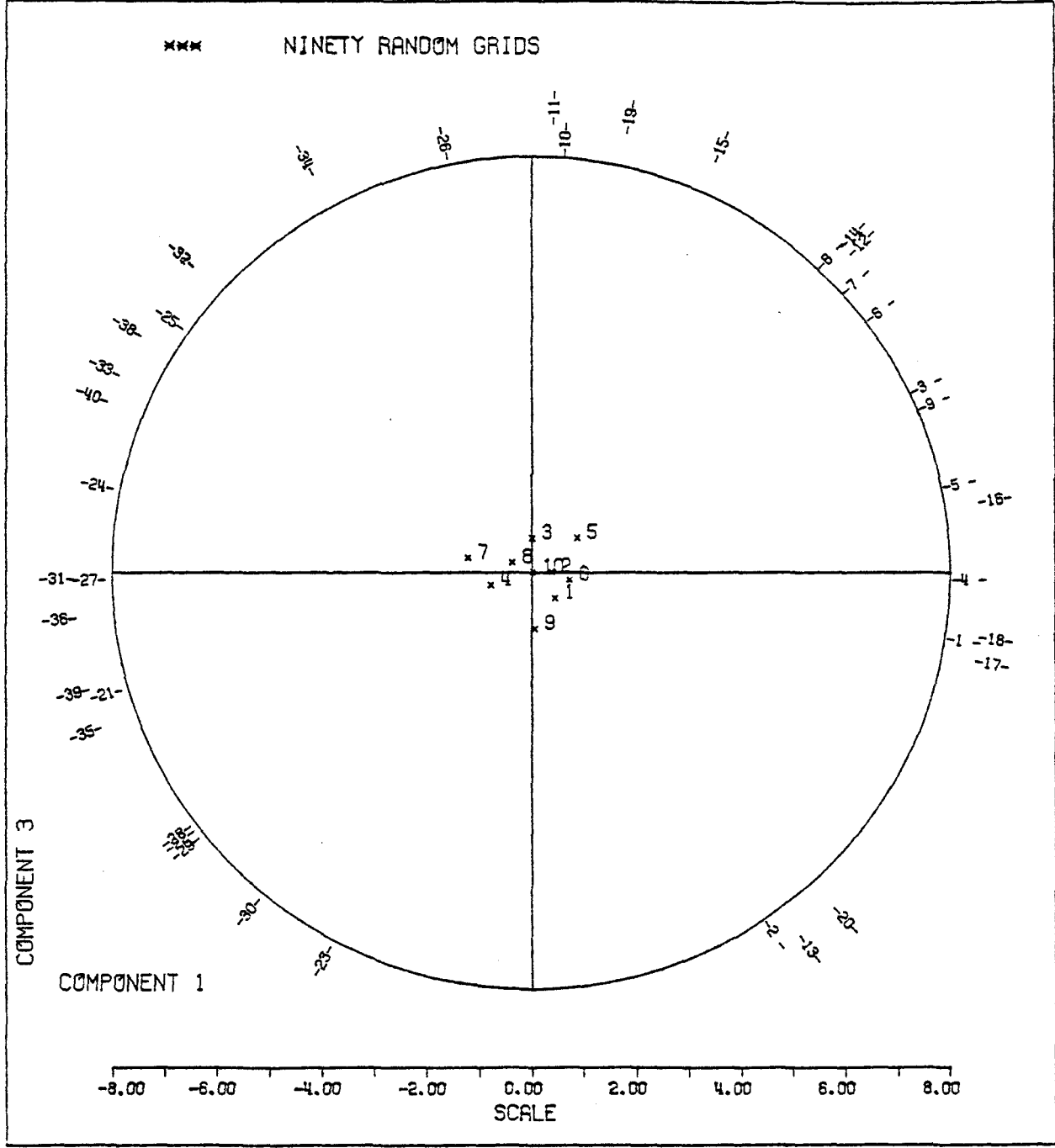


FIGURE 6.9  
The dispersion of 10 elements in construct space:  
components 1 and 3.

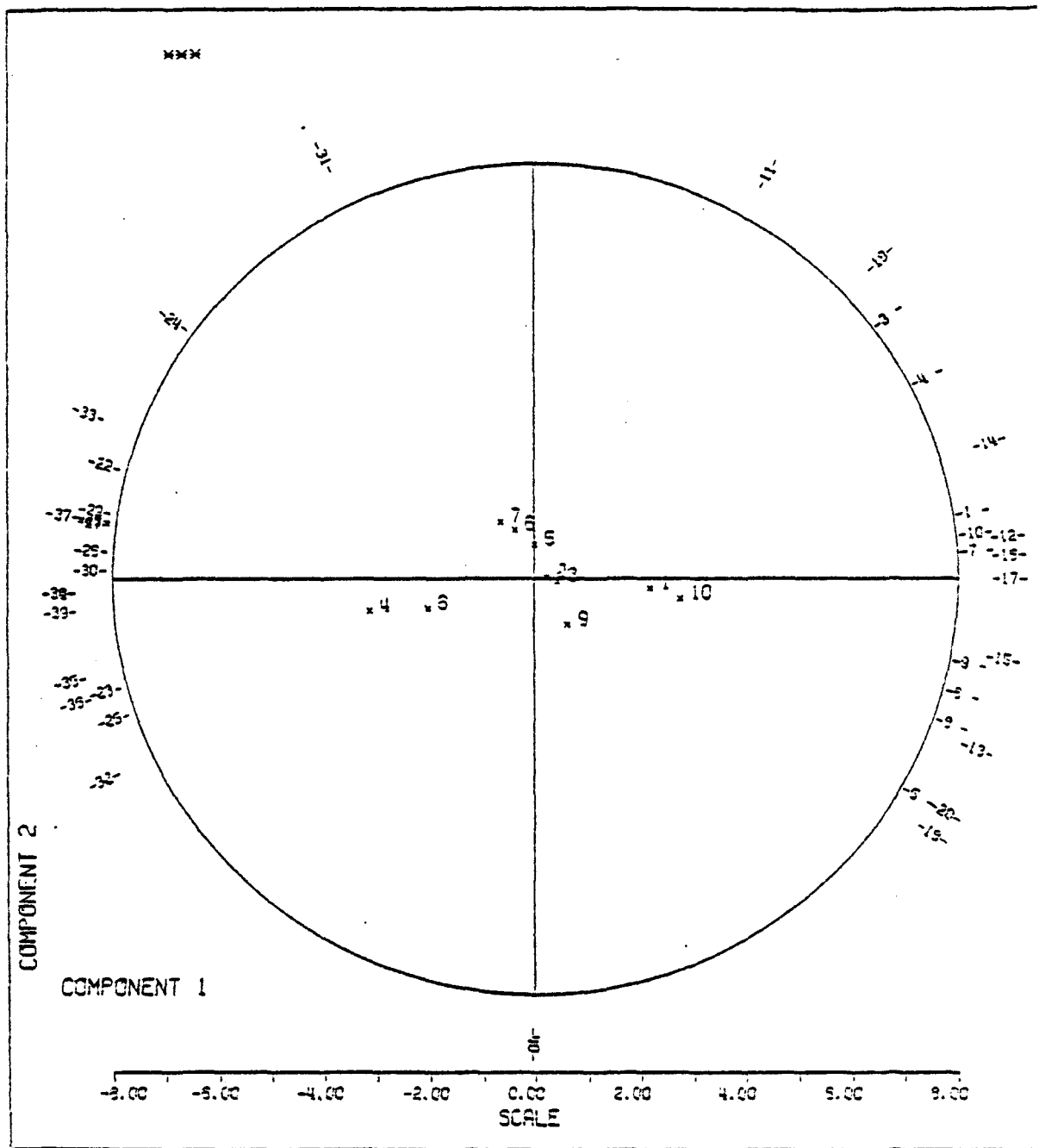


FIGURE 6.10  
Multidimensional scaling map of one manager showing the effect of perceptual structuring (construing): components 1 and 2.

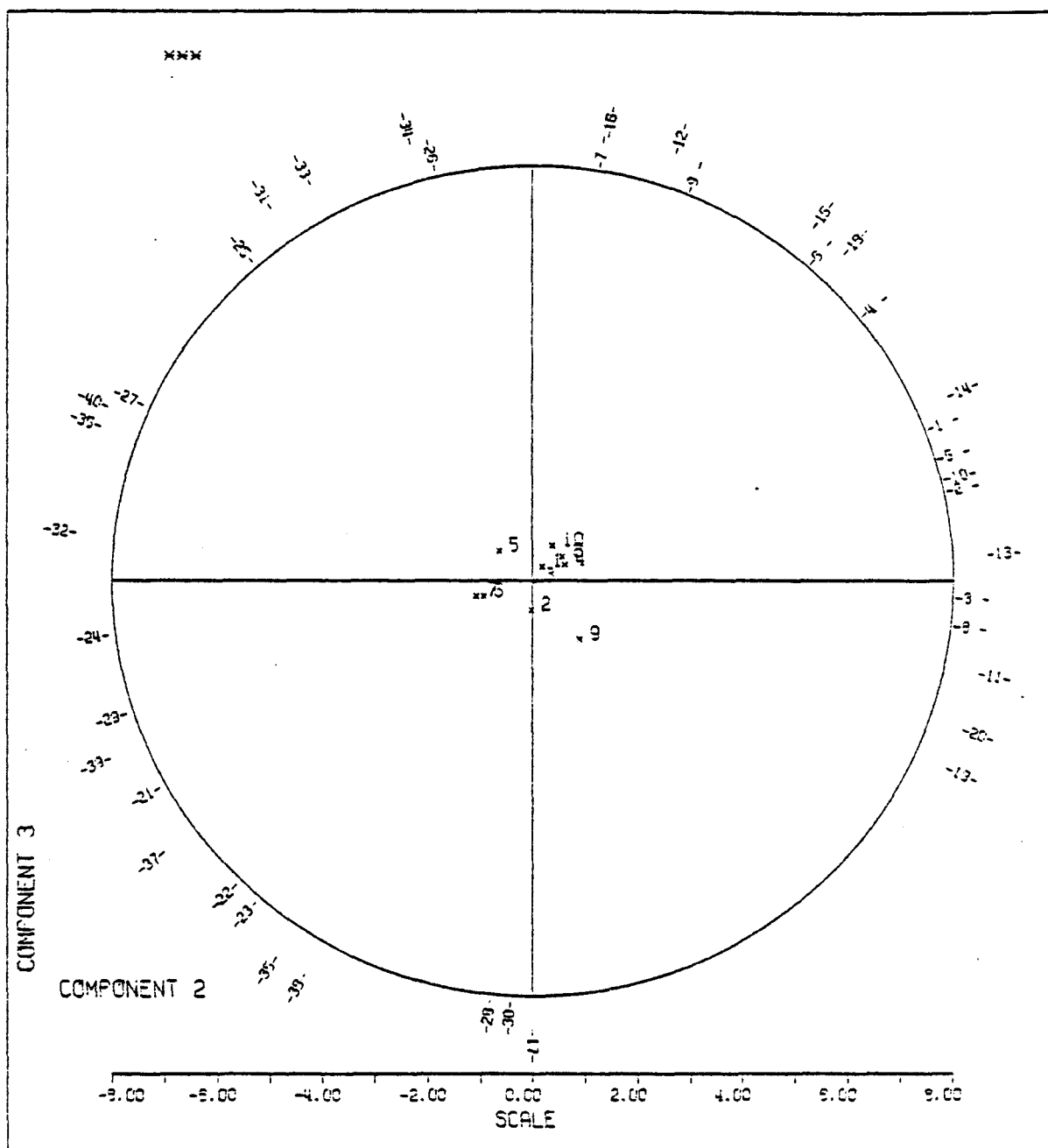


FIGURE 6.11  
Multidimensional scaling map of one manager showing the effect of  
perceptual structuring (construing): components 1 and 3.





TABLE 6.1

PROPERTIES OF 100 GRIDS

|             | LOWEST | HIGHEST | MEAN | SDEV |
|-------------|--------|---------|------|------|
| BIAS        | 0,15   | 0,27    | 0,21 | 0,02 |
| VARIABILITY | 0,02   | 0,71    | 0,66 | 0,02 |

SIZE OF THE LATENT ROOTS

| COMPONENT | LOWEST | HIGHEST | MEAN  | SDEV |
|-----------|--------|---------|-------|------|
| 1         | 16,11  | 24,11   | 19,69 | 1,64 |
| 2         | 14,43  | 19,71   | 16,88 | 1,04 |
| 3         | 11,76  | 16,78   | 14,35 | 0,96 |
| 4         | 10,00  | 14,50   | 12,29 | 0,85 |
| 5         | 8,71   | 12,43   | 10,49 | 0,67 |
| 6         | 7,29   | 10,34   | 8,72  | 0,67 |
| 7         | 5,69   | 9,23    | 7,44  | 0,71 |
| 8         | 3,43   | 7,43    | 5,88  | 0,74 |
| 9         | 2,59   | 5,95    | 0,19  | 0,76 |

CONSTRUCT CORRELATIONS

| CLASS | INTERVAL | FREQ         | PERCENT | % CUM  |
|-------|----------|--------------|---------|--------|
| -1,00 | TO -0,85 | 96           | 0,12    | 0,12   |
| -0,84 | TO -0,75 | 484          | 0,62    | 0,74   |
| -0,74 | TO -0,65 | 1135         | 1,46    | 2,20   |
| -0,64 | TO -0,55 | 2192         | 2,81    | 5,01   |
| -0,54 | TO -0,45 | 3520         | 4,51    | 9,52   |
| -0,44 | TO -0,35 | 4899         | 6,28    | 15,80  |
| -0,34 | TO -0,25 | 6403         | 8,21    | 24,01  |
| -0,24 | TO -0,15 | 7651         | 9,81    | 33,82  |
| -0,14 | TO -0,05 | 8326         | 10,67   | 44,49  |
| -0,04 | TO 0,05  | 8517         | 10,92   | 55,41  |
| 0,06  | TO 0,15  | 8351         | 10,71   | 66,12  |
| 0,16  | TO 0,25  | 7607         | 9,75    | 75,87  |
| 0,26  | TO 0,35  | 6447         | 8,27    | 84,14  |
| 0,36  | TO 0,45  | 4875         | 6,25    | 90,39  |
| 0,46  | TO 0,55  | 3607         | 4,62    | 95,01  |
| 0,56  | TO 0,65  | 2202         | 2,82    | 97,84  |
| 0,66  | TO 0,75  | 1143         | 1,47    | 99,30  |
| 0,76  | TO 0,85  | 458          | 0,59    | 99,89  |
| 0,86  | TO 0,95  | 85           | 0,11    | 99,99  |
| 0,96  | TO 1,00  | 2            | 0,00    | 100,00 |
| TOTAL |          | <u>78000</u> |         |        |

#### 6.2.3.6 Cluster analysis

The second major multivariate data analysis technique which may be identified is that of cluster analysis. The technique has as its input requirement the same raw score matrix as is used in the factor analytic algorithm. Each respondent included in the sample is assigned a unique position in a multidimensional Cartesian space consistent with the respondent's evaluation of the variable. The assumption of interdependency of variables also obtains, hence the technique assumes that both criterion and predictor variables are random variables.

The usage of the technique is to group together respondents that show similarities in their evaluations, and are thus assumed to be related by some common factor(s). As stated by Sheth (1971), in cluster analysis, "the objective is to classify a population of entities into a small number of mutually exclusive and exhaustive groups based on the similarities of profiles among entities" (p.16). The technique is therefore a classification technique in the field of numerical taxonomy that separates objects into groups such that each object in a given group displays a higher similarity to other objects in its group than to objects in any other group.

In cluster analysis the researcher will seek to group associated respondents in such a way that an image profile emerges of separate groups. In the field of marketing the detail with which customer groups may be defined is dependent on the amount of information available about the customers.

Simplistically, the cluster analysis technique examines the sample of responses for similarity in evaluations, and groups together those respondents that have submitted evaluations that are similar, based on the variables on which they were tested. The technique therefore classified "swarms" of objects together as they appear in the multidimensional space. Since it may become difficult to define differences between clusters where a large number of variables are involved, the dimensionality of the space may be reduced by one of the factor analytic procedures - usually by principal component analysis. Groups of respondents will therefore be classified by the similarity of certain basic image dimensions which they associate with the concept domains concerned. Originally cluster analysis was used to assign variables to discrete groups. Clustering respondents or objects is a more recent development of the technique.

#### 6.2.3.7. Multidimensional scaling.

The methodology for exploring organization role-perception derives from a research strategy involving the discovery of structural characteristics from perceptual data. The

approach is similar in spirit to that taken by Jones and Young (1972).

Our concept of interpersonal perception implies that each individual in a social field has an internal representation of the other members in the field, with the individual positioned somewhere in the representation. This is his own personal "social environment". We will use the term "social structure" to refer to the pattern of this environment: the systematic relationships among the persons composing the structure (p. 108).

Multidimensional scaling differs from simple unidimensional scales in that people may be located within a two-dimensional plane or a space of even higher dimensionality. This simultaneous representation in more than one dimension offers a better chance of revealing patterns of social structure. The core concept in this representation is that of a metric space (Green & Carmone, 1970).

A metric space is one for which there exists a well defined distance function. Euclidean distances are most common and are given by the equation.

$$d_{ij} = \left[ \sum_{k=1}^r (x_{ik} - x_{jk})^2 \right]^{1/2},$$

Actually this function is a special case of a more general function, the Minkowski  $r$ -metric, so that there are several possible functions, including the so-called city-block metric, in which distance is the sum of the absolute differences in the coordinates on each dimension. Shepard (1969), however, suggests that the Euclidean metric is quite robust. Whatever the metric, structural relations are represented as spatial distances.

The application of multidimensional scaling starts with the selection of a set of inter-related entities. The basic input data required for multidimensional scaling is a number for each pair or set of entities, reflecting how closely the two entities, or set of entities, is related. Multidimensional scaling is then used to provide as output a geometric configuration of the entities in which the interpoint distances correspond to the empirical input values of psychological relatedness.

Scaling methods : There are three basic methods of multidimensional scaling: (Green & Carmone, 1970):

- fully metric
- non-metric
- fully non-metric

#### 6.2.3.7.1 Fully metric methods

This set of methods (also called linear or classical) is based on the assumption that the input distances are on an interval scale. The

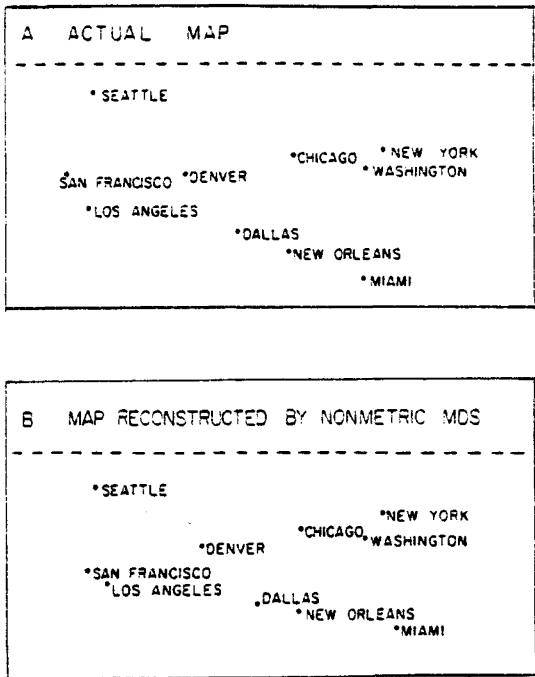
methods are used in a way whereby an output configuration is sought with interpoint distances that match the input values up to a linear transformation.

#### 6.2.3.7.2 Non-metric methods

In utilizing this set of methods it is assumed that the input distances are on an ordinal scale but that the output distances are on a ratio scale (the dimensions of the output configuration are on an interval scale). Rosenberg and Sedlak (1972) provide a dramatic example of the power of non-metric methods developed by Shepard (1966). Shepard showed that the reconstruction of a known configuration from only the rank order of the interpoint distances is essentially perfect with fifteen or more points and is usually quite good with even fewer points (Shepard, 1966). It is argued by Rosenberg and Sedlak (1972) that the reason for this is that even the rank order of distances contain enough metric information under most conditions to recover the original configuration.

Figure 6.8 shows, for example, the mapping which was produced by one of Kruskal's (1967) non-metric programmes when only the rank order of the distances in Figure 6.8 was

used as input. In psychological research the assumption that input data may be only ordinal is more realistic than is the interval-scale assumption required by linear methods.



DISTANCE IN MILES BETWEEN TEN U.S. CITIES.

|               |      |         |       |      | San       | New     |            |        |        |
|---------------|------|---------|-------|------|-----------|---------|------------|--------|--------|
|               | N.Y. | Chicago | Miami | L.A. | Francisco | Orleans | Washington | Denver | Dallas |
| N.Y.          | 0    |         |       |      |           |         |            |        |        |
| Chicago       | 818  | 0       |       |      |           |         |            |        |        |
| Miami         | 1325 | 1386    | 0     |      |           |         |            |        |        |
| L.A.          | 2911 | 2189    | 2985  | 0    |           |         |            |        |        |
| San Francisco | 3082 | 2233    | 3238  | 407  | 0         |         |            |        |        |
| New Orleans   | 1406 | 977     | 881   | 1947 | 2300      | 0       |            |        |        |
| Washington    | 229  | 696     | 1096  | 2754 | 2897      | 1165    | 0          |        |        |
| Denver        | 1352 | 1043    | 2126  | 1189 | 1267      | 1314    | 1707       | 0      |        |
| Dallas        | 1649 | 955     | 1394  | 1431 | 1791      | 509     | 1414       | 805    | 0      |
| Seattle       | 3025 | 2184    | 3496  | 1193 | 366       | 2731    | 2880       | 1425   | 2222   |

Figure 6.8  
 Illustration of the power of non metric MDS where only the rank order of distances between the above cities were used. From: Rosenberg and Sedlak (1972, p.240 - 241).



#### 6.2.3.7.3. Fully non-metric

Both the input and output are assumed to be non-metric, that is the output is not a geometric configuration but only a rank order of the entities on each of a set of dimensions in turn (Bennett & Hays, 1960; Hays & Bennett, 1961). Non-metric methods have not been used extensively because they do not utilize the advantage of the metric information available in the input data.

The analysis procedures utilized in this dissertation are classified by Shepard, Romney and Nerlove (1972) as Multidimensional Scaling of Profile Data.

A. Rectangular matrix, rows correspond to  $n$  objects and columns correspond to  $m$  variables (or vice versa).

One object with respect to one of the variables. The row (or column) of  $m$  measured values of any object is considered to be a profile characterizing that object.

Examples: An individual's subjective rating of each of  $n$  stimuli with respect to each of  $m$  attributes; the objective scores on each of  $n$  tests of each of  $m$  individuals; or the

measured values of each of  $n$  companies or nations with respect to each of  $m$  economic variables.

In any of these examples, whether the rows are regarded as the objects and the columns as the variables or vice versa will depend upon the interests of the investigator or upon the purposes of the investigation.

Model: The objects are represented as  $n$  points (or vectors) in a space in such a way that the profile associated with each object varies according to some simple or orderly rule with the position of that point in the space. The precise nature of the assumed rule depends upon the particular model.

In the standard factor-analytic model the profile associated with a point is to be approximated as a linear combination of a set of basic profiles associated with the reference axes and weighted (in the combination) proportionally to the projection of that point on each of those axes. In parametric mapping, on the other hand, the only requirement is that the profile associated with a point varies sufficiently smoothly with its position (pp. 27 & 28).

### 6.3. The behavioural measures and their correlates

#### 6.3.1 A measure of cognitive complexity/simplicity.

This is given by the explanation power of the first component.

The most extensive initial use of repertory grids outside the theoretical framework which Kelly developed to surround the technique was the measurement of the postulated dimension of cognitive complexity.

Jones (1954) was the first person to assess the concept cognitive complexity to be measured by the explanatory power of the first factor extracted from the repertory grid and also by the number of factors that could be derived from the grid.

In the INGRID and GRIDAV analysis the explanatory power of the first component is given by the percentage of the total variation accounted for by the first component. This figure is considered to be an inverse measure of cognitive complexity.

Bieri (1955, 1961) has developed the concept within the general context of personal construct theory and defines cognitive complexity in terms of the versatility of the individual's construct system.

A system of constructs which differentiates highly among persons is considered to be cognitively complex. A construct which provides poor differentiation among persons is considered to be cognitively simple in structure (Bieri 1961,p.263).

According to Chetwynd (1976) a number of investigators has refined or broadened the definition of cognitive complexity "so that we now have many different phenomena labelled cognitive complexity/ simplicity and many differing ways of measuring those phenomena (for example, Crockett, 1965; Stringer, 1971; Vannoy, 1965).

A number of correlates of cognitive complexity are described by Bieri (1961) and Crockett (1965). Crockett reviews the literature on definitions of cognitive complexity and its effects on the formation of impressions of others as well as methods of measurement and some of the accompanying problems. Crockett makes an important distinction between cognitive differentiation and integration.

Developmental and experiential differences have also been shown to be important to the level of complexity. In a study of adolescent boys, Hunt (1962) reported in Chetwynd (1976) showed that cognitive complexity increases with age. Signell (1966) confirmed this study. In the experiential domain, Runkel and Damrin (1961) demonstrated a U-shaped relationship between training and cognitive complexity.

Chetwynd (1976) concludes that a great deal more research will have to be done into the correlates of cognitive complexity and that evidence has been provided both for and against the hypothesis. It seems that no research has to date been related to the work done by the above researchers into the domain of psychological differentiation defined by Witkin, Dyk, Faterson, Goodenough and Karp (1962).

In this study the size of the components is taken simply as a measure of the extent to which managers will channel or filter constructs into simple cognitive or conceptual structures.

#### 6.3.2. Measures of response error.

Bias - measure of the tendency of an informant to respond by using only one end of the grading scale (a measure of acquiescence).

Variability - a measure of the tendency of an informant to respond by using the extremes of the grading scale.

### 6.3.3. Relationships between constructs and elements in three dimensions

The dispersion of all the functions of a grid in the space of its three major components can be represented diagrammatically using the polar co-ordinates listed in the output of INGRID or GRIDAV. The programme developed to achieve this multidimensional scaling technique has been termed GRAPHPLOT. All the graphical displays of the relationships between constructs and elements in Chapter 7 were derived using this programme.

## CHAPTER 7

### ANALYSIS OF DATA

Currently many psychologists feel that psychology should concern itself more with 'whole' people. It should centre more on 'real human experience'. This is comical in one sense - it is as if sailors suddenly decided they ought to take an interest in ships.

(Bannister & Fransella, 1980, p.9)

#### 7.1 Introduction

In order to understand social behaviour, one begins by attempting to comprehend the psychological process by which man perceives and organizes social stimuli.

A single behaviour can be mapped only simply, but a set of behaviours can be mapped in several fashions.

However complex may be the mapping process, the meaning of any human behaviour at the overt level is derived from its mappings into a finite number of frameworks, and the frameworks chosen represent a shared system of concepts common to the culture of the mappers. In general, overt concepts involve no assumptions about what is going on "inside" the actor, nor are they dependent upon characteristics of the organization as a supra-individual entity. Overt mappings are direct, objective, at a low level of abstraction, and require a minimum of observation time.

Concepts of the overt system consist of direct mappings of behavioural events into a finite set of frameworks. The type of overt concept is specified by the choice of framework and mapping rule. In general, overt concepts imply nothing other than immediately evident qualities displayed by an actor.

In contrast with concepts of the overt system, some concepts describing behaviours apply to phenomena which one presumes are taking place in the minds of actors and which serve to mediate between stimulus events and output behaviour for the individual. Such terms as attitude, motive, norm, value, goal, expectation, cognitive dissonance, personal construct system, among others, refer to hypothetical processes which may be reflected in a number of differing behaviour types depending upon the situation. Cognitive concepts are designed to account for patterns of similar behaviour displayed by persons and involve a variety of mentalistic connotations.

Words have no inner or inevitable meaning, but are devices for communication. They are carriers both of meaning, feeling and tone. The test of the acceptability of a word is very simple. It is this: Is the word or concept useful in visualizing or mentally managing the world? The idea of a personal construct passes this test.

It is a convenient and helpful way to visualize people's ideas about objects and phenomena in general. It lends itself to measurement and analysis. A set of constructs can be analysed, diagnosed and results can be measured, and cognitive structures or maps may be derived from the intricate network of relationships which are analyzed.

By cognitive map, in this study, one means simply the mental structural representations that managers have in their minds about other managers in organizational settings. These mental pictures may come from direct or indirect experience. They may be rational or irrational, they may depend on evidence or hearsay, and they may appear in an infinite number of patterns. This viewpoint is aptly summarized by Frost (1978).

There is no such thing as the organization in a "concrete social entity" sense, but rather there are co-existing and frequently competing images of what the substance of organization is at any point in time (p.355).

The object of the analysis of the data in this dissertation is to examine the structure and meaning which may exist in the socially construed world of managers.

The manager's mind works with verbal codes which summarize complex events and task-relevant information (Daft & Wiginton, 1979, p.184).

In addition to examining the nature of individual personal construct systems in this dissertation the researcher examines group processes through personal constructs. The managerial group is considered as a semi-connected lattice of relations.

A collective or group construct system could be construed by an individual or a group in a manner analogous to the construing of one person by another. Equally the process of construing would constitute the individual/group/ or inter-group relation (Stringer & Bannister, 1979, p.xv).

## 7.2 Analysis of data

### 7.2.1 Hypothetico-deductive

Each of the 90 grids derived from the managers in the 10 companies was analysed using the INGRID programme described in Chapter 6. The analysis of each grid yielded a principal components analysis, a measure of bias, a measure of variability and measures of construct and component intercorrelations.

Angular distances between constructs and elements expressed as cosines and polar co-ordinates were also



derived for use in the role perception or cognitive map part of the study.

As discussed in Chapter 6, an analysis of cognitive structure is most effectively achieved by comparing the overall measured or consensus grid with the multiple random or quasi-grids.

Tables 7.1 to 7.4 are summaries of the essential comparative features of the construct systems of the 90 individual managers in the study and the randomly produced grids.

Bias, which is a measure of consistent extremeness of responding either extremely high or extremely low, ranges for the 90 measured grids, between a low of 0,17 and a high of 0,71 with a mean of 0,40 and a standard deviation of 0,11. The comparative figures for 90 randomly generated grids are low 0,15, high 0,27, with a mean of 0,21 and a standard deviation of 0,02 (Table 7.1).

It is apparent from an examination of the raw data that there has been a tendency on the part of the managers, when rating the elements, to use the extremes of the more positive poles of the continua rather than the extremes of the negative ends. Although the instructions given to the respondents specifically stated that the full range of the scale be used, managers nevertheless saw themselves in general terms as being part of the top management in their respective companies and tended to rate on the positive side of neutral. Although this was the noted tendency, examination of the raw data nevertheless reveals that use was made of both ends of the continua in most cases. Chetwynd (1976) points out that bias is very much higher in the case of experimental grids than quasigrids.

TABLE 7.1

A comparison of the bias and variability of measured and quasi-grids.

Properties of 90 measured grids

|             | LOWEST | HIGHEST | MEAN | SDEV |
|-------------|--------|---------|------|------|
| BIAS        | 0,17   | 0,71    | 0,40 | 0,11 |
| VARIABILITY | 0,23   | 0,77    | 0,46 | 0,10 |

Properties of 90 quasi-grids

|             | LOWEST | HIGHEST | MEAN | SDEV |
|-------------|--------|---------|------|------|
| BIAS        | 0,15   | 0,27    | 0,21 | 0,02 |
| VARIABILITY | 0,61   | 0,71    | 0,67 | 0,02 |

It is reasonable to assume therefore that there are some psychological implications in this structural measure which in this particular study may be attributed to the fact that the top management team in each company expectedly has at least some measure of self esteem. This may be reinforced by an acquiescence in response style. The degree of bias falls within the ranges in work quoted by Chetwynd (1976) and was not extreme enough in any individual grid from the sample of 90 to warrant normalization of the data, an option allowed for, if necessary, in the analysis of each grid.

Variability

A measure of the tendency of the managers to respond by using extreme ends of the scale ranged from a low of 0,23 to a high of 0,78 with a mean of 0,46 and a standard deviation of 0,10.

In her findings Chetwynd (1976) shows that the variability of experimental grids is slightly higher, and this is borne out in this study when comparing the mean variability for quasias 0,67 with that for the experimental grids 0,46.

### Size of the latent roots

A comparison of the difference between measured and quasi-grids is shown for the two distributions in terms of the sizes of the latent roots (Table 7.2). The measured distribution has a distinctly different pattern of latent roots arising out of the principal components analyses conducted on each grid. The mean contribution of component 1 measured as a percentage contributed is 46,67% whereas for the quasi grid it is 19,64%. The lowest value of component 1 for an individual manager (29,73%) is higher than the highest (24,54%) obtained randomly, clearly illustrating the effects of perceptual construction or relationship among the dimensions utilized by individual managers.

TABLE 7.2

A comparison of the principal components of measured and quasi-grids.

#### Size of the latent roots for measured grids

| COMPONENT | LOWEST | HIGHEST | MEAN  | SDEV  |
|-----------|--------|---------|-------|-------|
| 1         | 29,73  | 70,21   | 46,67 | 11,49 |
| 2         | 8,60   | 26,96   | 18,39 | 4,83  |
| 3         | 5,79   | 17,62   | 11,77 | 3,53  |
| 4         | 3,45   | 10,39   | 7,62  | 1,70  |
| 5         | 2,50   | 7,90    | 5,33  | 1,38  |
| 6         | 1,86   | 6,51    | 4,20  | 1,34  |
| 7         | 1,38   | 4,66    | 2,88  | 0,69  |
| 8         | 0,95   | 3,44    | 2,01  | 0,58  |
| 9         | 0,51   | 2,61    | 1,14  | 0,48  |

#### Size of the latent roots for quasi-grids

| COMPONENT | LOWEST | HIGHEST | MEAN  | SDEV |
|-----------|--------|---------|-------|------|
| 1         | 16,11  | 24,54   | 19,64 | 1,67 |
| 2         | 14,43  | 19,71   | 16,86 | 1,08 |
| 3         | 11,74  | 16,78   | 14,34 | 0,98 |
| 4         | 10,00  | 14,50   | 12,30 | 0,87 |
| 5         | 8,71   | 12,43   | 10,48 | 0,74 |
| 6         | 7,29   | 10,34   | 8,78  | 0,68 |
| 7         | 5,69   | 9,23    | 7,47  | 0,71 |
| 8         | 3,43   | 7,43    | 5,90  | 0,76 |
| 9         | 2,59   | 5,95    | 4,22  | 0,79 |

The mean contribution of variance on component 2 is 18,37% for the measured grid and 16,87% for the random grid. Thereafter, from component 3 onwards the relationships of the magnitude of means is reversed with the quasi-grid means for successive components being higher than those for measured grids.

An interesting feature of the characteristics of the means is that, in the measured managerial sample, the effect of the first two components is to "remove" a relatively large percentage of the variance (65%) leaving only 35% of the variance for distribution among the remaining seven components whereas the first two components in the random grid sample account only for 36,5% leaving 63,5% to be distributed among the remaining seven components; hence the structural reversal when comparing the results of the two sets of principal component analyses.

The differences between means resulting from these two samples were tested using Hotelling  $\underline{T}^2$  and Mahalanobis  $\underline{D}^2$  (Morrison 1967). Both Hotelling's  $\underline{T}^2$  and Mahalanobis'  $\underline{D}^2$  can be transformed to an  $\underline{F}$  statistic. The differences between means were compared for the number of components contributing 90% of the variance. The remaining components contributed only 10% of the variance. Interpretation of these remaining components is not possible.

In Table 7.3 the output for the separate  $\underline{t}$ 's, Hotelling's  $\underline{T}^2$ , and Mahalanobis'  $\underline{D}^2$  is given. The separately computed  $\underline{t}$ 's for each set of means is significant  $p < ,005$  for all comparisons of the principal component 1 to 5. The  $\underline{t}$ 's range from 2,88 on component 2 to 31,34 for component 5. Component 1 which contributes the largest portion of variance has on comparison a  $\underline{t} = 22,10$ .

The multivariate  $\underline{D}^2$  (56,82);  $\underline{T}^2$  (2557,19);  $\underline{F}$  (499,94) are computed for the overall comparison of the set of means and are also significant  $p < .001$ .

A visual comparison of the differences in the nature of the distributions of the components is also provided on the right-hand side of Table 7.3.

The magnitude of the percentage of variance contributed by the components also forms an interesting base for comparison. For example, the lowest percentage of variance on component 1 is still larger than the highest of the random sample.

The null hypothesis that a particular grid or set of grids is indistinguishable from an array of random numbers needs to be considered. This is achieved by comparing the output and behaviour of a set of 90 randomly generated grids with those of the 90 managers. The programme RANGRID described in Chapter 6 was used to compare the output derived from the consensus grid for 90 managers with the randomly generated grids.

PAGE 2 COMPARISON OF RANDOM AND MEASURED GRIDS

DIFFERENCES AMONG GROUP MEANS USING ALL VARIABLES  
FOR THE FOLLOWING GROUPS

\*\*\*\*\*  
\* MEASURED \*  
\* RANDOM \*  
\*\*\*\*\*

|                      |           |         |       |
|----------------------|-----------|---------|-------|
| MAHALANOBIS D SQUARE | 56.8264   |         |       |
| HOTELLING T SQUARE   | 2557.1921 |         |       |
| F VALUE              | 499.9453  | P VALUE | 0.000 |
| DEGREES OF FREEDOM   | 5, 174    |         |       |

DIFFERENCES ON SINGLE VARIABLES

\*\*\*\*\*  
\* XX1 \* VARIABLE NUMBER 1  
\*\*\*\*\*  
STATISTICS P VALUE DF

|              |       |     |      |
|--------------|-------|-----|------|
| T (SEPARATE) | 22.10 | 0.0 | 92.7 |
| T (POOLED)   | 22.10 | 0.0 | 178  |

F(FOR VARIANCES)  
LEVENE \*\*\*\*\* 0.062 1, 178

|             |            |          |
|-------------|------------|----------|
| GROUP       | 1 MEASURED | 2 RANDOM |
| MEAN        | 46.6670    | 19.6360  |
| STD DEV     | 11.4843    | 1.6655   |
| S.E.M.      | 1.2106     | 0.1756   |
| SAMPLE SIZE | 90         | 90       |
| MAXIMUM     | 70.2100    | 24.5400  |
| MINIMUM     | 29.7300    | 16.1100  |

1 MEASURED(N= 90)

```

H
H
H
H H H
H HH H H H
H HHHH HHHH H
HHHHHHHHHHHHH H
MIN-----MAX
AN H = 3 CASES
  
```

2 RANDOM (N= 90)

```

X
X
X
XX
XX
XXX
XXXX
MIN-----MAX
AN X = 8 CASES
  
```

\*\*\*\*\*  
\* XX2 \* VARIABLE NUMBER 2  
\*\*\*\*\*  
STATISTICS P VALUE DF

|              |      |       |      |
|--------------|------|-------|------|
| T (SEPARATE) | 2.88 | 0.005 | 97.8 |
| T (POOLED)   | 2.88 | 0.005 | 178  |

F(FOR VARIANCES)  
LEVENE \*\*\*\*\* 0.075 1, 178

|             |            |          |
|-------------|------------|----------|
| GROUP       | 1 MEASURED | 2 RANDOM |
| MEAN        | 18.3700    | 16.8682  |
| STD DEV     | 4.8350     | 1.0754   |
| S.E.M.      | 0.5097     | 0.1134   |
| SAMPLE SIZE | 90         | 90       |
| MAXIMUM     | 26.9600    | 19.7100  |
| MINIMUM     | 8.6000     | 14.4300  |

1 MEASURED(N= 90)

```

H
H
H
H HHH H
H HHH HHHHHH H
HHHHHHHHHHHHHHHHHHH
MIN-----MAX
AN H = 3 CASES
  
```

2 RANDOM (N= 90)

```

X
X
X
X
XXX
XXXX
XXXXXX
MIN-----MAX
AN X = 7 CASES
  
```

\*\*\*\*\*  
\* XX3 \* VARIABLE NUMBER 3  
\*\*\*\*\*  
STATISTICS P VALUE DF

|              |       |       |       |
|--------------|-------|-------|-------|
| T (SEPARATE) | -6.65 | 0.000 | 102.6 |
| T (POOLED)   | -6.65 | 0.000 | 178   |

F(FOR VARIANCES)  
LEVENE \*\*\*\*\* 0.073 1, 178

|             |            |          |
|-------------|------------|----------|
| GROUP       | 1 MEASURED | 2 RANDOM |
| MEAN        | 11.7709    | 14.3392  |
| STD DEV     | 3.5328     | 0.9805   |
| S.E.M.      | 0.3724     | 0.1034   |
| SAMPLE SIZE | 90         | 90       |
| MAXIMUM     | 17.6200    | 16.7800  |
| MINIMUM     | 5.7900     | 11.7400  |

1 MEASURED(N= 90)

```

H
H
H
H HHHHHH
H HHHHHHHHHHHH HHHH
MIN-----MAX
AN H = 4 CASES
  
```

2 RANDOM (N= 90)

```

XX
XXX
XXX
XXXX
XXXXXX
XXXXXXXXX
MIN-----MAX
AN X = 4 CASES
  
```

TABLE 7.3 Comparison of principal components on random and measured grids

◆ ◆ ◆ ◆ ◆  
◆ ××◆ ◆ ◆ ◆ ◆

\* \* \* \* \*  
 \* X X 5 \*  
 \* \* \* \* \*

| GROUP       | 1 MEASURED | 2 RANDOM |
|-------------|------------|----------|
| MEAN        | 7.6191     | 12.3010  |
| STD DEV     | 1.7033     | 0.8679   |
| S.E.M.      | 0.1795     | 0.0915   |
| SAMPLE SIZE | 90         | 90       |
| MAXIMUM     | 10.3900    | 14.5000  |
| MINIMUM     | 3.4500     | 10.0000  |

| GROUP       | 1 MEASURED | 2 RANDOM |
|-------------|------------|----------|
| MEAN        | 5.3346     | 10.4832  |
| STD DEV     | 1.3793     | 0.7364   |
| S.E.M.      | 0.1454     | 0.0776   |
| SAMPLE SIZE | 90         | 90       |
| MAXIMUM     | 7.9000     | 12.4300  |
| MINIMUM     | 2.5000     | 8.7100   |

```

      1 MEASURED(N= 90)
          H
          H
          H
        HHH
      HH HHHHH H
      HHHHHHHHHHHH
-----
MIN              AN H =      4 CASES              MAX

```

```

2 RANDOM (N= 90)
      X
      XX
     XXXX
     XXXX
    XXXXXX
    XXXXXXXX
MIN-----MAX
      AN X =      4 CASES

```

TABLE 7.3 (contd) Comparison of principal components on random and measured grids

TABLE 7.4

Comparison of distributions of correlation coefficients for  
measured and quasi-grids.

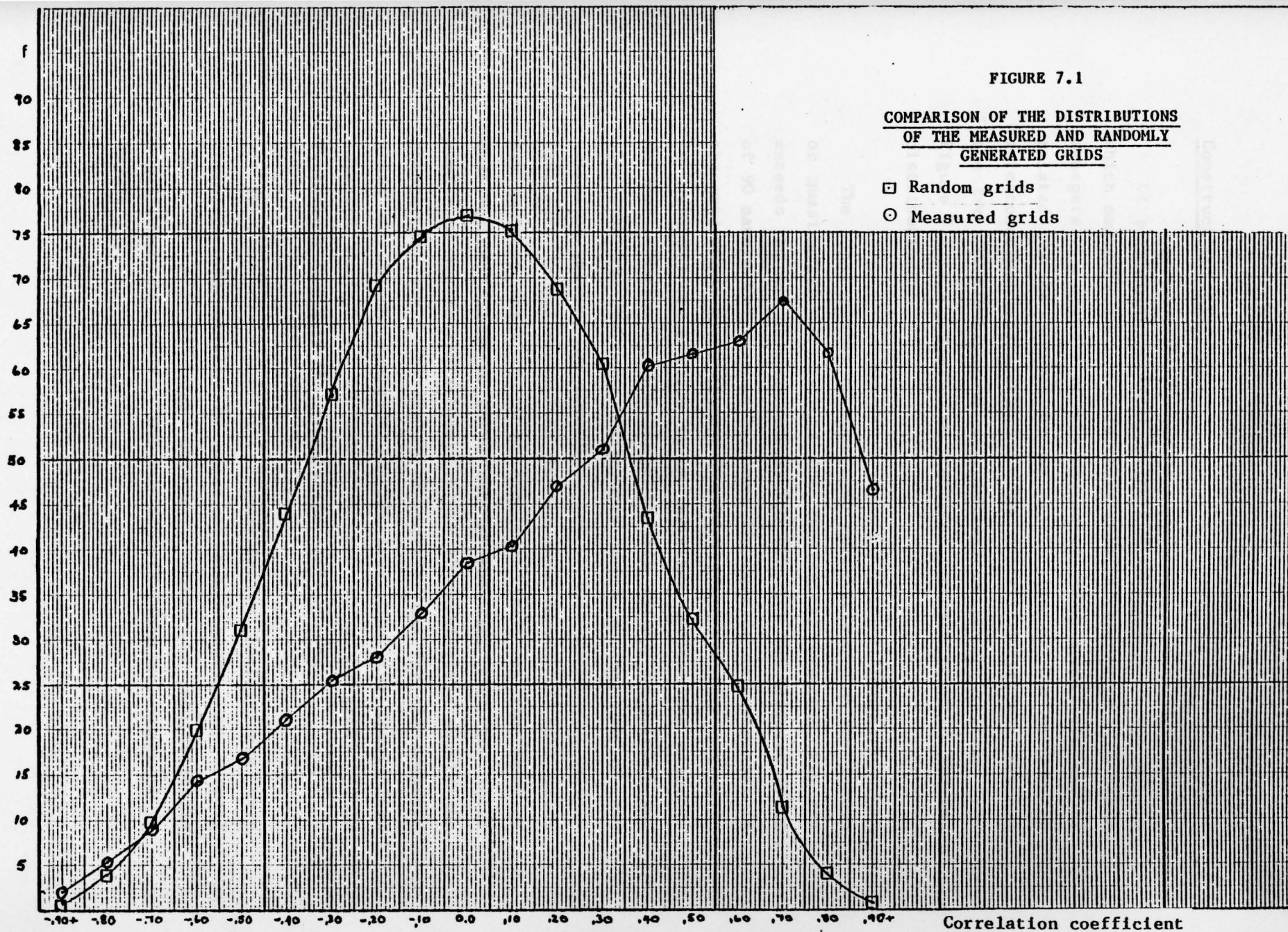
Construct correlations for the measured grids of 90 managers

| CLASS INTERVAL |    |       | FREQ  | PERCENT      | CUM %  |
|----------------|----|-------|-------|--------------|--------|
| -1,00          | TO | -0,85 | 232   | 0,33         | 0,33   |
| -0,84          | TO | -0,75 | 536   | 0,77         | 1,10   |
| -0,74          | TO | -0,65 | 906   | 1,30         | 2,40   |
| -0,64          | TO | -0,55 | 1475  | 2,12         | 4,52   |
| -0,54          | TO | -0,45 | 1683  | 2,42         | 6,94   |
| -0,44          | TO | -0,35 | 2117  | 3,04         | 9,98   |
| -0,34          | TO | -0,25 | 2554  | 3,67         | 13,65  |
| -0,24          | TO | -0,15 | 2860  | 4,11         | 17,76  |
| -0,14          | TO | -0,05 | 3310  | 4,75         | 22,51  |
| -0,04          | TO | 0,05  | 3890  | 5,59         | 28,10  |
| 0,06           | TO | 0,15  | 4006  | 5,75         | 33,86  |
| 0,16           | TO | 0,25  | 4719  | 6,78         | 40,63  |
| 0,26           | TO | 0,35  | 5127  | 7,36         | 48,00  |
| 0,36           | TO | 0,45  | 6079  | 8,73         | 56,73  |
| 0,46           | TO | 0,55  | 6181  | 8,88         | 65,61  |
| 0,56           | TO | 0,65  | 6329  | 9,09         | 74,70  |
| 0,66           | TO | 0,75  | 6790  | 9,75         | 84,45  |
| 0,76           | TO | 0,85  | 6153  | 8,84         | 93,29  |
| 0,86           | TO | 1,00  | 4669  | 6,71         | 100,00 |
|                |    |       | TOTAL | <u>69616</u> |        |

Construct correlations for the 90 quasi-grids

| CLASS INTERVAL |    |       | FREQ         | PERCENT | CUM %  |
|----------------|----|-------|--------------|---------|--------|
| -1,00          | TO | -0,85 | 86           | 0,12    | 0,12   |
| -0,84          | TO | -0,75 | 429          | 0,61    | 0,73   |
| -0,74          | TO | -0,65 | 993          | 1,41    | 2,15   |
| -0,64          | TO | -0,55 | 1998         | 2,85    | 4,99   |
| -0,54          | TO | -0,45 | 3131         | 4,46    | 9,45   |
| -0,44          | TO | -0,35 | 4409         | 6,28    | 15,74  |
| -0,34          | TO | -0,25 | 5739         | 8,18    | 23,91  |
| -0,24          | TO | -0,15 | 6907         | 9,84    | 33,75  |
| -0,14          | TO | -0,05 | 7463         | 10,63   | 44,38  |
| -0,04          | TO | 0,05  | 7678         | 10,94   | 55,32  |
| 0,06           | TO | 0,15  | 7537         | 10,74   | 66,05  |
| 0,16           | TO | 0,25  | 6854         | 9,76    | 75,82  |
| 0,26           | TO | 0,35  | 5850         | 8,33    | 84,15  |
| 0,36           | TO | 0,45  | 4399         | 6,27    | 90,42  |
| 0,46           | TO | 0,55  | 3224         | 4,59    | 95,01  |
| 0,56           | TO | 0,65  | 1977         | 2,82    | 97,83  |
| 0,66           | TO | 0,75  | 1030         | 1,47    | 99,29  |
| 0,76           | TO | 0,85  | 416          | 0,59    | 99,89  |
| 0,86           | TO | 1,00  | 80           | 0,11    | 100,00 |
|                |    |       | <u>70200</u> |         |        |





### Construct Correlations

Of particular interest in this dissertation is the way in which managers may construe their role relationships with other managers. A measure of the degree to which constructs may be related can be derived by an examination of the pattern of interconstruct correlations. The overall comparison between the two distributions of correlations is given in Table 7.4. Figure 7.1 is a comparative graphical representation of the two distributions.

The total number of construct correlations for the random or quasi-grids (70 200) is the theoretical expected sum and exceeds the sum of correlations (69 616) for the measured grids of 90 managers. This is because, if there is any construct in the grid where every element has been given the same rating it is discarded since there is no variation between the elements on that construct. A message to this effect is printed out detailing the relevant constructs which do not record any variation between the elements. Due to this phenomenon certain construct intercorrelations in the measurement of real grids may be lost which would be highly unlikely in the case of quasi-grids. This is borne out by the fact that the total number of intercorrelations for the 90 quasi-grids equals the theoretical sum. The number of correlations for the measured grids of the 90 managers is 584 less than the theoretical expected maximum of 70 200 (780 per 40 x 10 grid) This represents 0,83% of the correlation coefficients.

The two distributions of correlation coefficients were compared inferentially by means of a  $\chi^2$  test. An overall  $\chi^2$  of 473 965 was obtained, which is statistically significant  $p < 0,0001$ . The two distributions are compared in Figure 7.1.

### 7.2.2 Exploratory-descriptive

#### The overall consensus grid for 90 managers

Figures 7.2 to 7.4 represent the maps derived from the multidimensional scaling process. These maps represent the overall or consensus grid for the 90 managers in the 10 companies.

Table 7.6 to 7.8 depict the constructs arranged in descending order by construct and by element for components 1, 2 and 3.

#### Component 1

A large number of the constructs have a high loading on component 1. The constructs, if interpretable represent a general ability to manage. This general ability to manage would, upon analysis of the data, however, tend to be restricted to the line management functions at the E and F levels of the organization.

The Personnel and Accounting Functions load negatively on this cluster of general management constructs with the D levels of personnel and accounting being the least related.

Constructs which either relate negatively or have very low loadings on component 1 are far more strongly related to either component 2 or component 3.

The construct loadings on component 1 do tend to have a semantic connotation (or gestalt) of dynamism, activity or power.

Power itself is a complex phenomenon and the bases

of power as elaborated by French and Raven (1968) are multidimensional involving: coercion, expertise, reward, legitimization and identification. Among the constructs which constitute the Kellian Repertory Grid constructed for this study, elements of most of the above bases of power may be discerned.

TABLE 7.6

Construct and element loadings for consensus grid for 90 managers on  
component 1.

| <u>Rank</u> | <u>Construct</u> | <u>Construct</u>                          | <u>Loading</u> |
|-------------|------------------|-------------------------------------------|----------------|
| Order       | No.              |                                           |                |
| 1           | 29               | Positive image                            | 0,95           |
| 2           | 9                | Sets high work standards and goals        | 0,94           |
| 3           | 40               | Always finds ways of removing obstacles   | 0,92           |
| 4           | 26               | Held in high esteem                       | 0,92           |
| 5           | 2                | Formulates effective policy               | 0,92           |
| 6           | 38               | Strong personality                        | 0,92           |
| 7           | 12               | Strong influence on general management    | 0,91           |
| 8           | 37               | Effective decision maker                  | 0,91           |
| 9           | 23               | Involved                                  | 0,91           |
| 10          | 34               | Efficient                                 | 0,91           |
| 11          | 18               | Thinks clearly                            | 0,90           |
| 12          | 39               | Dynamic                                   | 0,89           |
| 13          | 15               | Good communicator                         | 0,89           |
| 14          | 17               | Productive                                | 0,88           |
| 15          | 35               | Strong impact                             | 0,88           |
| 16          | 3                | Competent in own technology or profession | 0,87           |
| 17          | 4                | Has corporate views                       | 0,87           |
| 18          | 14               | Imaginative                               | 0,86           |
| 19          | 27               | Original                                  | 0,86           |
| 20          | 21               | Effective                                 | 0,86           |
| 21          | 22               | Good integrator                           | 0,86           |
| 22          | 1                | Forceful in views and convictions         | 0,85           |
| 23          | 8                | Plans effectively                         | 0,84           |
| 24          | 32               | Powerful                                  | 0,84           |
| 25          | 30               | Controls well                             | 0,81           |
| 26          | 36               | Organizes well                            | 0,81           |
| 27          | 19               | Demonstrates high energy level            | 0,80           |
| 28          | 20               | Analytical                                | 0,78           |
| 29          | 10               | Reacts to problems before they arise      | 0,73           |
| 30          | 13               | Tactful                                   | 0,66           |

TABLE 7.6. (continued)

Construct and element loadings for consensus grid for 90 managers on  
component 1.

| <u>Rank</u><br><u>Order</u> | <u>Construct</u><br><u>No.</u> | <u>Construct</u>          | <u>Loading</u> |
|-----------------------------|--------------------------------|---------------------------|----------------|
| 31                          | 16                             | Flexible                  | 0,66           |
| 32                          | 6                              | Decisive                  | 0,65           |
| 33                          | 7                              | Scientific                | 0,55           |
| 34                          | 11                             | Not a risk taker          | 0,48           |
| 35                          | 33                             | Quantitatively orientated | 0,37           |
| 36                          | 31                             | Unaggressive              | 0,35           |
| 37                          | 25                             | Concern for people        | 0,22           |
| 38                          | 5                              | People orientated         | 0,14           |
| 39                          | 24                             | Listens attentively       | 0,11           |
| 40                          | 28                             | Considers other needs     | - 0,13         |

| <u>Managerial Role</u> | <u>Loading on component 1</u> | <u>Paterson Band</u> |
|------------------------|-------------------------------|----------------------|
| Managing director      | + 2,1453                      | F                    |
| Financial director     | + 0,5738                      | E                    |
| Marketing director     | + 0,5678                      | E                    |
| Production director    | - 0,1766                      | E                    |
| Works manager          | - 0,3017                      | D                    |
| Personnel director     | - 0,4054                      | E                    |
| Sales manager          | - 0,6491                      | D                    |
| Personnel manager      | - 2,0071                      | D                    |
| Financial accountant   | - 2,5461                      | D                    |

### Component 2

The constructs which have high loadings on component 2 and which have very low loadings on component 1 are given in Table 7.7. The nature of these components, except possibly for the construct "competent in own profession" all have the semantic connotation of empathy or feeling for people.

The elements which load most highly on component 1 are the personnel director and the personnel manager. The financial director, sales manager and financial accountant have negligible loadings whereas the loadings for the works manager, managing director, production director and marketing director load negatively on component 2.

The relatively high negative loading of the marketing director on component 2 is somewhat surprising.

Persons fulfilling marketing roles are normally regarded as highly outgoing sociable and friendly persons. However, it may be in reality that marketing role-players are more product orientated than people orientated and that they are interested in the people as consumers of their products rather than in developing empathetic inter-personal role relationships. The role expectations of personnel and human resource managers are, however, those of concern for people in general.

### Component 3

The construct loadings on component 3 are given in Table 7.8. The constructs are all concerned with scientific rigour, being well organized, and analytical. By contrast the constructs which load negatively on this component are "being flexible", "taking risks" and "being imaginative".

TABLE 7.7

Construct and element loadings for consensus grid for 90 managers on component 2.

| <u>Rank order</u> | <u>No.</u> | <u>Construct</u>              | <u>Loading</u> |
|-------------------|------------|-------------------------------|----------------|
| 1                 | 24         | Listens attentively           | 0,92           |
| 2                 | 5          | People orientated             | 0,91           |
| 3                 | 25         | Concern for people            | 0,90           |
| 4                 | 31         | Unagressive                   | 0,84           |
| 5                 | 28         | Considers others needs        | 0,80           |
| 6                 | 33         | Not quantitatively orientated | 0,73           |
| 7                 | 13         | Tactful                       | 0,64           |
| 8                 | 6          | Undecisive                    | 0,58           |

| <u>Managerial Role</u> | <u>Loading on Component 2</u> | <u>Paterson Band</u> |
|------------------------|-------------------------------|----------------------|
| Personnel director     | + 1,4943                      | E                    |
| Personnel manager      | + 0,1315                      | D                    |
| Sales manager          | - 0,0166                      | D                    |
| Financial director     | - 0,4032                      | E                    |
| Financial accountant   | - 0,4558                      | D                    |
| Managing director      | - 0,4690                      | F                    |
| Marketing director     | - 0,6234                      | E                    |
| Works manager          | - 0,7860                      | D                    |
| Production director    | - 0,9461                      | E                    |



TABLE 7.8  
Construct and element loadings for consensus grid for 90 managers on  
component 3.

| <u>Rank order</u> | <u>No.</u> | <u>Construct</u>          | <u>Loading</u> |
|-------------------|------------|---------------------------|----------------|
| 1                 | 7          | Scientific                | 0,59           |
| 2                 | 20         | Analytical                | 0,45           |
| 3                 | 33         | Quantitatively orientated | 0,42           |
| 4                 | 36         | Unagressive               | 0,42           |
| 5                 | 18         | Thinks clearly            | 0,42           |

Construct negative loadings

|    |             |      |
|----|-------------|------|
| 11 | Takes risks | 0,69 |
| 16 | Flexible    | 0,59 |
| 14 | Imaginative | 0,46 |
| 27 | Original    | 0,44 |

| <u>Managerial Role</u> | <u>Loading on Component 3</u> | <u>Paterson Band</u> |
|------------------------|-------------------------------|----------------------|
| Financial director     | + 1,03                        | E                    |
| Financial accountant   | + 0,62                        | D                    |
| Production director    | + 0,50                        | E                    |
| Personnel director     | + 0,34                        | E                    |
| Managing director      | - 0,23                        | F                    |
| Works manager          | - 0,30                        | D                    |
| Personnel manager      | - 0,38                        | D                    |
| Marketing director     | - 0,84                        | E                    |
| Sales manager          | - 0,98                        | D                    |

The elements which load most highly on this component are the financial director, financial accountant and production director, whereas the marketing director and sales manager positions load negatively. The findings on negative loadings have both high face as well as high construct validity since one would not really expect financial and production role incumbents to display, in terms of their disciplines, characteristics of flexibility, risk-taking and of being highly imaginative. The financial accountant loads negatively on component 1. The high loading on 3 but low loading on 1 suggest that he has the competence in his own technology but does not have the opportunity or ability to influence the other managers in the organization. In nine out of ten companies studied, the accounting function was computerized, suggesting that the financial accountant's ability to influence others is eroded still further and that his discipline is purely related to technology with very little influence on others in his role-set.

Some interesting features which were found to be interpretable with respect to the relative positioning of the different role occupants along the above three major components are illustrated in the graphical plots or role perception matrices of the consensus grid (Figures 7.2 to 7.4).

#### 7.2.2.1 The consensus grid

The consensus grid showing the dispersion of the managers in construct space is depicted in the following 3 figures (7.2 to 7.4).

# KEY TO THE MULTIDIMENSIONAL SCALING MAPS

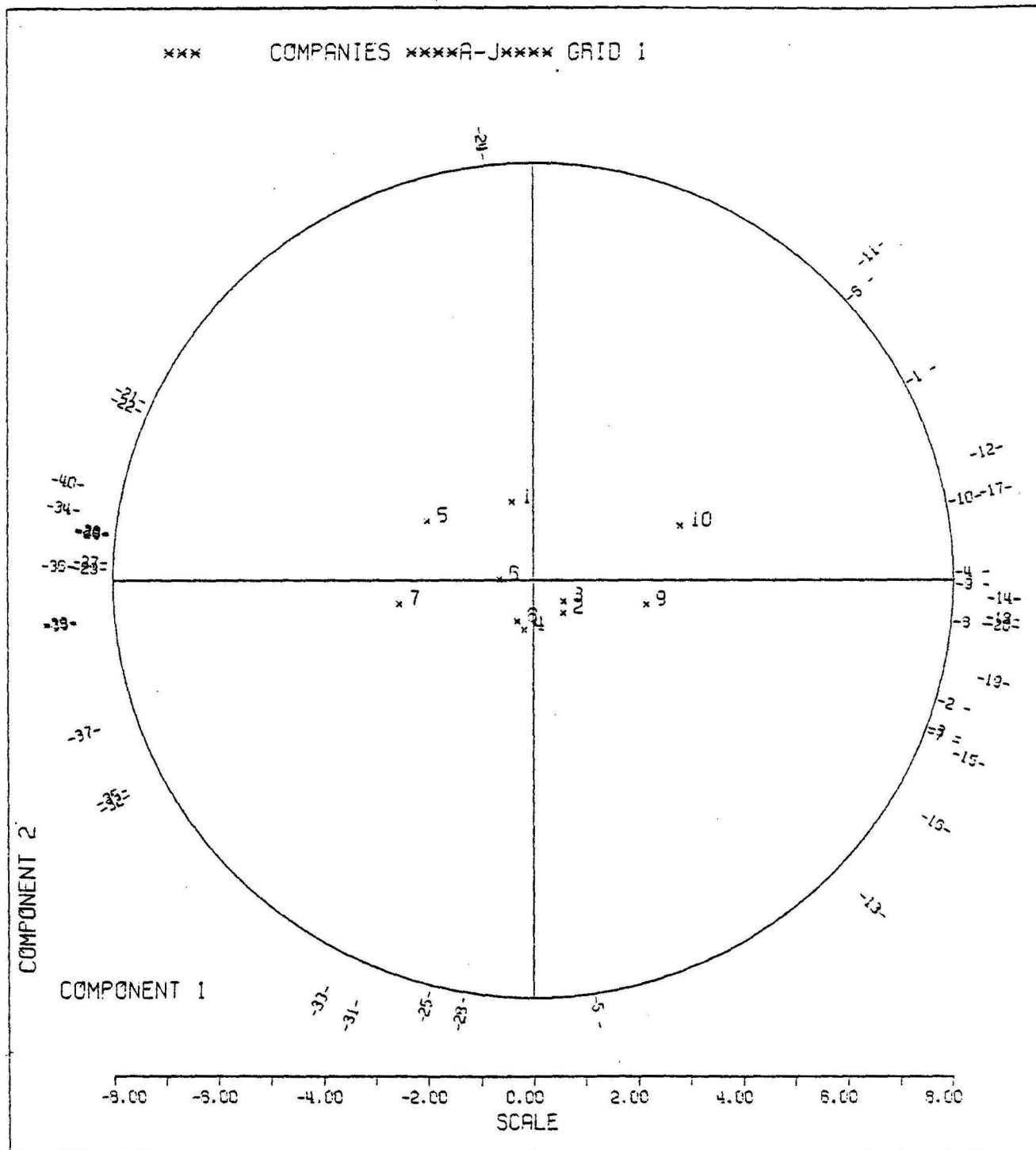
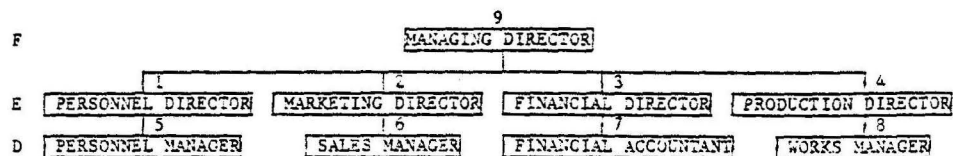


FIGURE 7.2

The consensus grid for 90 managers showing the managers' (elements') positioning in construct space. The numbers around the perimeter represent the constructs loading on the two main components.

# KEY TO THE MULTIDIMENSIONAL SCALING MAPS

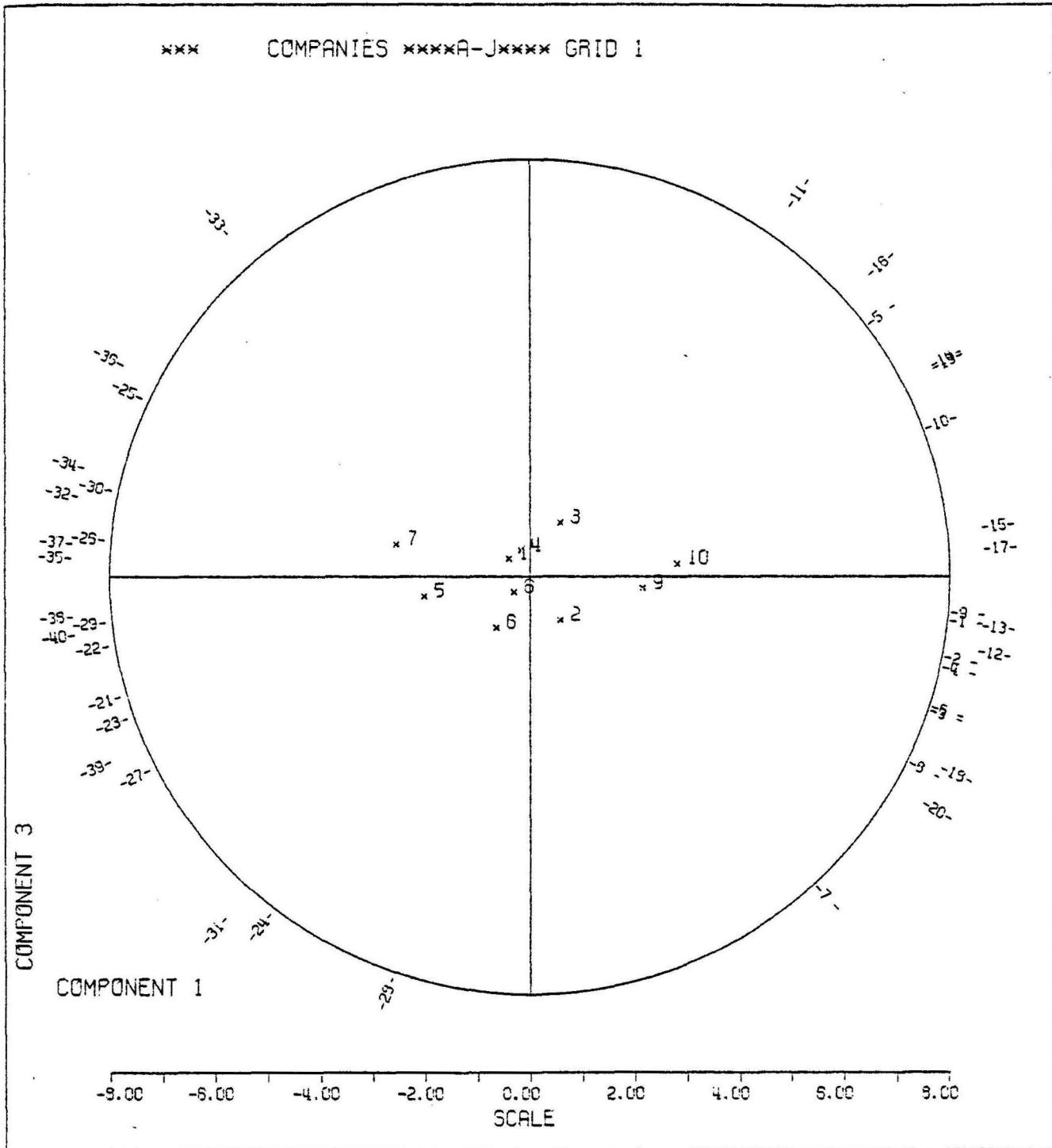
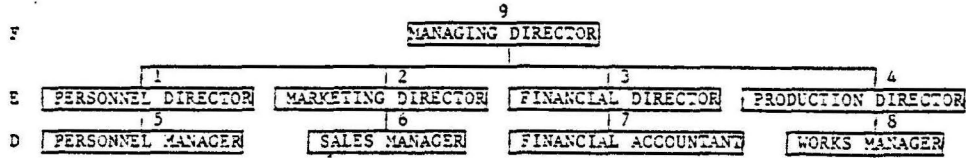


FIGURE 7.3

The consensus grid for 90 managers showing the relationships among the managers in construct space for components 1 and 3.

# KEY TO THE MULTIDIMENSIONAL SCALING MAPS

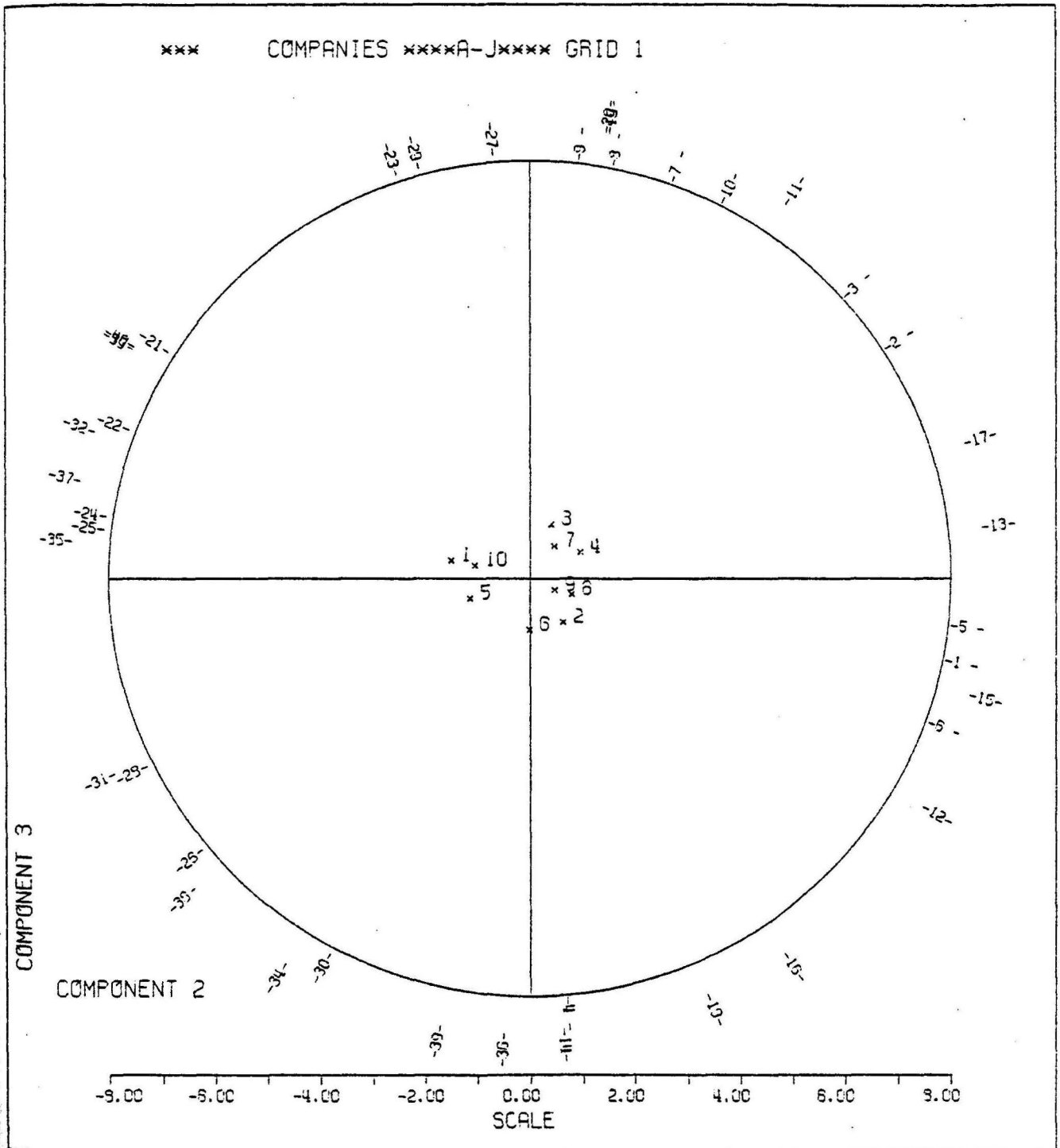
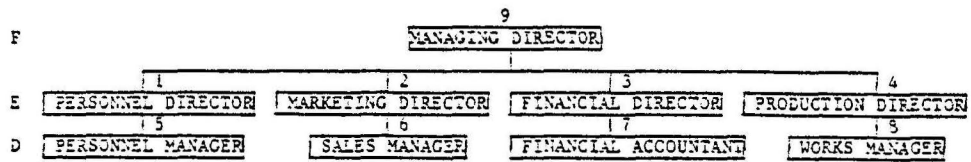


FIGURE 7.4

The consensus grid for 90 managers showing the relationships among the managers in construct space for components 2 and 3.

#### 7.2.2.2 Extreme cognitive simplicity

Manager C05 in his social construction of the managerial role-set in which he exists, displays an extremely simple cognitive view of his organizational world as can be discerned from Figures 7.5 to 7.7. The percentage of variance by the first component for this manager is 70,21%. The overall table of percentages is given in Table 7.9 below:

TABLE 7.9  
The component space of manager C05

| <u>Component</u> | <u>Root</u> | <u>%</u> |
|------------------|-------------|----------|
| 1                | 28,09       | 70,21    |
| 2                | 3,83        | 9,60     |
| 3                | 3,08        | 7,72     |
| 4                | 1,38        | 3,45     |
| 5                | 1,24        | 3,11     |
| 6                | 0,95        | 2,39     |
| 7                | 0,64        | 1,62     |
| 8                | 0,46        | 1,16     |
| 9                | 0,29        | 0,73     |

It is interesting to note that this manager was perceived in the semi-structured interview data to have the least impact, power and status of all managers in his role set. The pattern of inter-construct correlations reveals that for this manager virtually every construct is related to virtually every other construct. Constructs which are judged in general to be cognitively separate from others by other managers, for example the general differences between constructs loading on factor 1 and factor 2, are not perceived as being differentiated by this manager. In his construing of his social world he combines the constructs into one relatively simple cognitive map or picture of the world.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS

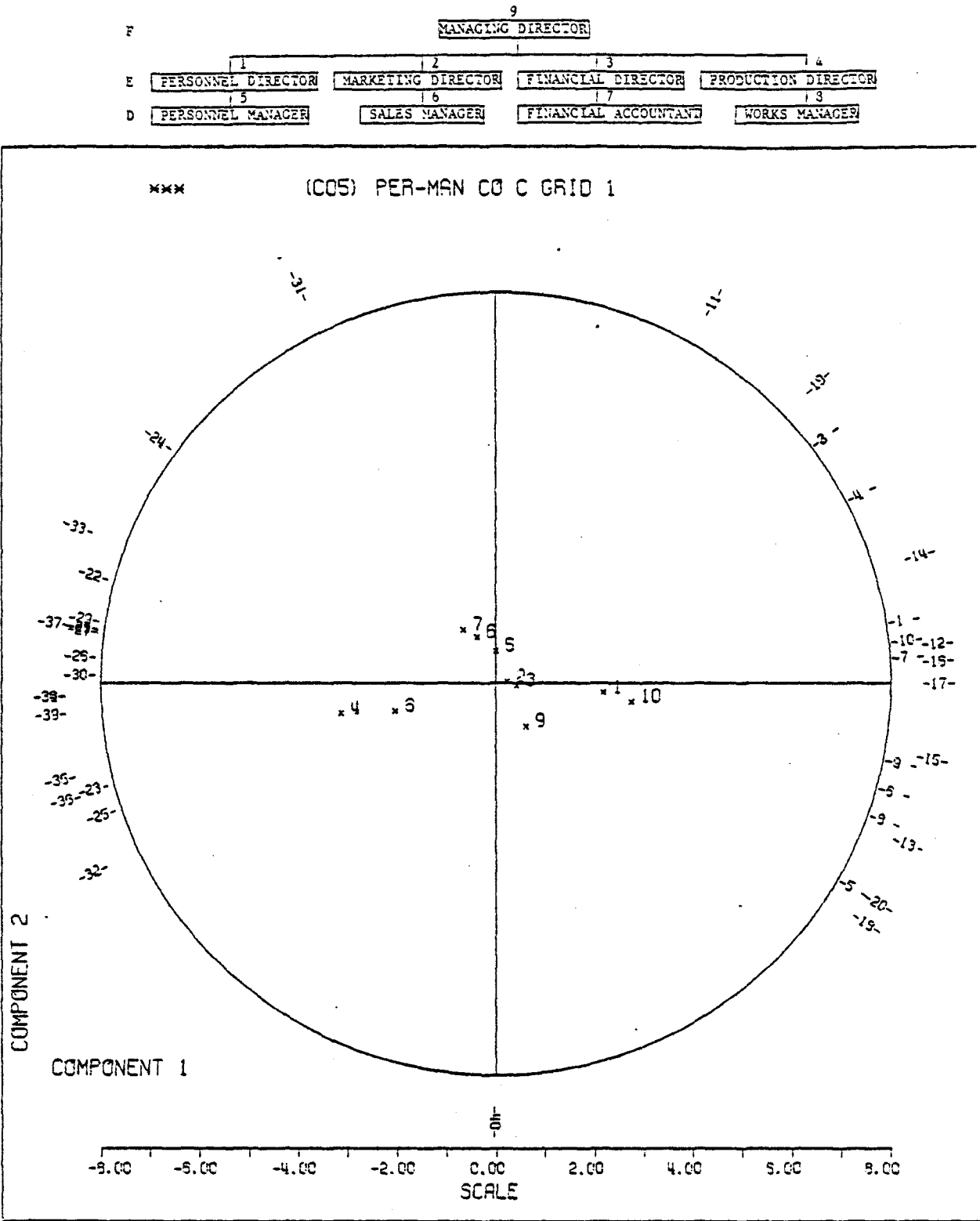


FIGURE 7.5

The individual grid or cognitive map of a manager exhibiting extreme cognitive simplicity: components 1 and 2. Almost all the constructs load on component 1.

# KEY TO THE MULTIDIMENSIONAL SCALING MAPS

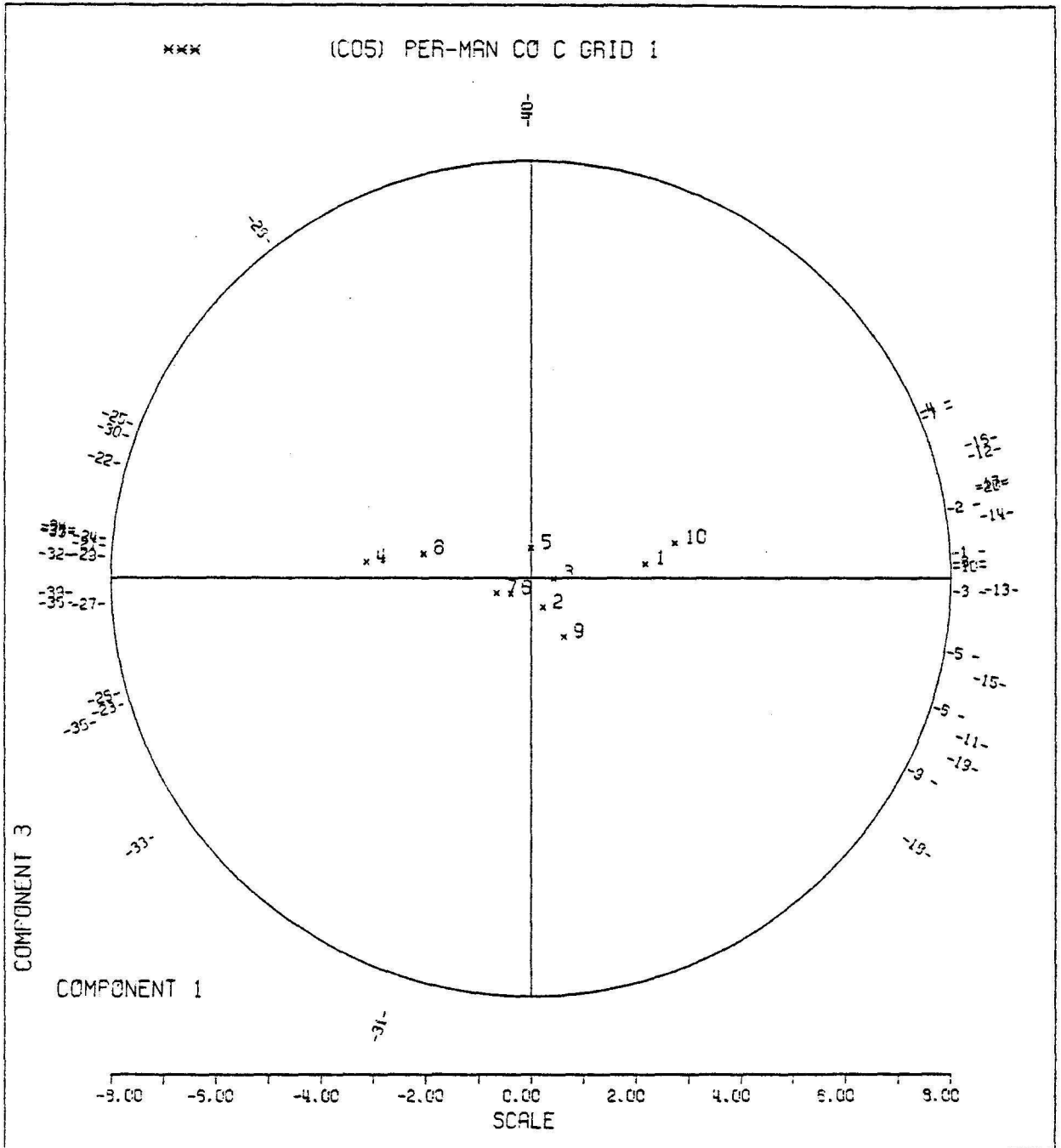
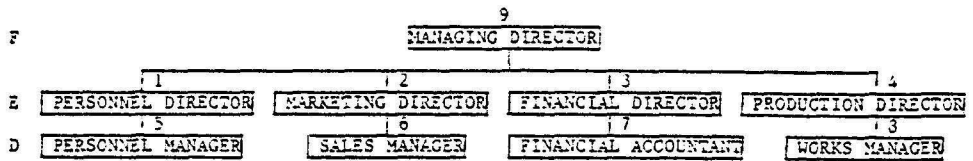


FIGURE 7.6

The individual grid or cognitive map of a manager exhibiting extreme cognitive simplicity: components 1 and 3.



KEY TO THE MULTIDIMENSIONAL SCALING MAPS

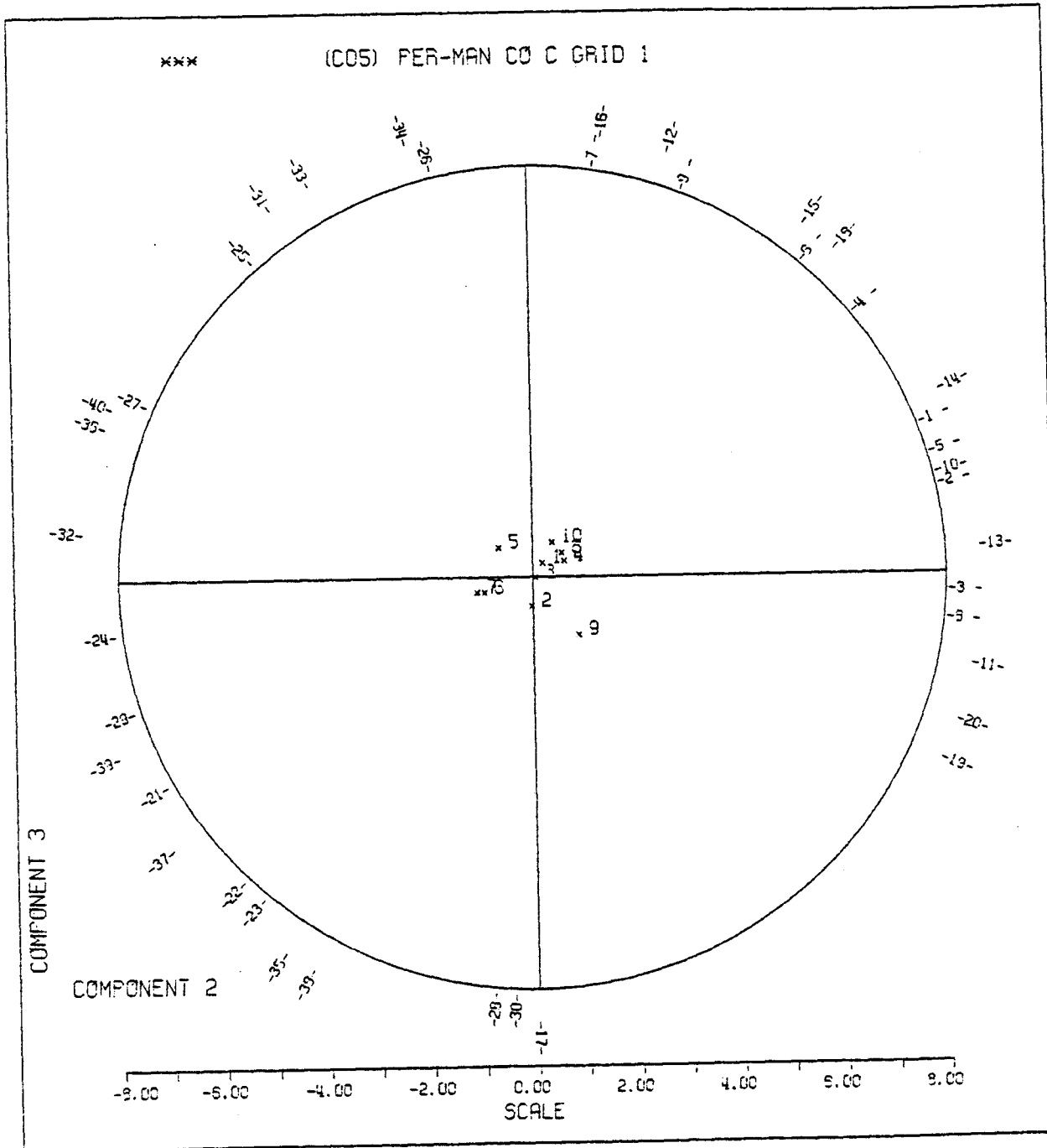
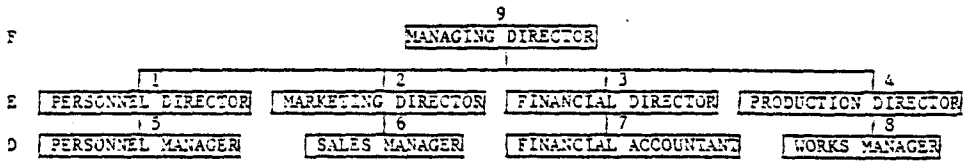


FIGURE 7.7

The individual grid or cognitive map of a manager exhibiting extreme cognitive simplicity: components 2 and 3.

### 7.2.2.3 Extreme cognitive complexity

Manager B09 in his social construction of the management role set in which he exists, displays an extremely complex cognitive view of his organizational world as may be discerned from Figures 7.8 to 7.10.

The percentage of variance contributed by the first component for manager B09 is 30,26%. The overall table of percentages is given in Table 7.10 below:

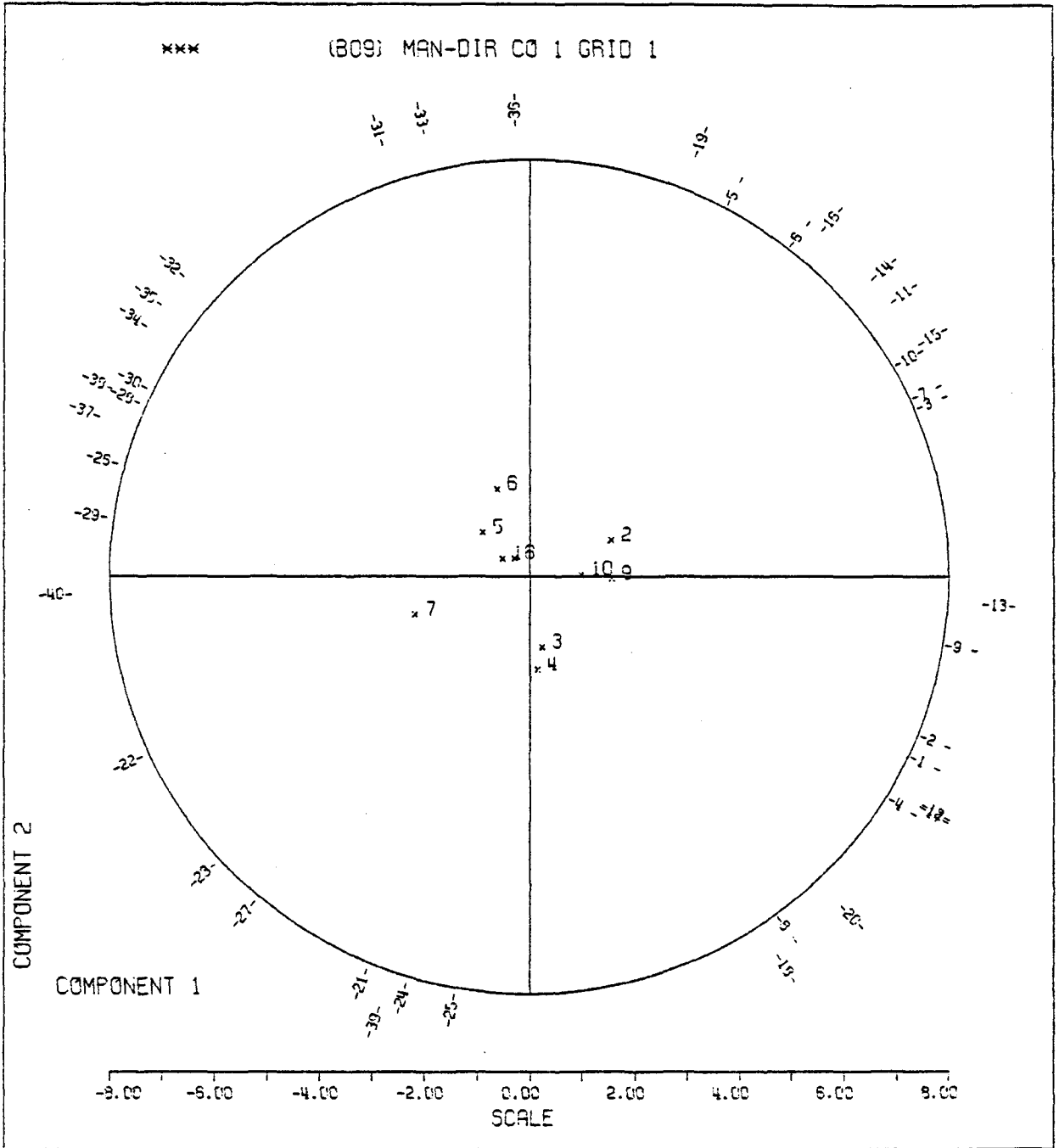
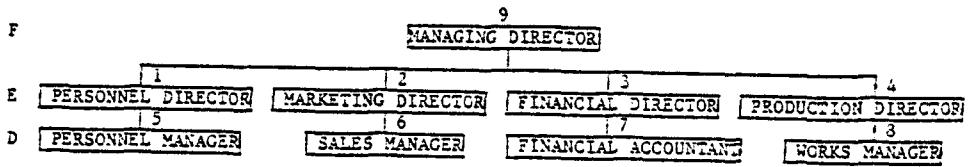
TABLE 7.10

The component space of manager B09.

| <u>Component</u> | <u>Root</u> | <u>%</u> |
|------------------|-------------|----------|
| 1                | 12,10       | 30,26    |
| 2                | 9,57        | 23,93    |
| 3                | 7,04        | 17,62    |
| 4                | 3,73        | 9,31     |
| 5                | 2,54        | 6,35     |
| 6                | 2,48        | 6,21     |
| 7                | 1,24        | 3,11     |
| 8                | 0,88        | 2,22     |
| 9                | 0,39        | 1,00     |

A comparison is made of the patterns of correlations for the above two managers in Table 7.11 and in Figure 7.11.

# KEY TO THE MULTIDIMENSIONAL SCALING MAPS



**FIGURE 7.8**

Individual grid or cognitive map of a manager exhibiting a high degree of cognitive complexity: components 1 and 2. In contrast with Figure 7.5 the dispersion of the constructs is widely scattered around the perimeter of the circle.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS

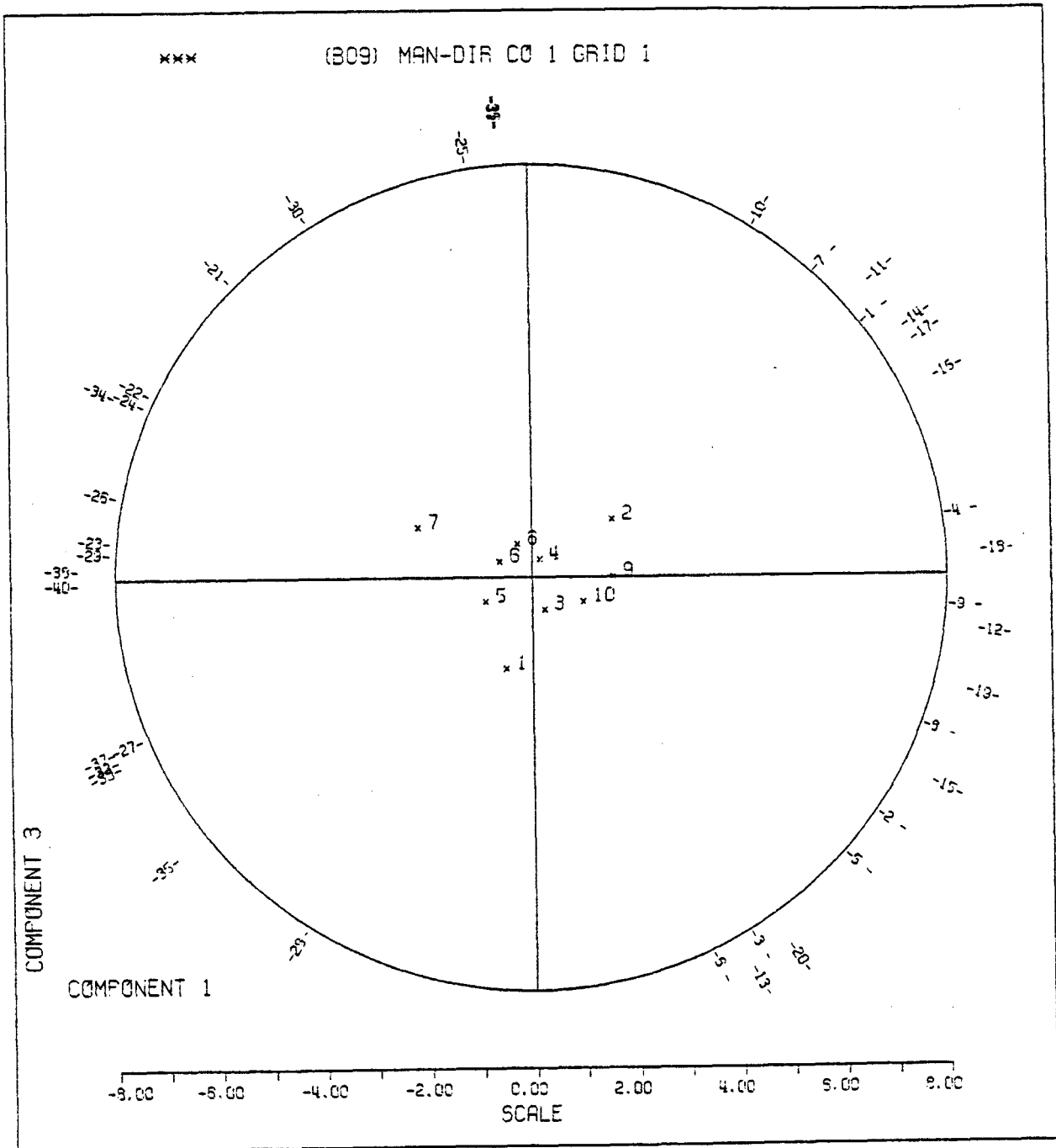
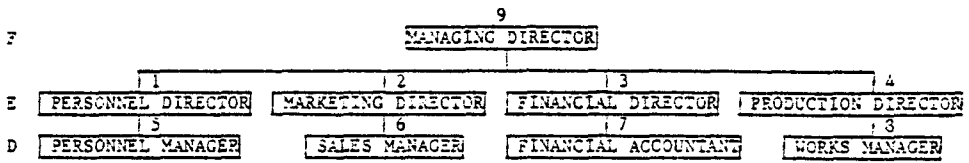


FIGURE 7.9

Individual grid or cognitive map of a manager exhibiting a high degree of cognitive complexity: components 1 and 3.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS

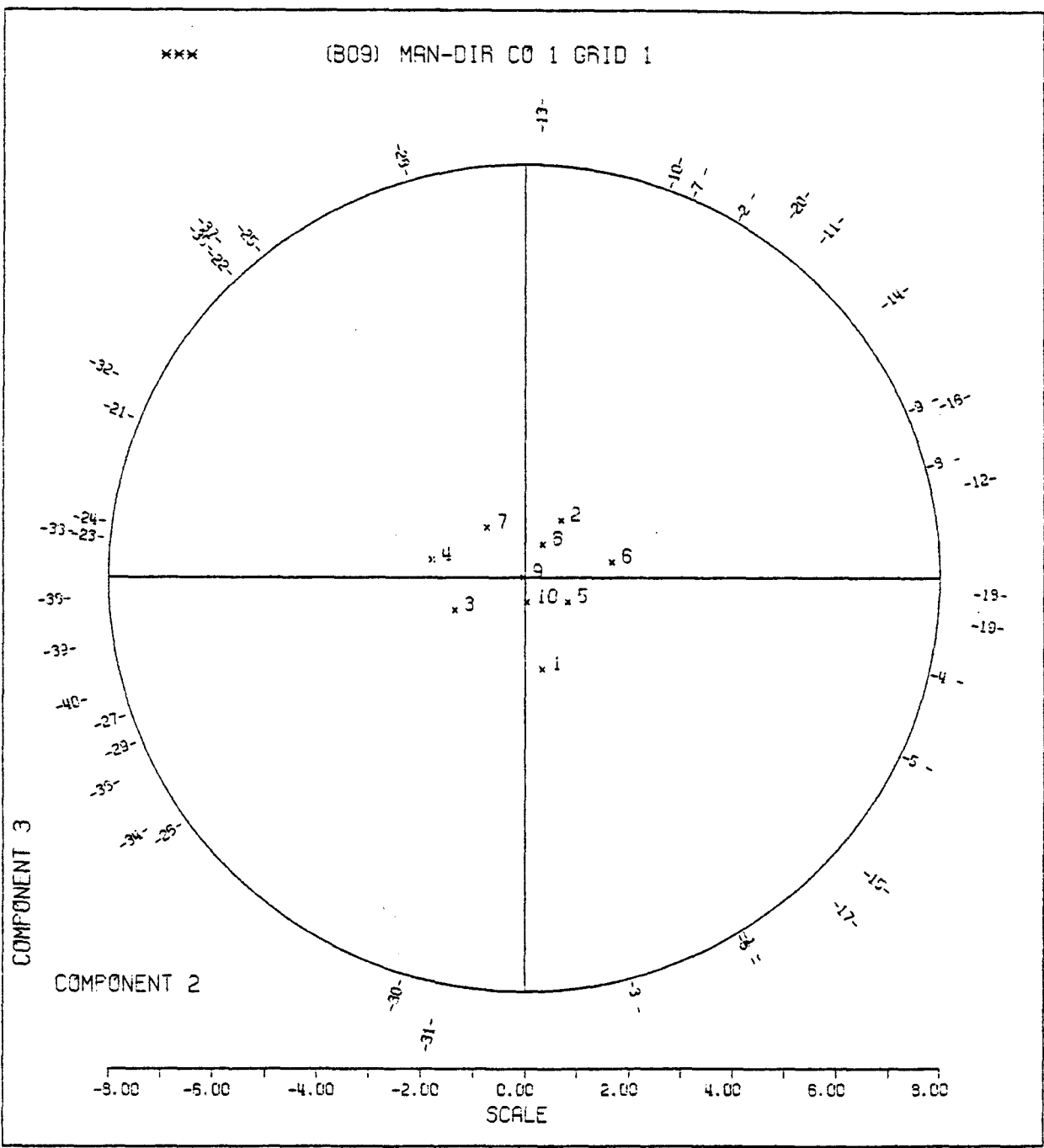
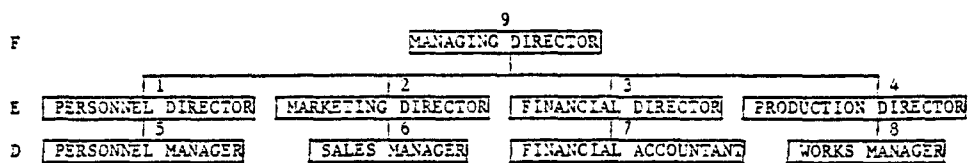


FIGURE 7.10

Individual grid or cognitive map of a manager exhibiting a high degree of cognitive complexity: components 2 and 3.

TABLE 7.11

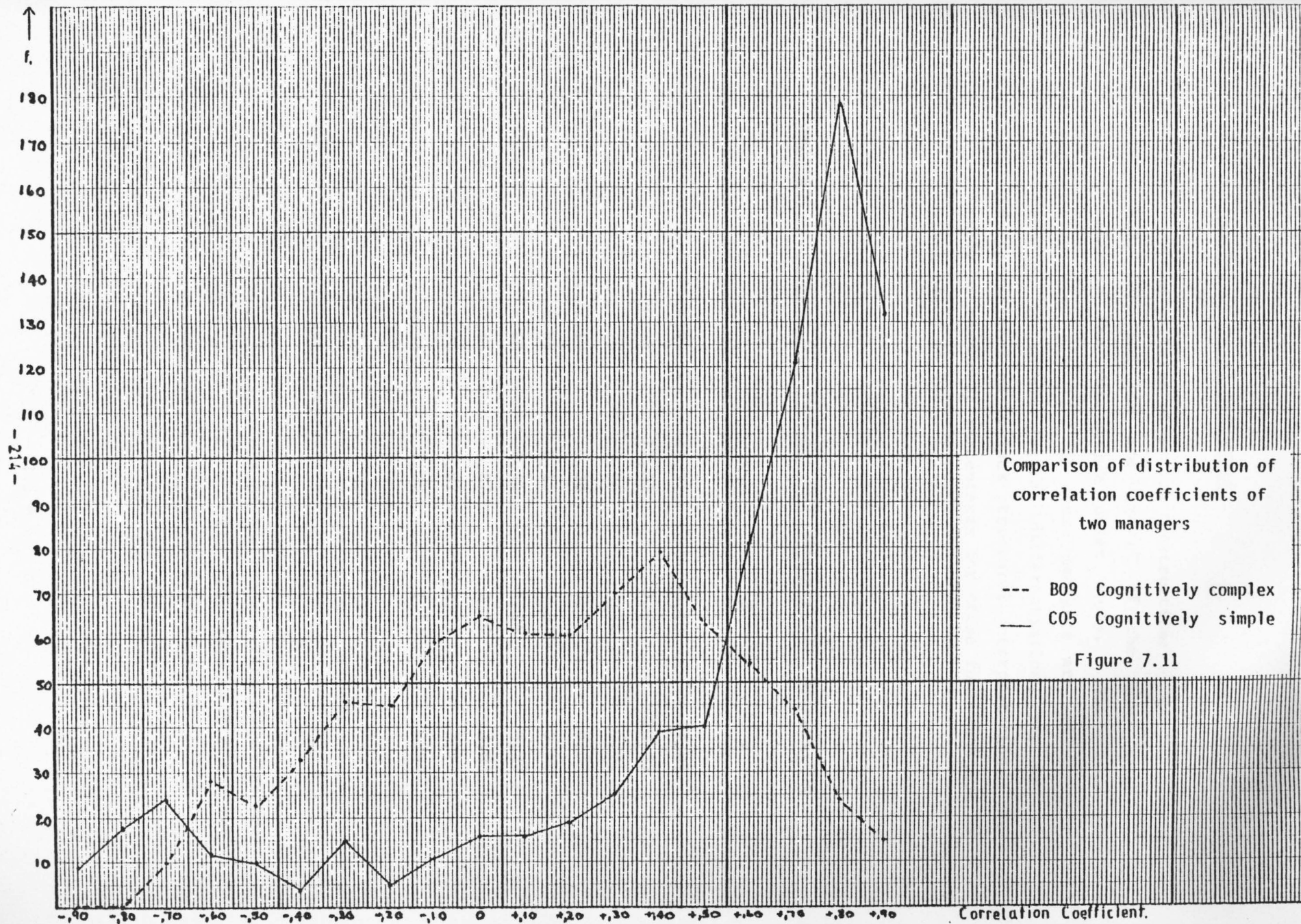
Comparison of the distribution of correlations between the 40 constructs used by manager C05 (cognitively simple pattern) and by manager B09 (cognitively complex pattern).

Construct correlations. (C05)

| CLASS INTERVAL |          | FREQ       | PERCENT | % CUM  |
|----------------|----------|------------|---------|--------|
| -1,00          | TO -0,85 | 9          | 1,15    | 1,15   |
| -0,84          | TO -0,75 | 18         | 2,31    | 3,46   |
| -0,74          | TO -0,65 | 24         | 3,08    | 6,54   |
| -0,64          | TO -0,55 | 12         | 1,54    | 8,08   |
| -0,54          | TO -0,45 | 10         | 1,28    | 9,36   |
| -0,44          | TO -0,35 | 4          | 0,51    | 9,87   |
| -0,34          | TO -0,25 | 15         | 1,92    | 11,79  |
| -0,24          | TO -0,15 | 10         | 1,28    | 13,08  |
| -0,14          | TO -0,05 | 11         | 1,41    | 14,49  |
| -0,04          | TO -0,05 | 16         | 2,05    | 16,54  |
| 0,06           | TO 0,15  | 16         | 2,05    | 18,59  |
| 0,16           | TO 0,25  | 19         | 2,44    | 21,03  |
| 0,26           | TO 0,35  | 25         | 3,21    | 24,23  |
| 0,36           | TO 0,45  | 39         | 5,00    | 29,23  |
| 0,46           | TO 0,55  | 40         | 5,13    | 34,36  |
| 0,56           | TO 0,65  | 81         | 10,38   | 44,74  |
| 0,66           | TO 0,85  | 121        | 15,51   | 60,26  |
| 0,76           | TO 0,85  | 178        | 22,82   | 83,08  |
| 0,86           | TO 0,95  | 126        | 16,15   | 99,23  |
| 0,96           | TO 1,00  | 6          | 0,77    | 100,00 |
| TOTAL          |          | <u>780</u> |         |        |

Construct correlations. (B09)

| CLASS INTERVAL |          | FREQ       | PERCENT | % CUM  |
|----------------|----------|------------|---------|--------|
| -1,00          | TO -0,85 | 0          | 0,0     | 0,0    |
| -0,84          | TO -0,75 | 0          | 0,0     | 0,0    |
| -0,74          | TO -0,65 | 10         | 1,28    | 1,28   |
| -0,64          | TO -0,55 | 28         | 3,59    | 4,87   |
| -0,54          | TO -0,45 | 23         | 2,95    | 7,82   |
| -0,44          | TO -0,35 | 33         | 4,23    | 12,05  |
| -0,34          | TO -0,25 | 46         | 5,90    | 17,95  |
| -0,24          | TO -0,15 | 45         | 5,77    | 23,72  |
| -0,14          | TO -0,05 | 59         | 7,56    | 31,28  |
| -0,04          | TO -0,05 | 65         | 3,33    | 39,62  |
| 0,06           | TO 0,15  | 61         | 7,82    | 47,44  |
| 0,16           | TO 0,25  | 61         | 7,82    | 55,26  |
| 0,26           | TO 0,35  | 70         | 8,97    | 64,23  |
| 0,36           | TO 0,45  | 79         | 10,13   | 74,36  |
| 0,46           | TO 0,55  | 63         | 8,08    | 82,44  |
| 0,56           | TO 0,65  | 54         | 6,92    | 89,36  |
| 0,66           | TO 0,75  | 44         | 5,64    | 95,00  |
| 0,76           | TO 0,85  | 24         | 3,08    | 98,08  |
| 0,86           | TO 0,95  | 13         | 1,67    | 99,74  |
| 0,96           | TO 1,00  | 2          | 0,26    | 100,00 |
| TOTAL          |          | <u>780</u> |         |        |



#### 7.2.2.4 Central or modal responses

The patterns of social constructions of managers C01, H03, I01, and D06 are typical of the modal response tendency for the sample under study. The cognitive structures displayed by these managers are sufficiently complex to reveal logical differentiation, yet not so differentiated as to lack structural interpretation. The table of component percentages for these four managers is given below in Table 7.12:

TABLE 7.12

| <u>Component 1</u> | <u>Manager C01</u> | <u>Manager H03</u> | <u>Manager I02</u> | <u>Manager D06</u> |
|--------------------|--------------------|--------------------|--------------------|--------------------|
|                    | %                  | %                  | %                  | %                  |
| 1                  | 46,35              | 46,21              | 50,10              | 47,89              |
| 2                  | 20,25              | 17,03              | 17,95              | 20,85              |
| 3                  | 11,16              | 9,26               | 10,34              | 9,21               |
| 4                  | 7,19               | 8,38               | 5,72               | 6,82               |
| 5                  | 5,69               | 6,15               | 4,87               | 5,68               |
| 6                  | 4,40               | 4,94               | 4,24               | 3,39               |
| 7                  | 2,65               | 3,87               | 2,69               | 3,05               |
| 8                  | 1,76               | 2,97               | 2,59               | 2,12               |
| 9                  | 0,56               | 1,20               | 1,51               | 0,99               |

#### 7.2.2.5 The individual companies A - J

The graphical plots of the ten separate companies are given in Figures 7.12 to 7.21. The results for the ten companies combined are illustrated in Figure 7.22.



KEY TO THE MULTIDIMENSIONAL SCALING MAPS

|   |                        |                    |                      |                     |
|---|------------------------|--------------------|----------------------|---------------------|
|   | 9<br>MANAGING DIRECTOR |                    |                      |                     |
|   | 1                      | 2                  | 3                    | 4                   |
| E | PERSONNEL DIRECTOR     | MARKETING DIRECTOR | FINANCIAL DIRECTOR   | PRODUCTION DIRECTOR |
|   | 5                      | 6                  | 7                    | 8                   |
| D | PERSONNEL MANAGER      | SALES MANAGER      | FINANCIAL ACCOUNTANT | WORKS MANAGER       |

\*\*\* COMPANY A GRID 1

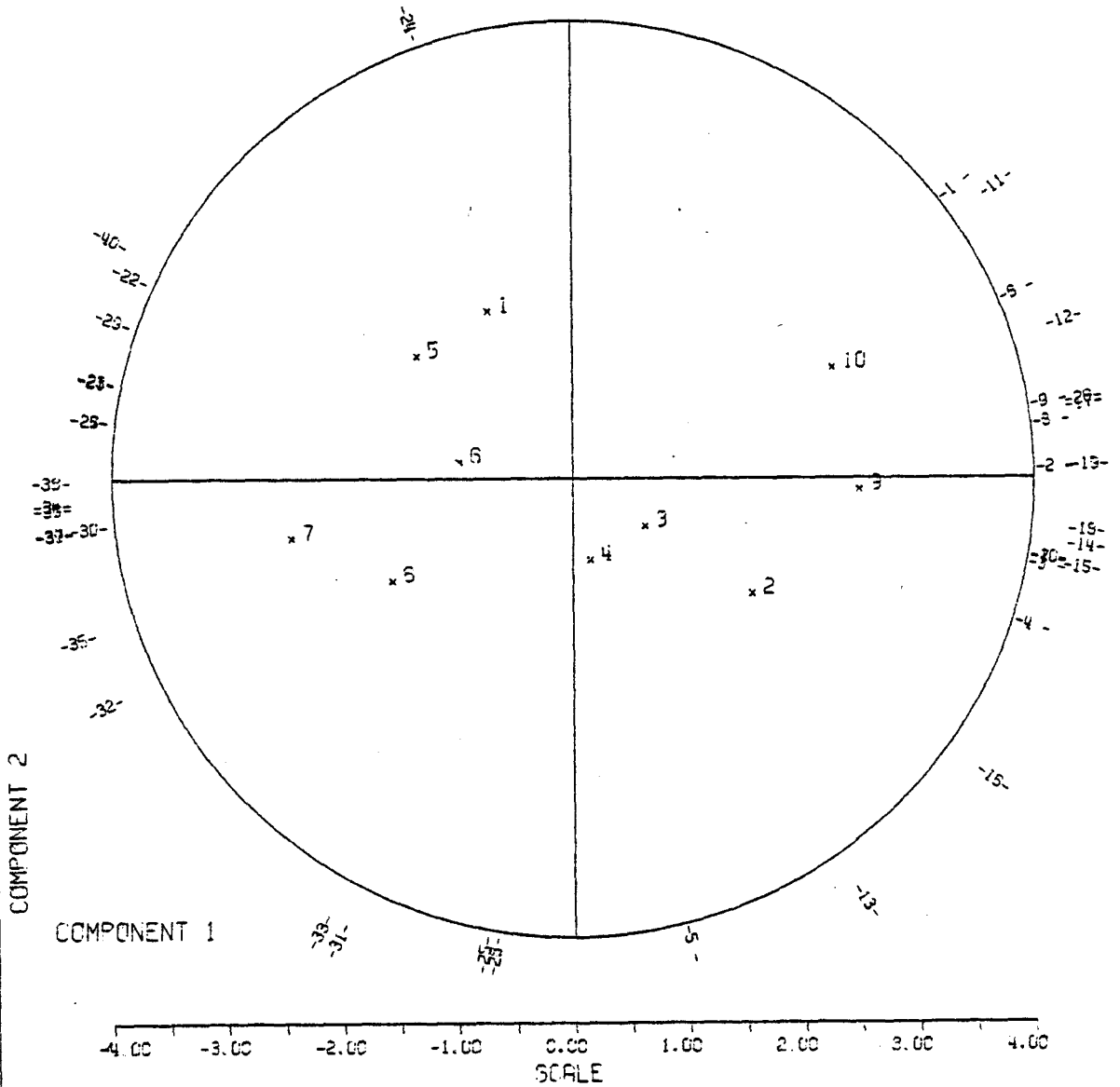
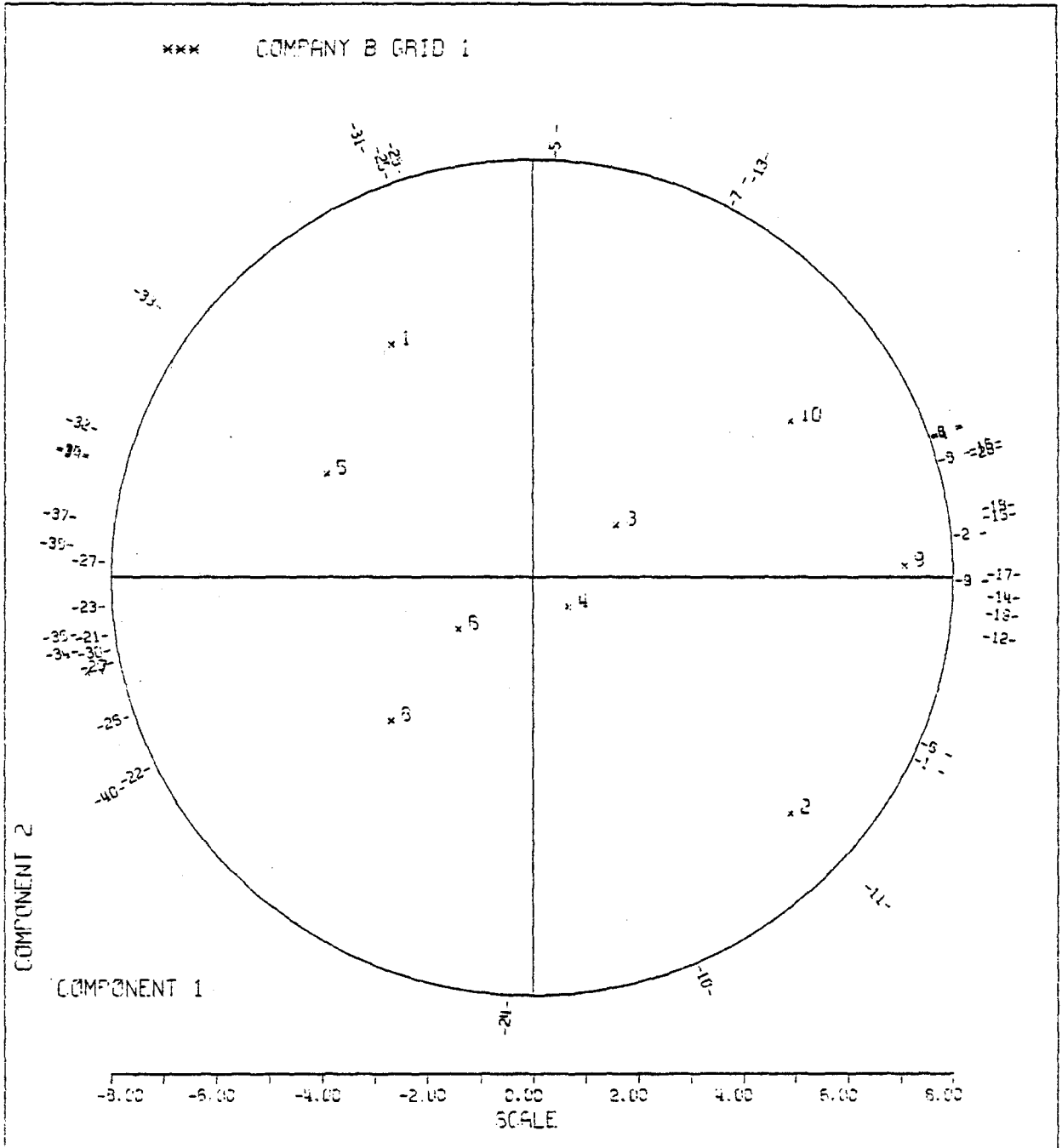
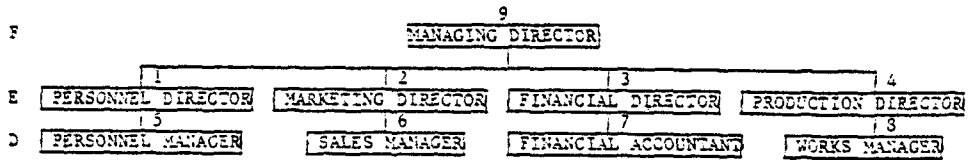


FIGURE 7.12

The consensus grid for 9 managers (a role-set) in company A showing the portioning of the managers in construct space: components 1 and 2.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS



**FIGURE 7.13**

The consensus grid for 9 managers (a role-set) in company B showing the positioning of the managers in construct space: components 1 and 2.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS

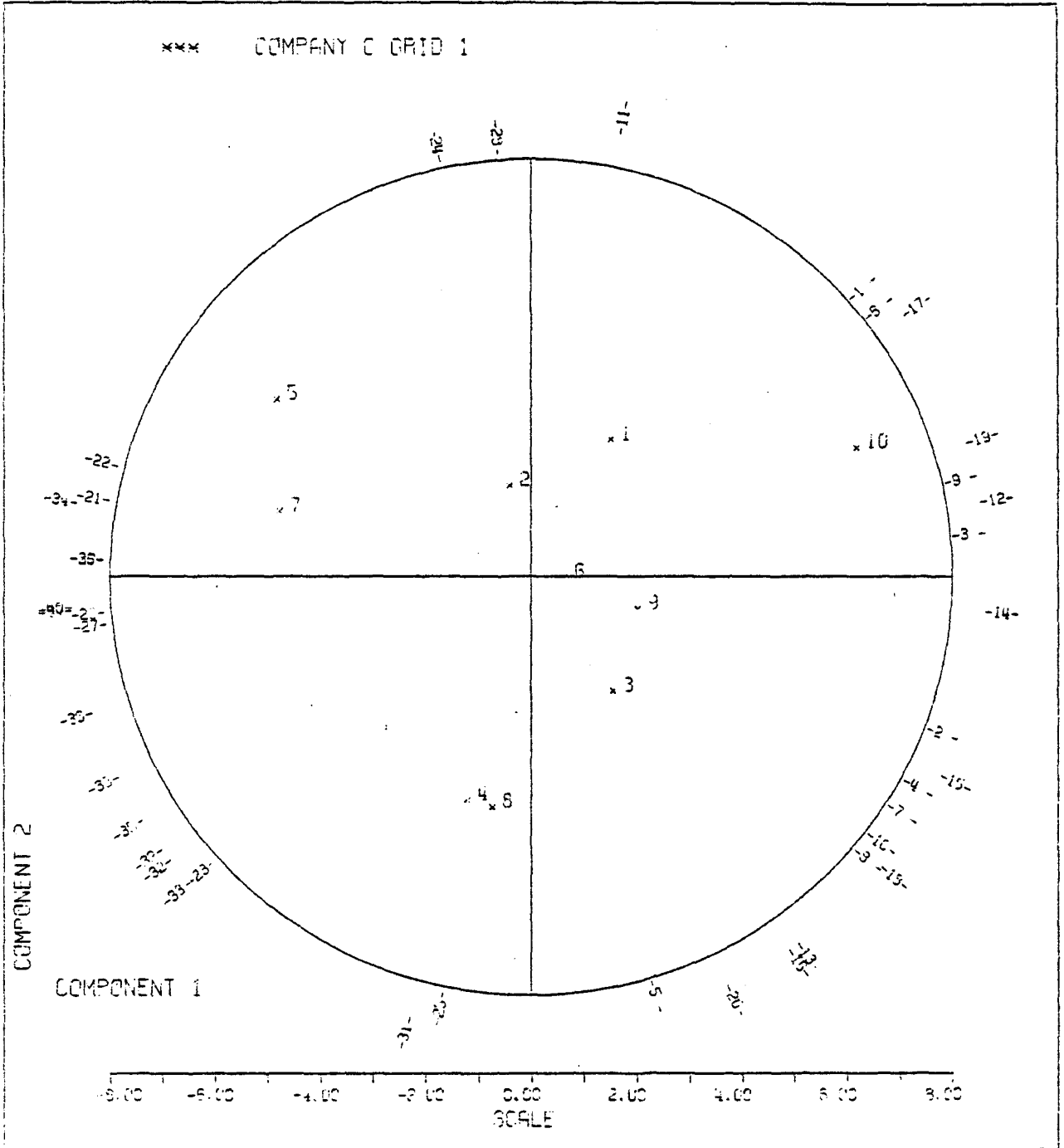
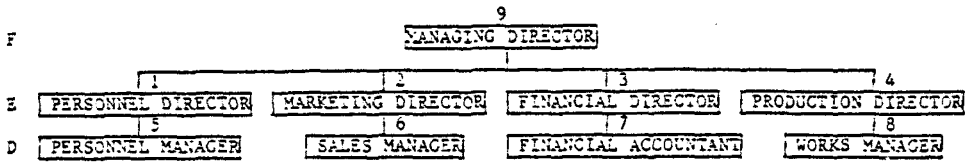


FIGURE 7.14

The consensus grid for the 9 managers in company C.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS

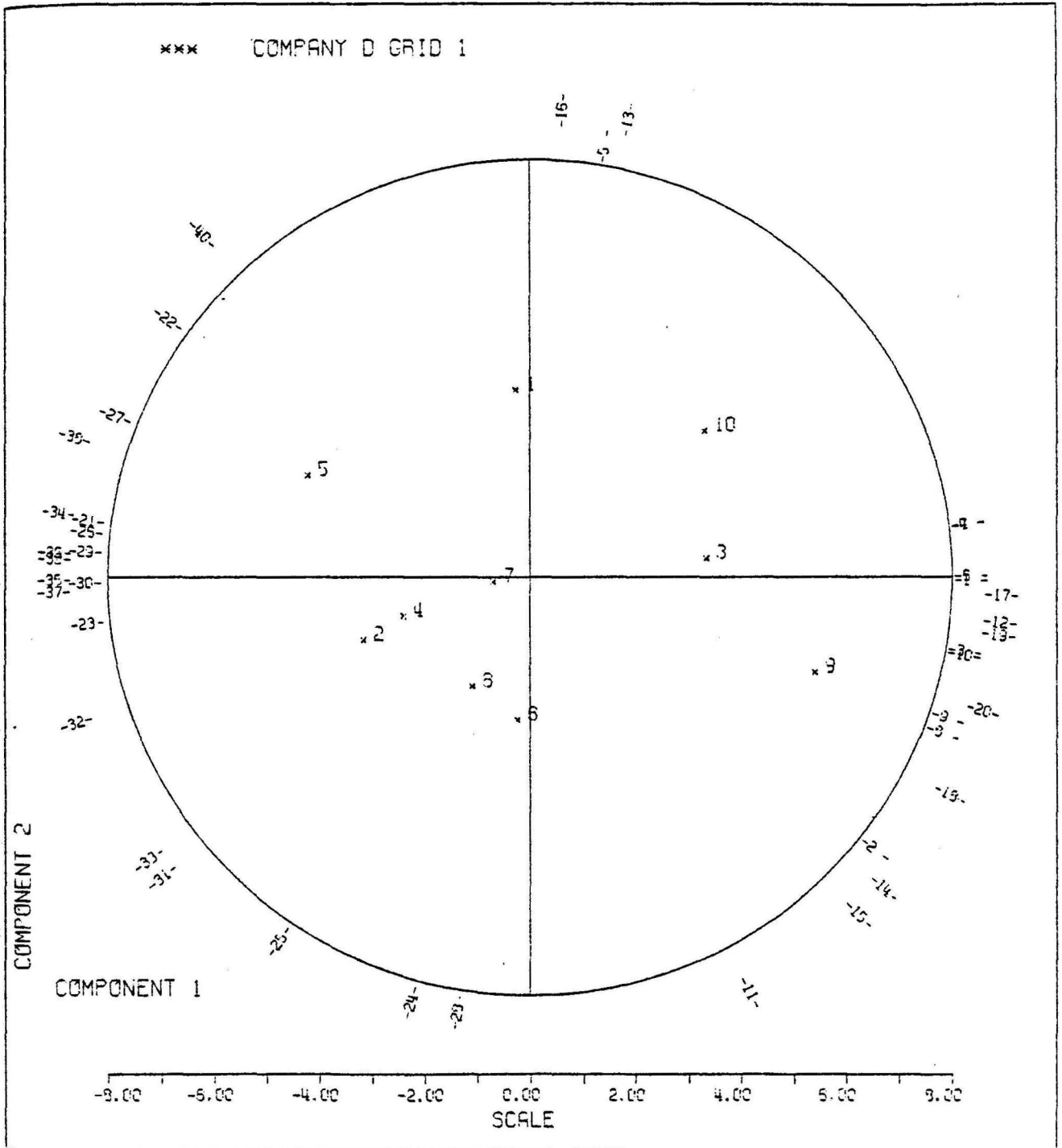
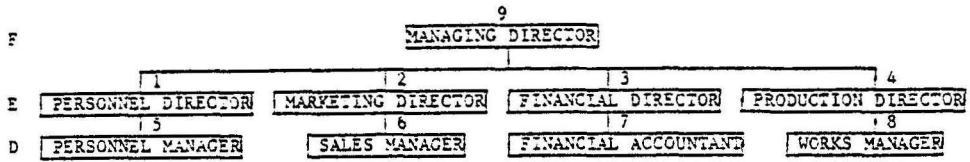
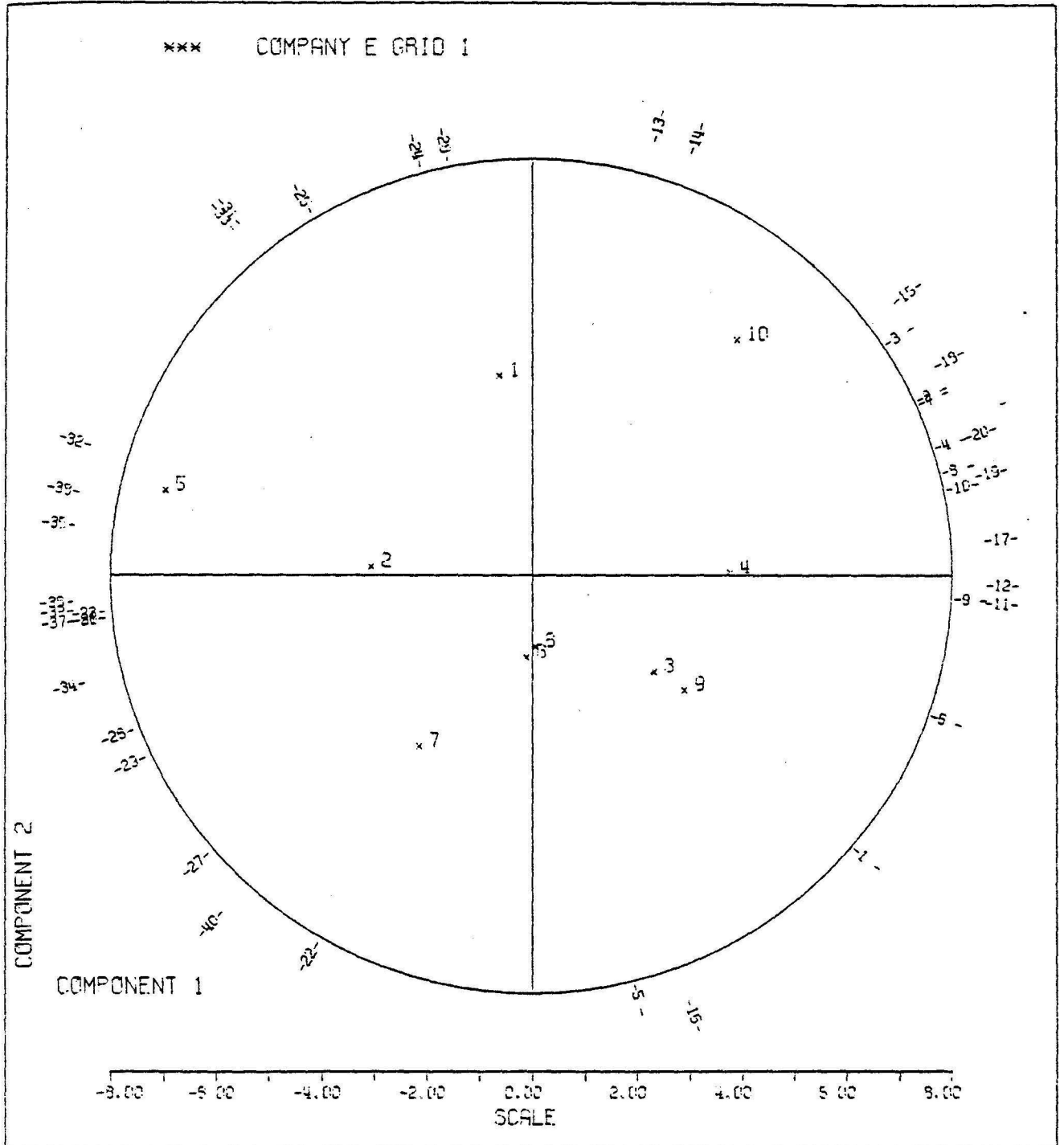
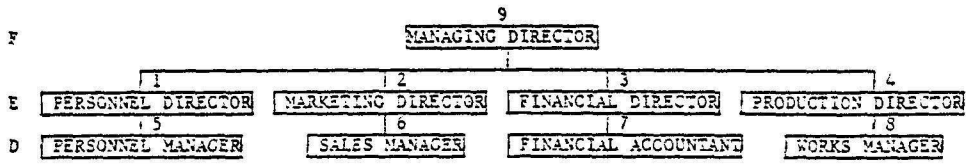


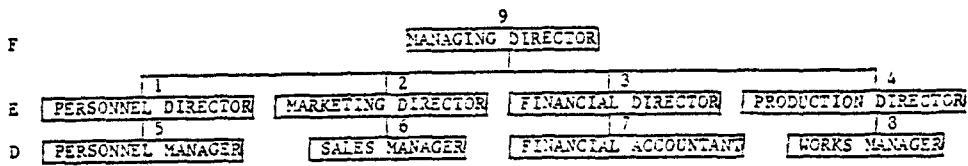
FIGURE 7.15  
The consensus grid for the 9 managers in company D.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS



**FIGURE 7.16**  
The consensus grid for the 9 managers in company E.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS



\*\*\* COMPANY F GRID 1

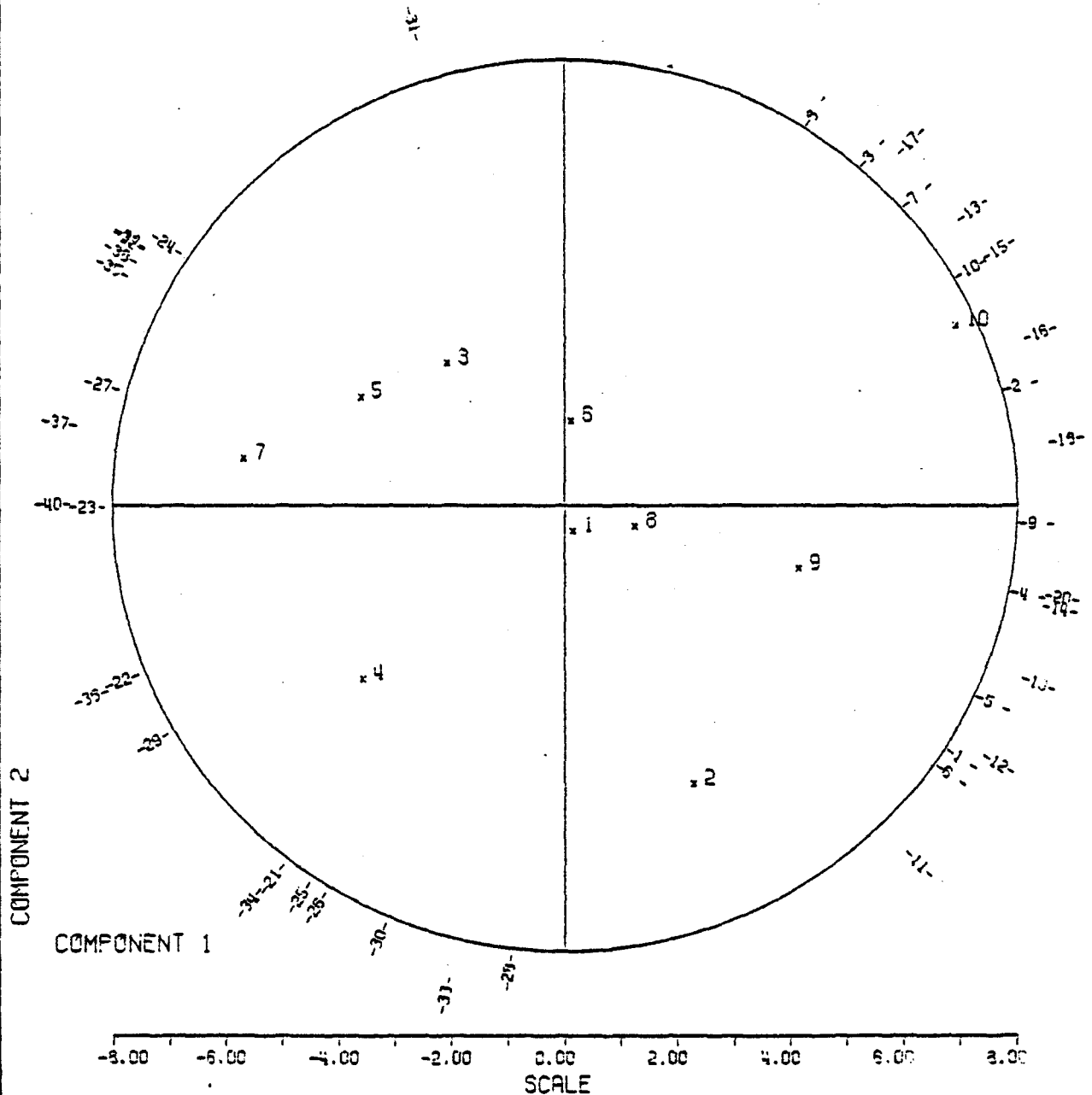


FIGURE 7.17

The consensus grid for the 9 managers in company F.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS

|   |                        |                    |                      |                     |
|---|------------------------|--------------------|----------------------|---------------------|
|   | 9<br>MANAGING DIRECTOR |                    |                      |                     |
| F | 1                      | 2                  | 3                    | 4                   |
| E | PERSONNEL DIRECTOR     | MARKETING DIRECTOR | FINANCIAL DIRECTOR   | PRODUCTION DIRECTOR |
| D | 5                      | 6                  | 7                    | 8                   |
|   | PERSONNEL MANAGER      | SALES MANAGER      | FINANCIAL ACCOUNTANT | WORKS MANAGER       |

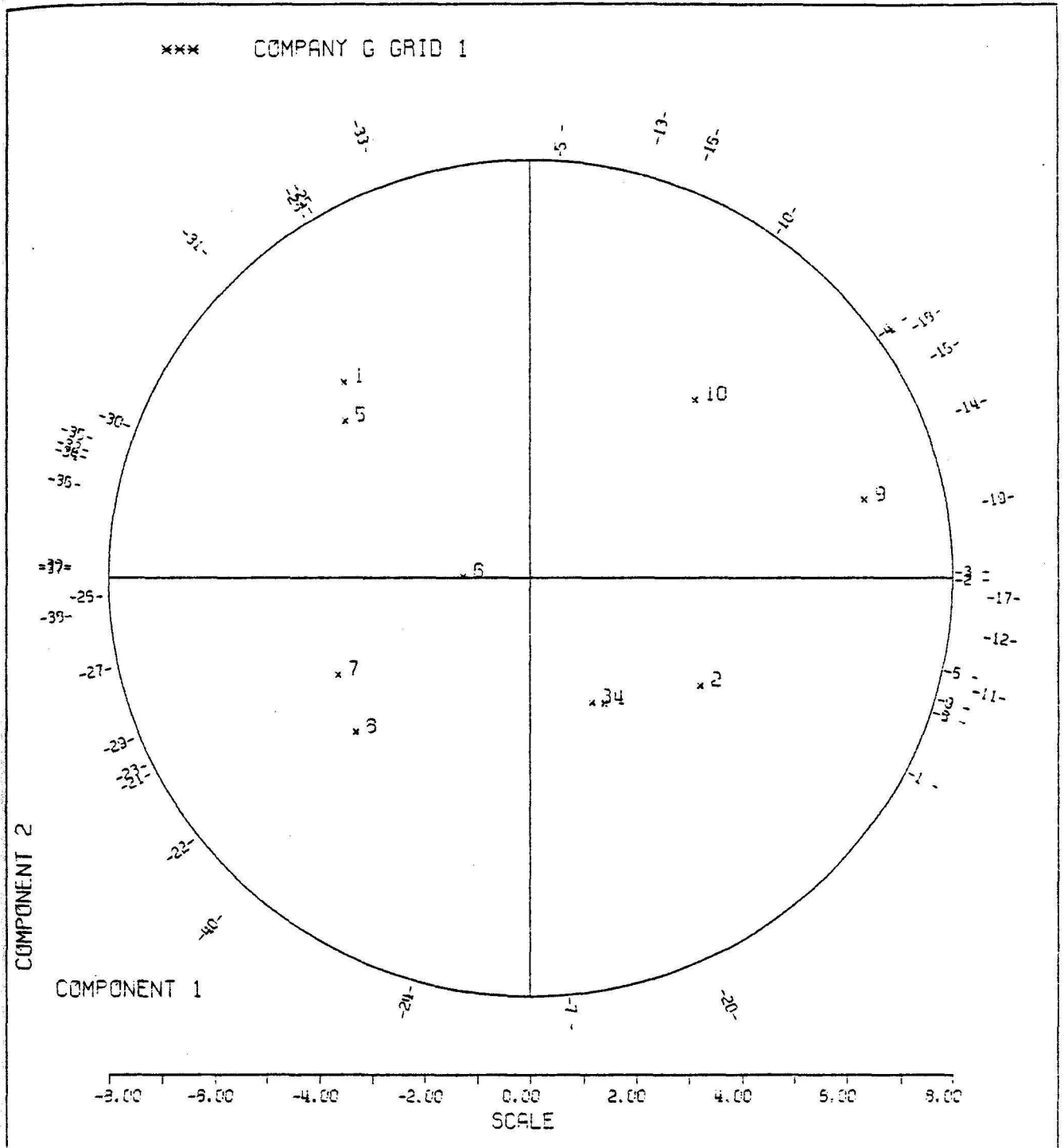


FIGURE 7.18  
The consensus grid for the 9 managers in company G.

# KEY TO THE MULTIDIMENSIONAL SCALING MAPS

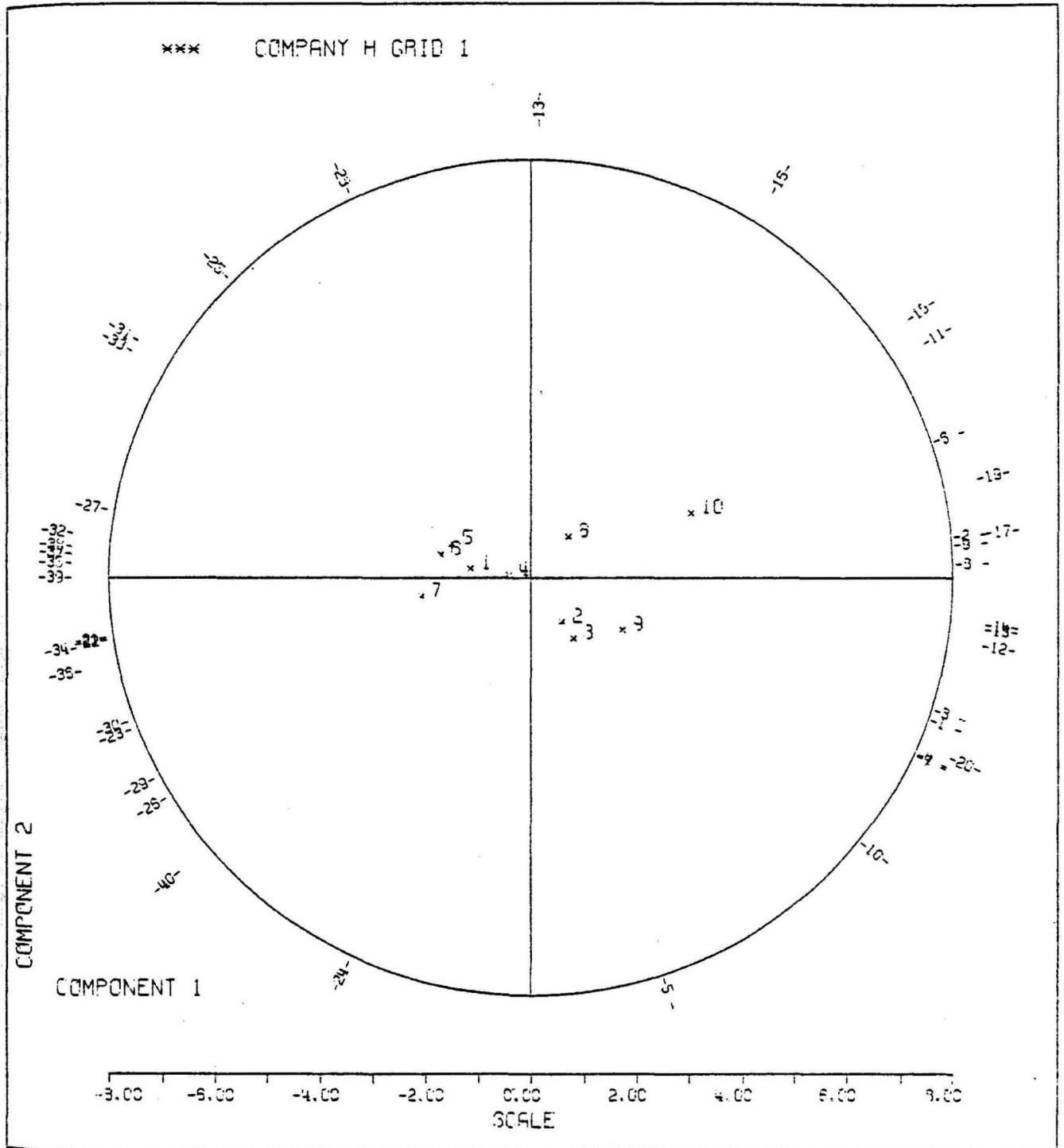
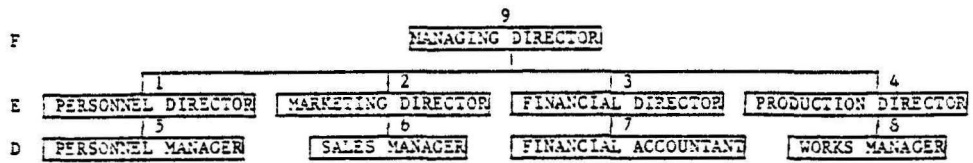


FIGURE 7.19  
The consensus grid for the 9 managers in company H.



KEY TO THE MULTIDIMENSIONAL SCALING MAPS

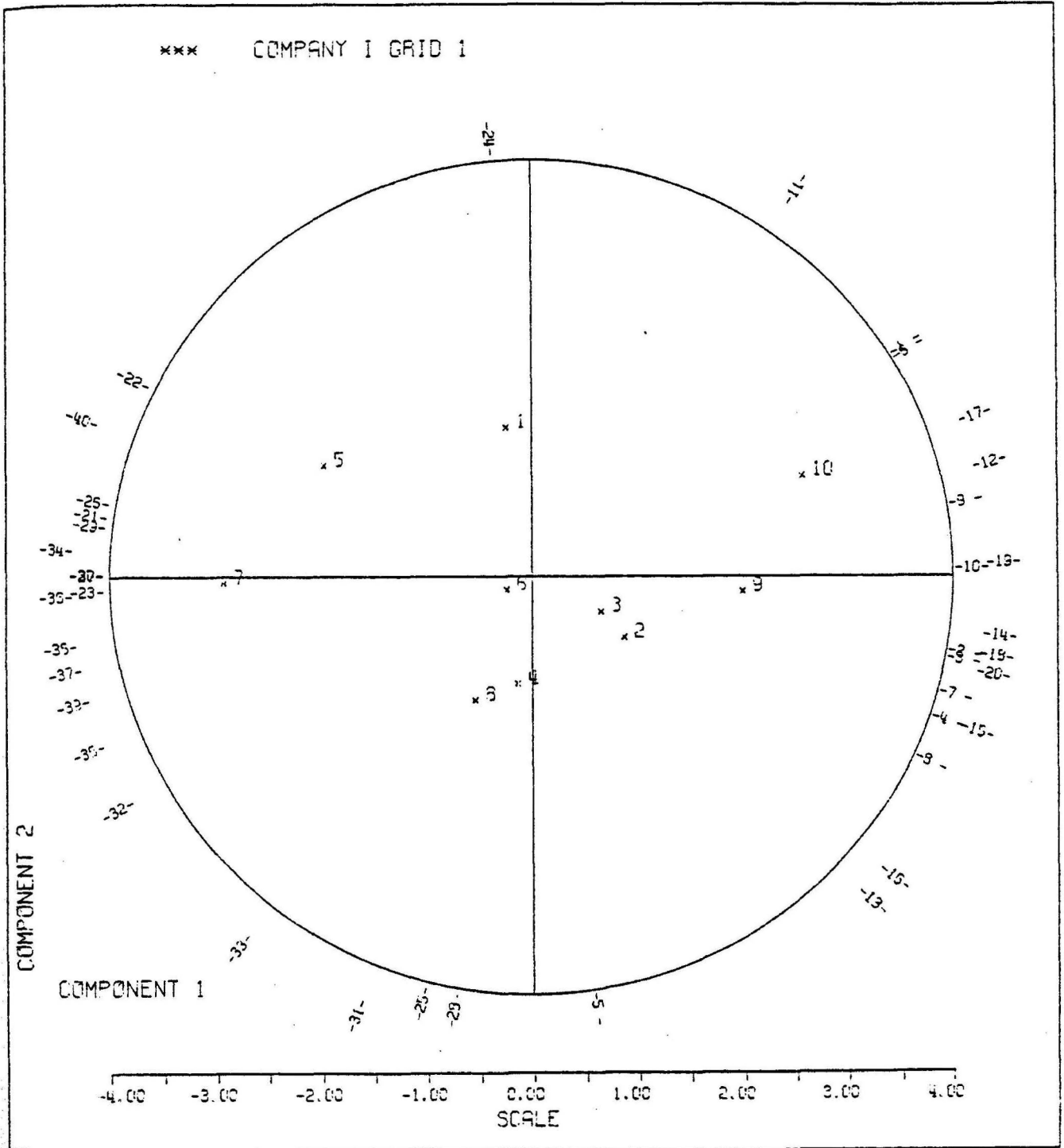
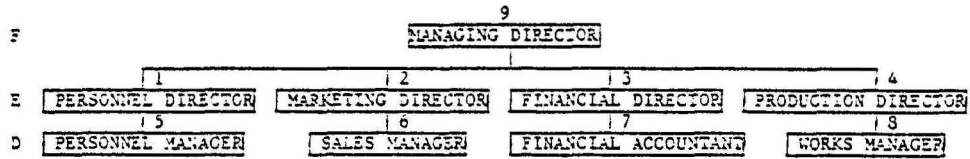
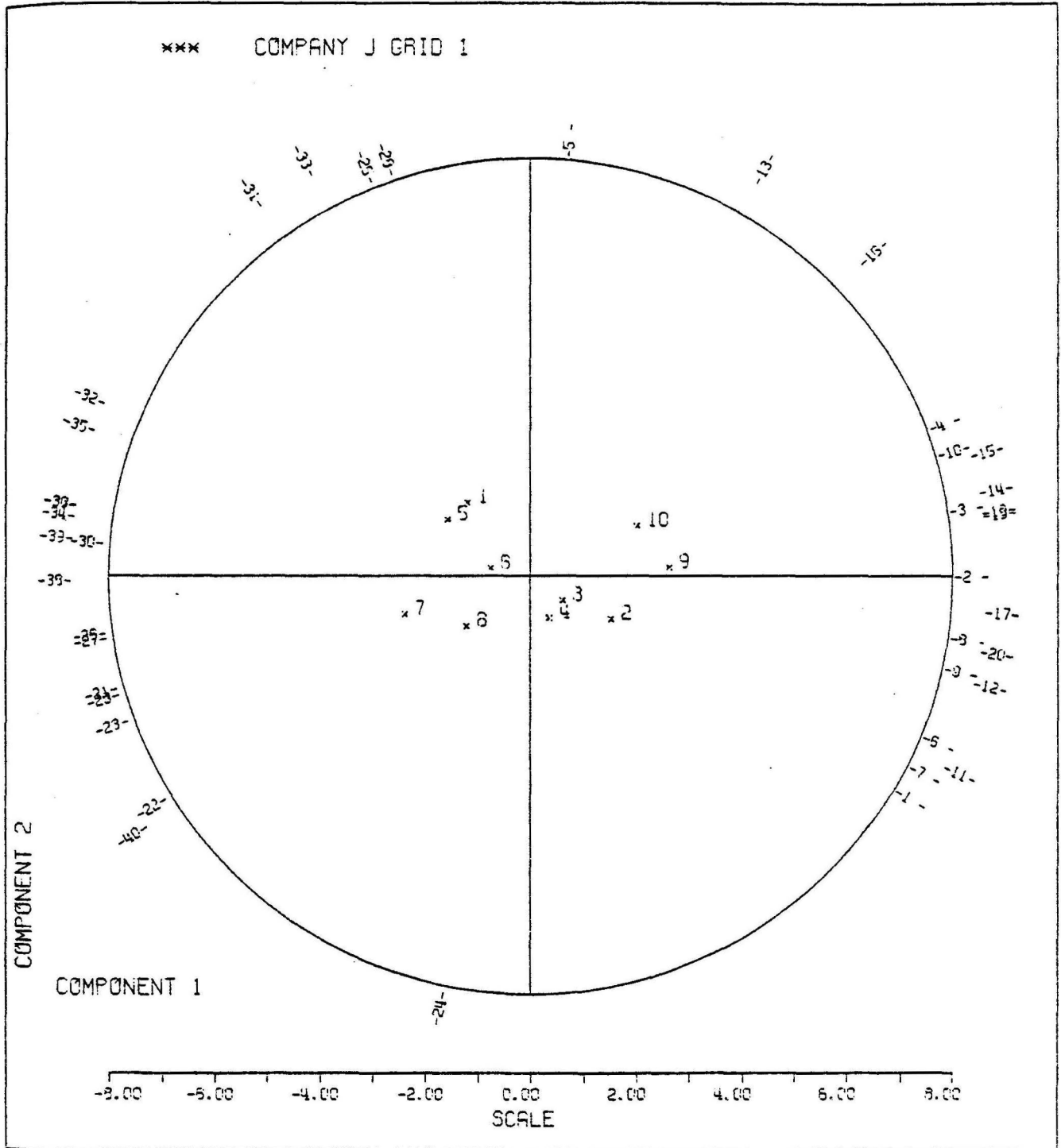
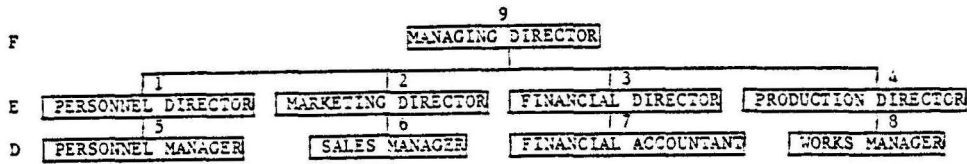


FIGURE 7.20

The consensus grid for the 9 managers in company I.

KEY TO THE MULTIDIMENSIONAL SCALING MAPS



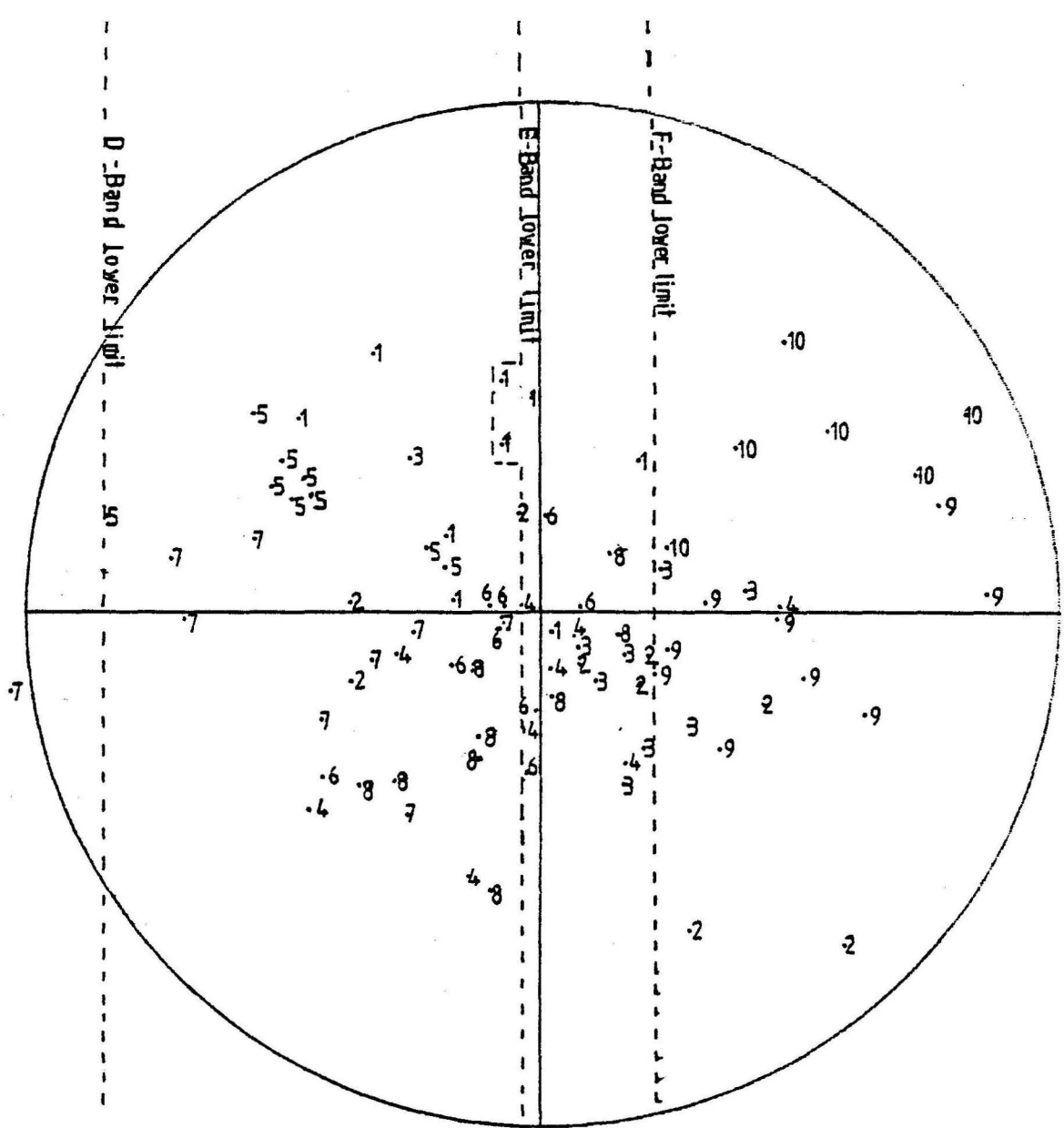


Figure 7.22

In Figure 22 it can be seen that a certain degree of vertical differentiation (reading from right to left) has occurred in the perception of managers in different roles. There appears to be a clear lower limit to the F band decision-makers - the general manager. However, 3 financial and 3 marketing directors are also in this zone. In certain companies policy decisions are made by E band managers in their role as members of the board. However, these same managers often program the policy decisions and act in their functional role at the E band level. There are 5 D band managers out of 23 in the E band zone and 7 E band managers in the D band zone. These differentiations are all along component one. There is also clear differentiation along component two (vertical axis) with the personnel functionaries being primarily in quadrant four.

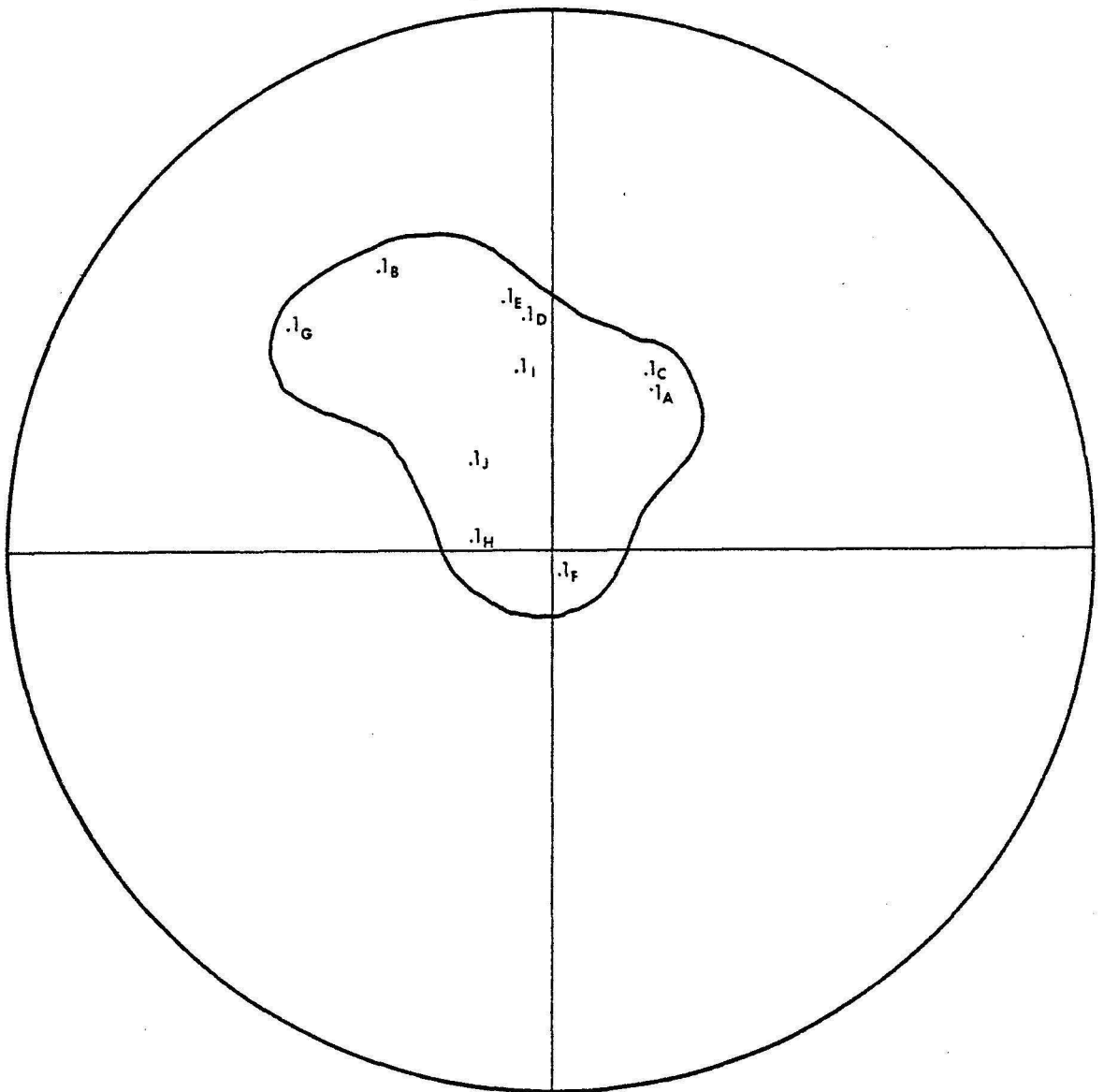


FIGURE 7.23

The personnel manager (or director) at the E band level in 10 different companies (A - J) as perceived by his role-set.

In company A the personnel manager had previously been in corporate planning. In company C the personnel manager was promoted to the board of directors soon after the data had been collected. The personnel manager in company F held an MBL degree and left the company to take up a position in general management with another company towards the end of the data collection in the company.

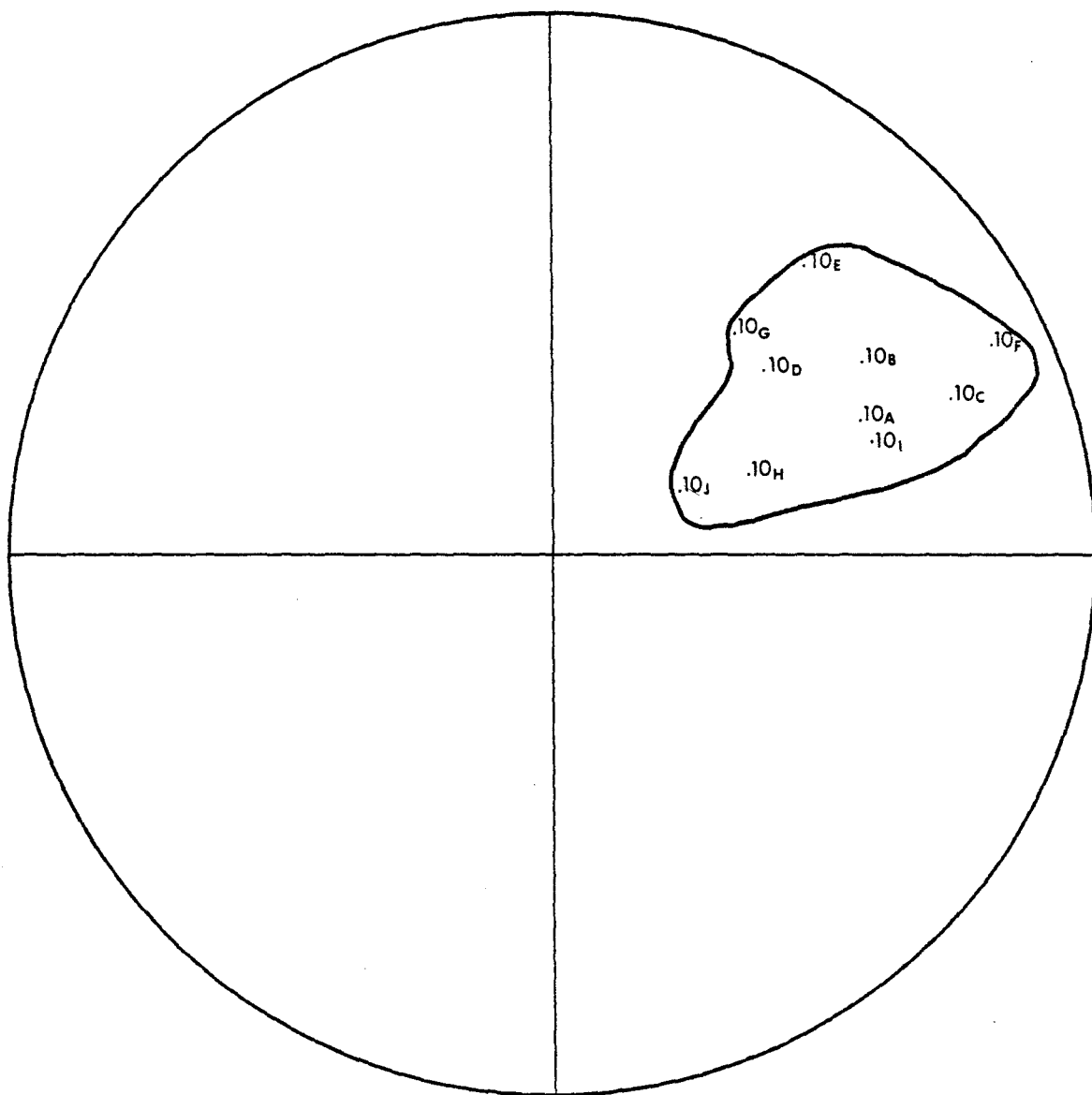


FIGURE 7.24

The personnel manager (director) at the E decision band level  
perceived "as he ideally ought to be" by role sets of managers in  
10 different companies A - J.

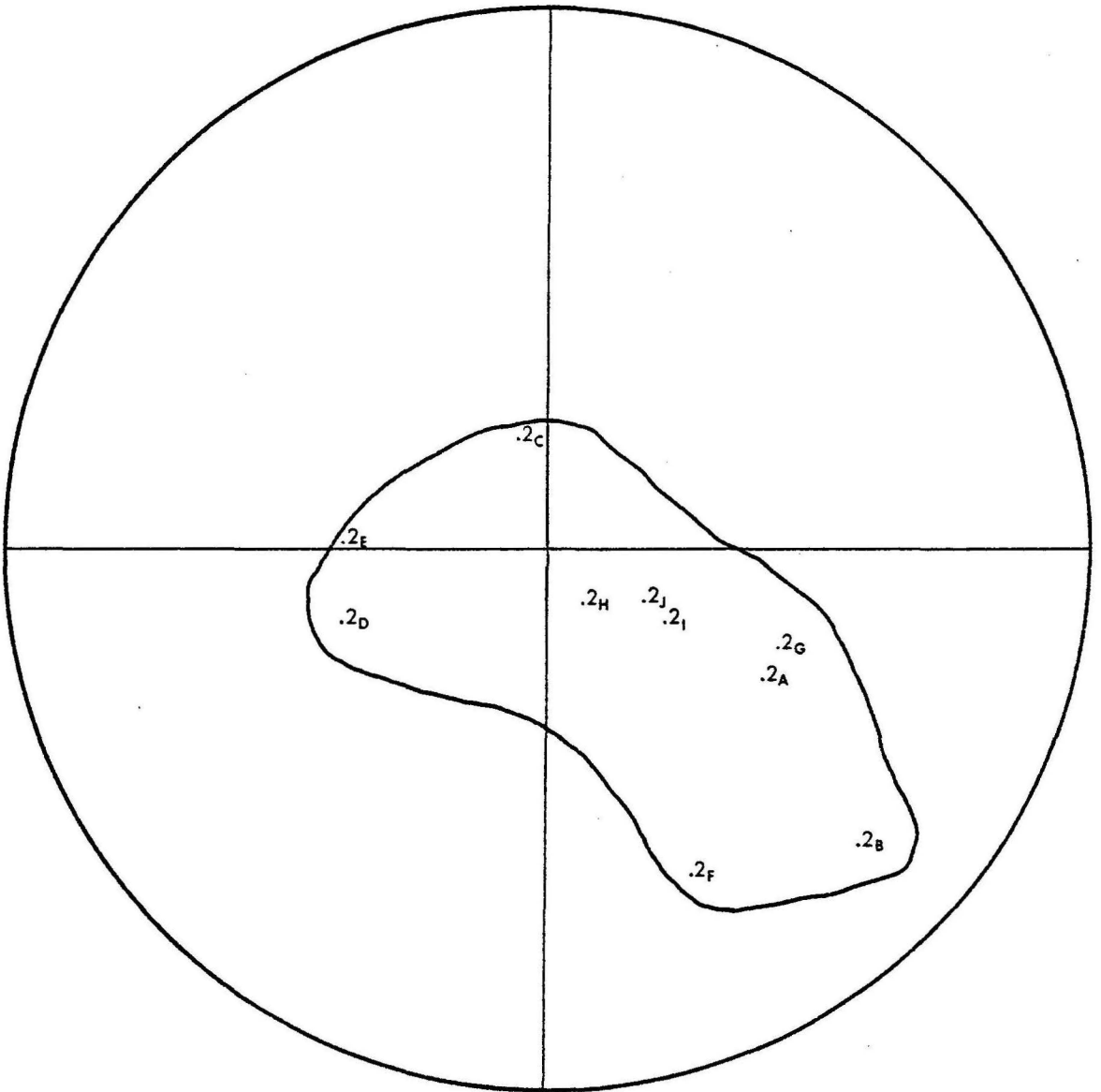


FIGURE 7.25  
The marketing manager at the E band level in 10 different  
companies (A - J) as perceived by his role set.

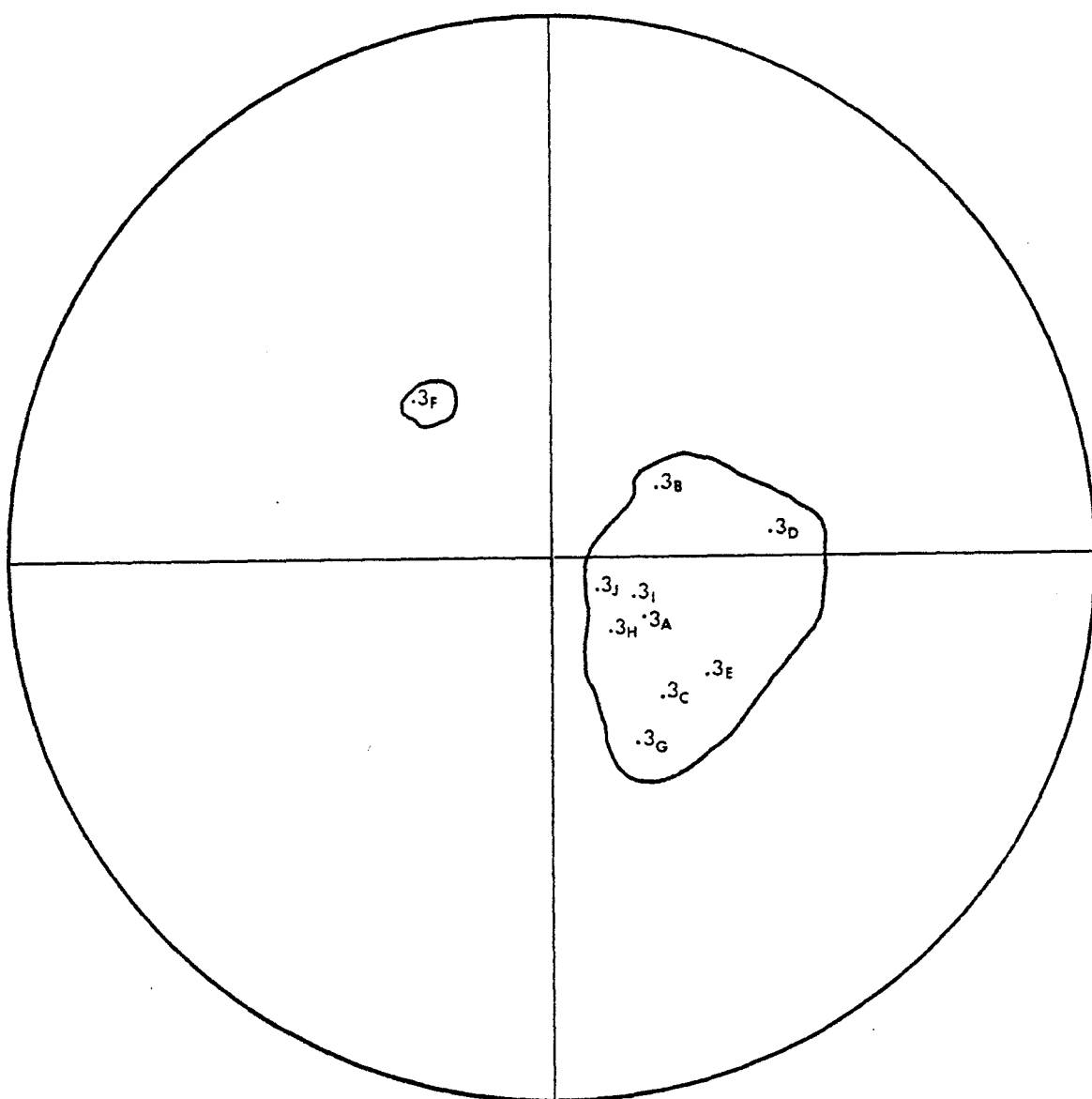


FIGURE 7.26

The financial manager (or director) at the E band level as perceived by his role set in 10 different companies A - J.

The financial manager of company F was in this company the financial and administration manager and did not make decisions on the source and application of funds. These were made at the group level. He was considerably older than other financial managers and was not considered to be particularly effective (interview data).

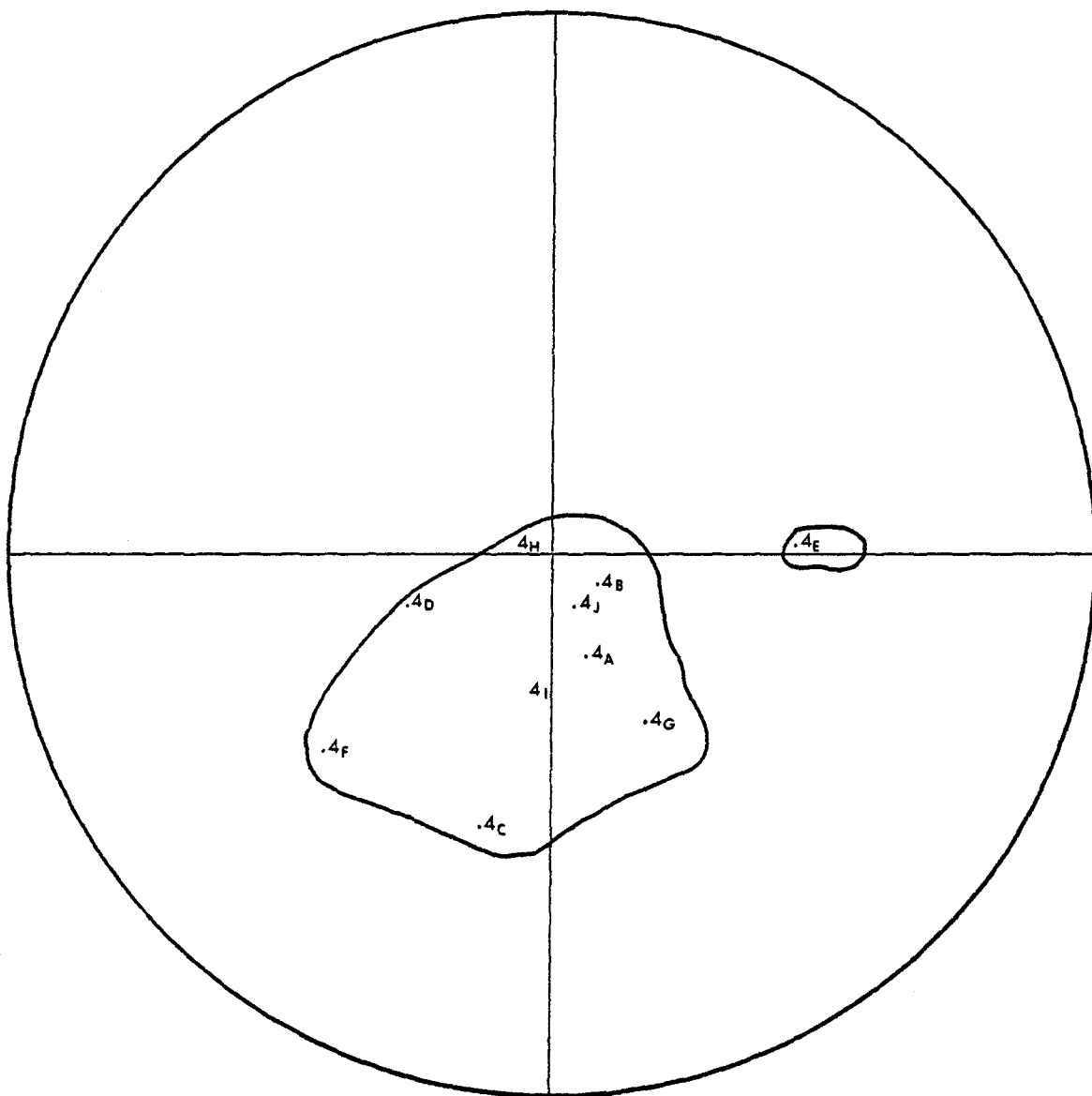


FIGURE 7.27

The production manager (director) at the E decision band level in 10 different companies as perceived by his role set.



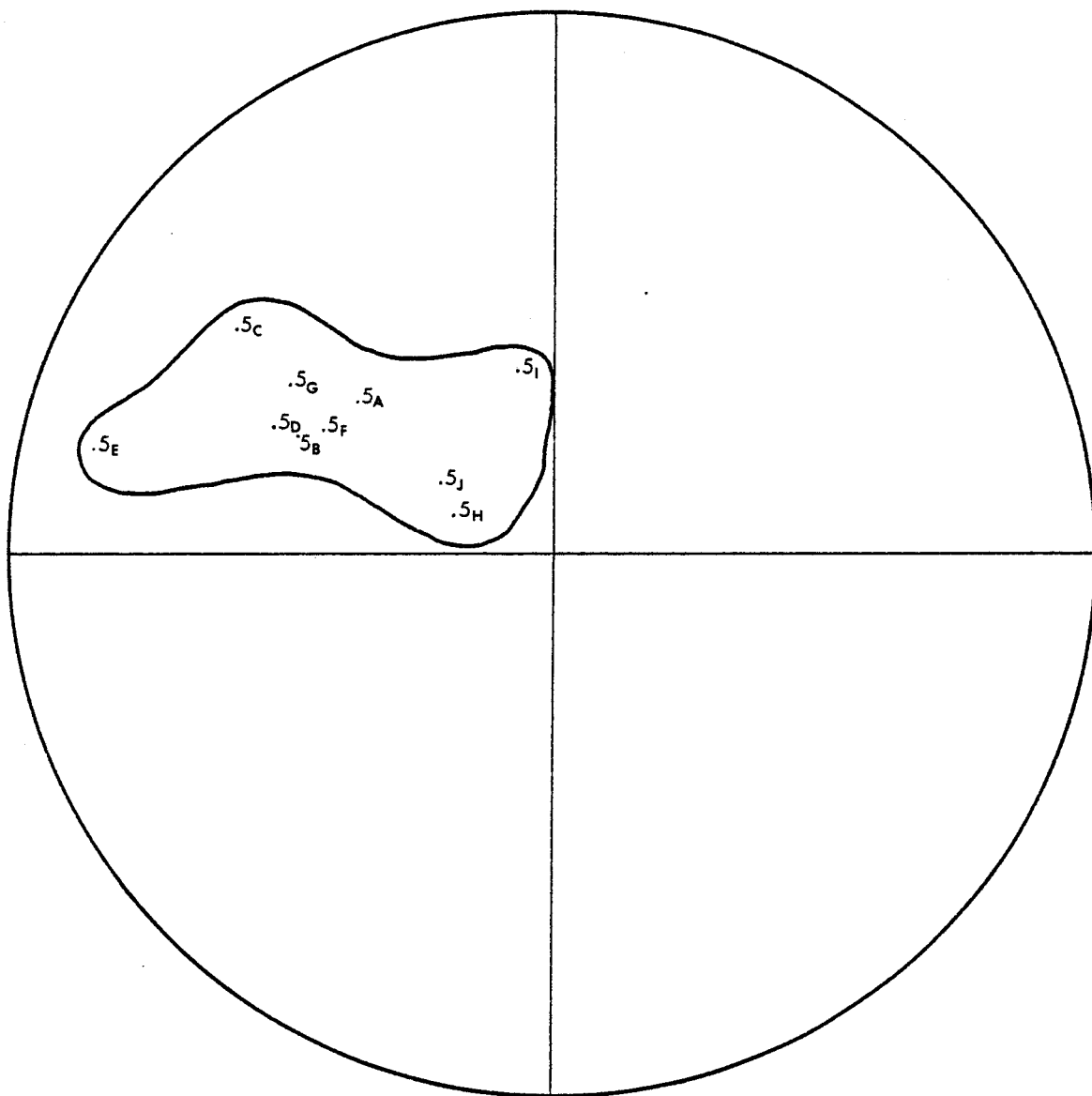


FIGURE 7.28

The personnel manager at the D band level in 10 different companies as perceived by his role set.

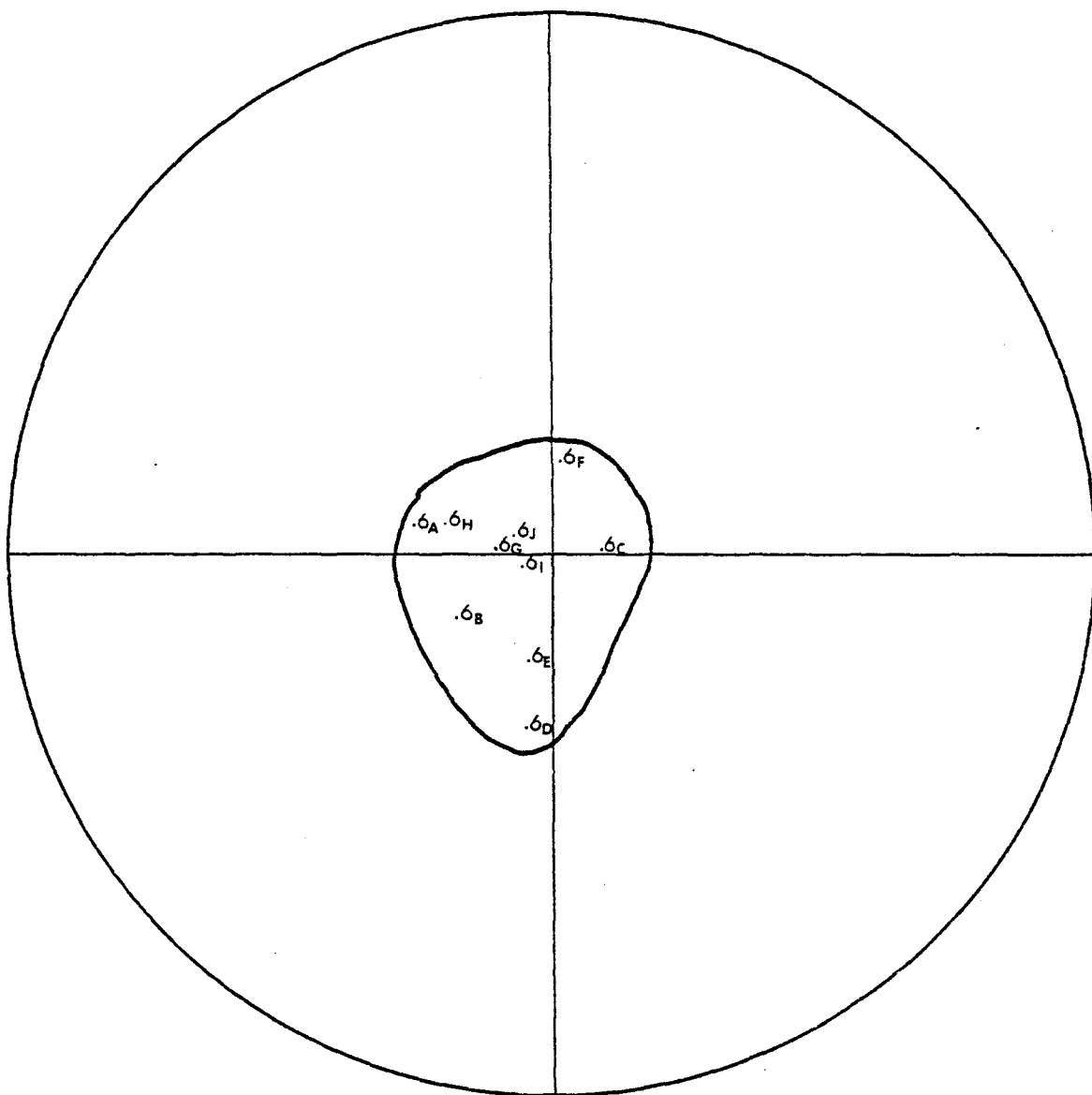


FIGURE 7.29

The sales manager at the D band level in 10 different companies as perceived by his role set.

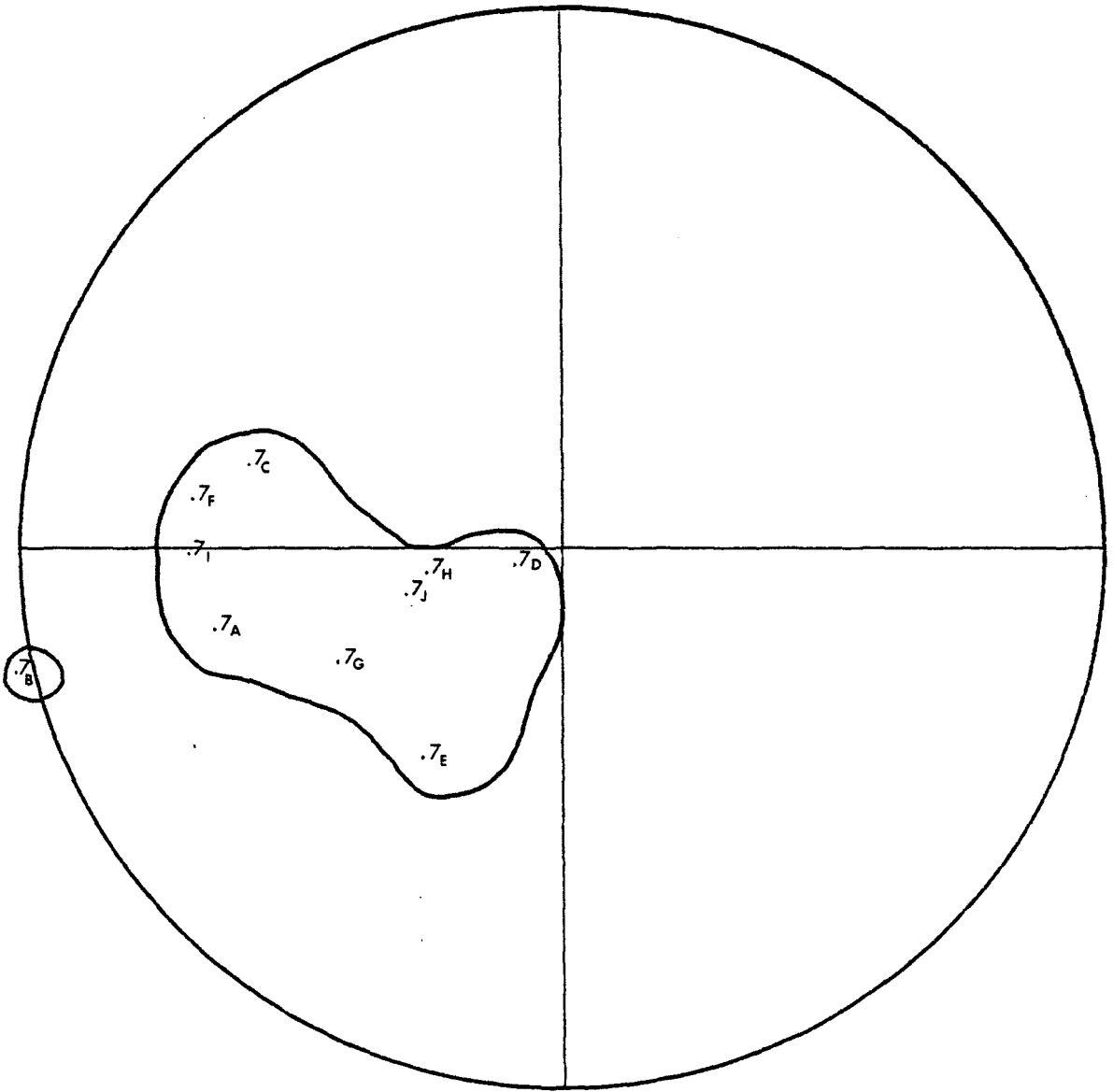


FIGURE 7.30

The financial accountant at the D decision band level in 10 different companies as perceived by his role set.

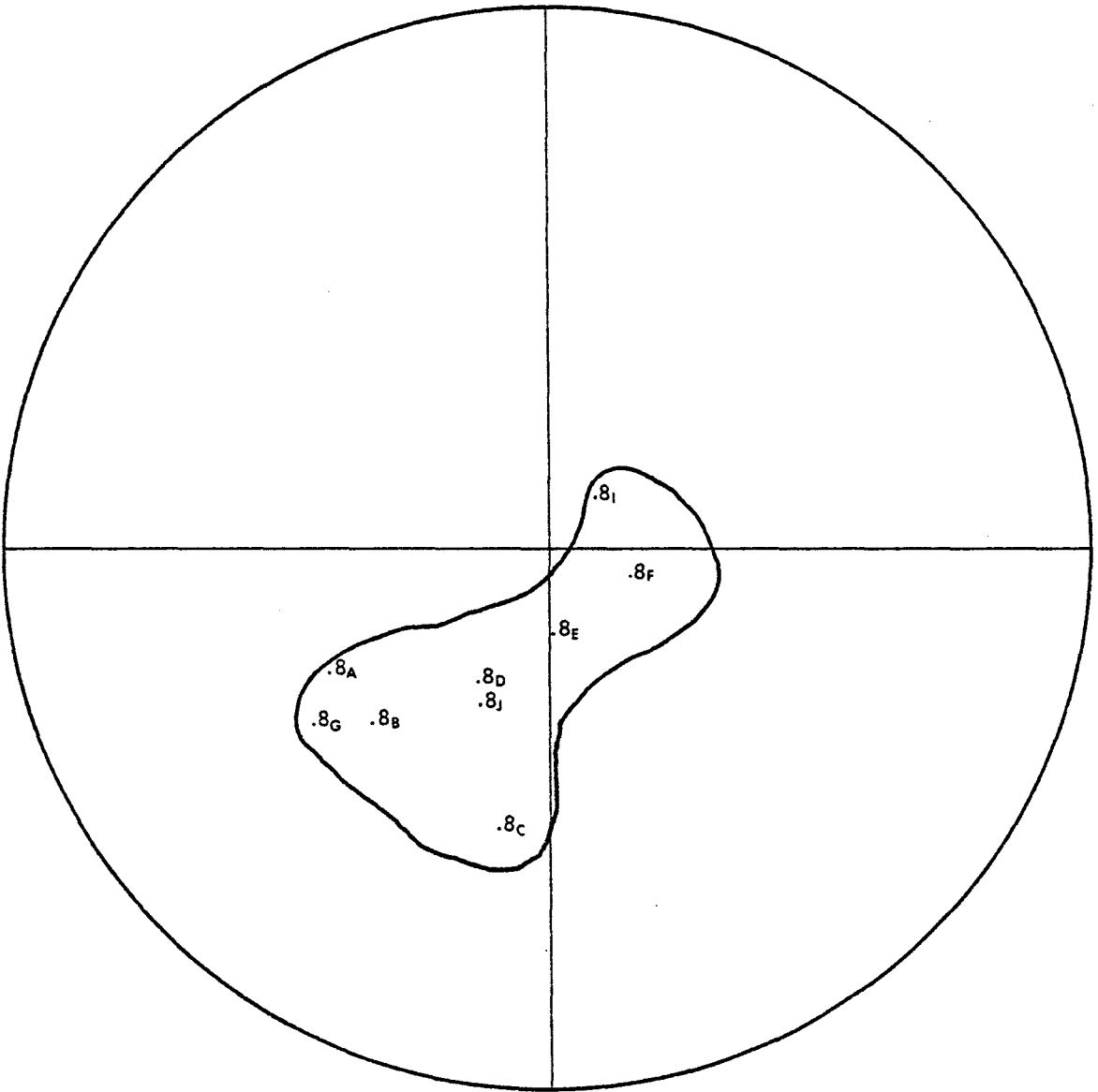


FIGURE 7.31

The production manager at the D decision band level in 10 different companies as perceived by his role-set.

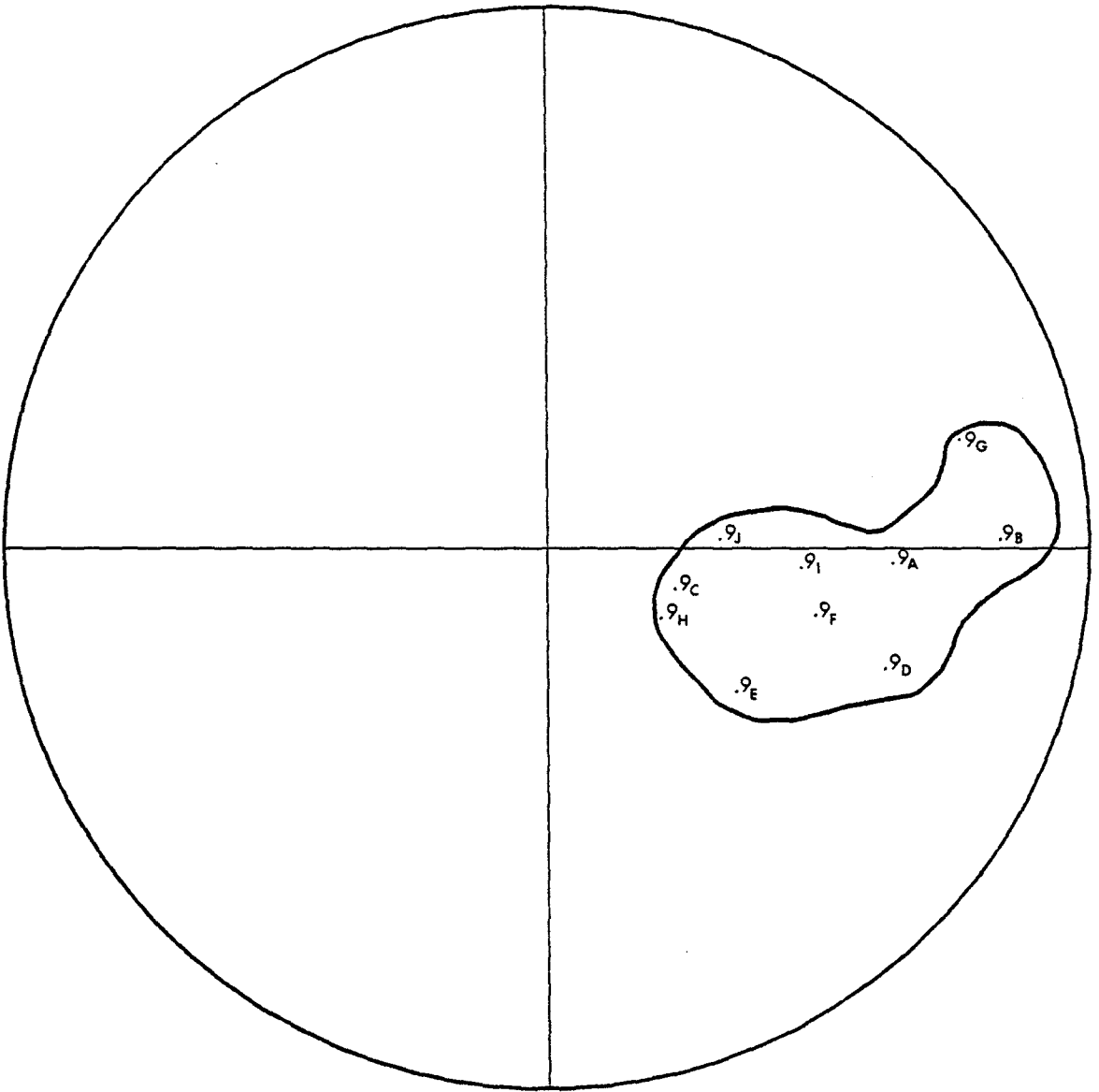


FIGURE 7.32

The managing director (decision band level F) in 10 different companies (A - J) as perceived by his role-set.

#### 7.2.2.7 The bases of power instrument

In a study done by Cogill (1975) on assessment centre results it was observed that a large proportion of variance is accounted for by the first components in managerial assessments. The assessment centre dimensions which loaded on component 1 were concerned primarily with dynamism, activity, power/potency. It was decided by the researcher to include the Holzbach (1974) instruments to determine whether there was any further differentiation of the first component as may be inferred from the French and Raven (1968) framework.

Table 7.12 depicts the results of the principal components analysis of the Holzbach instrument. No clear component structure has emerged since there is no pattern in the loadings across the components corresponding to the four sub-scale measures.

Table 7.13 depicts the results of a factor rotation - Direct Quartimin Factor Pattern which fails to reveal any clear separation of the sub-scales of legitimate power, reward power, coercive power, expert power or referent power.

TABLE 7.12

Loadings on components for French and Ravens' Bases of Power

| <u>ITEM</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>SUB-SCALE</u> |
|-------------|------------------|------------------|------------------|------------------|------------------|------------------|
|             | 1                | 2                | 3                | 4                | 5                |                  |
| 1           | ,77              | ,62              | -,13             | -,09             | -,05             | Legitimate       |
| 2           | ,96              | -,13             | ,05              | ,02              | ,21              | Reward           |
| 3           | ,83              | -,44             | -,08             | -,21             | ,08              | Coercive         |
| 4           | ,80              | -,55             | -,11             | ,05              | ,01              | Referent         |
| 5           | ,71              | ,36              | -,18             | ,24              | -,50             | Legitimate       |
| 6           | ,52              | ,76              | -,37             | ,02              | ,07              | Legitimate       |
| 7           | ,72              | ,52              | ,37              | ,10              | ,13              | Coercive         |
| 8           | ,97              | ,18              | -,11             | ,10              | ,03              | Expert           |
| 9           | ,93              | ,19              | -,17             | -,01             | ,24              | Reward           |
| 10          | ,42              | ,58              | ,64              | -,16             | -,08             | Coercive         |
| 11          | ,95              | -,18             | ,03              | -,17             | -,09             | Referent         |
| 12          | ,96              | -,17             | ,03              | -,16             | -,04             | Referent         |
| 13          | ,92              | -,34             | ,04              | ,03              | ,18              | Reward           |
| 14          | -,30             | ,89              | ,04              | -,20             | ,20              | Coercive         |
| 15          | ,86              | -,01             | ,38              | ,05              | -,03             | Expert           |
| 16          | ,91              | ,17              | -,02             | ,25              | -,22             | Expert           |
| 17          | ,97              | -,10             | ,13              | ,09              | -,16             | Referent         |
| 18          | ,85              | ,41              | ,23              | ,18              | ,12              | Expert           |
| 19          | ,95              | -,08             | ,09              | -,20             | -,05             | Referent         |
| 20          | ,95              | ,04              | ,10              | ,07              | -,04             | Expert           |
| 21          | -,22             | ,86              | -,35             | ,26              | ,09              | Coercive         |
| 22          | ,90              | -,22             | -,28             | ,02              | -,12             | Reward           |
| 23          | ,34              | ,34              | -,19             | -,83             | -,14             | Coercive         |
| 24          | ,91              | -,27             | -,03             | ,04              | ,23              | Reward           |
| 25          | ,90              | -,09             | -,39             | -,01             | ,13              | Reward           |

TABLE 7.13

| <u>ITEM</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>COMPONENT</u> | <u>SUB-SCALE</u> |
|-------------|------------------|------------------|------------------|------------------|------------------|------------------|
|             | 1                | 2                | 3                | 4                | 5                |                  |
| 1           | ,29              | ,43              | ,26              | ,34              | ,31              | Legitimate       |
| 2           | ,93              | -,00             | ,20              | -,01             | -,01             | Reward           |
| 3           | ,83              | -,30             | -,08             | -,02             | ,21              | Coercive         |
| 4           | ,78              | -,33             | -,17             | ,18              | ,04              | Referent         |
| 5           | -,16             | ,13              | ,05              | 1,02             | ,06              | Legitimate       |
| 6           | ,29              | ,78              | ,03              | ,25              | ,23              | Legitimate       |
| 7           | ,34              | ,24              | ,73              | ,07              | -,04             | Coercive         |
| 8           | ,67              | ,22              | ,15              | ,33              | ,04              | Expert           |
| 9           | ,90              | ,35              | ,11              | ,01              | ,11              | Reward           |
| 10          | -,23             | -,05             | ,95              | ,09              | ,19              | Coercive         |
| 11          | ,60              | -,26             | ,13              | ,26              | ,24              | Referent         |
| 12          | ,66              | -,23             | ,14              | ,20              | ,23              | Referent         |
| 13          | ,93              | -,17             | ,11              | -,01             | -,06             | Reward           |
| 14          | -,30             | ,67              | ,35              | -,31             | ,26              | Coercive         |
| 15          | ,43              | -,24             | ,55              | ,21              | -,04             | Expert           |
| 16          | ,32              | ,06              | ,21              | ,67              | -,07             | Expert           |
| 17          | ,46              | -,23             | ,27              | ,46              | ,00              | Referent         |
| 18          | ,50              | ,26              | ,57              | ,18              | -,10             | Expert           |
| 19          | ,58              | -,21             | ,24              | ,20              | ,27              | Referent         |
| 20          | ,56              | -,05             | ,30              | ,33              | ,02              | Expert           |
| 21          | -,23             | ,93              | -,05             | ,16              | -,07             | Coercive         |
| 22          | ,65              | -,08             | -,21             | ,43              | ,12              | Reward           |
| 23          | -,01             | ,01              | -,01             | -,04             | 1,00             | Coercive         |
| 24          | ,99              | -,04             | ,06              | -,02             | ,09              | Reward           |
| 25          | ,92              | ,21              | -,25             | ,15              | ,14              | Reward           |

DIRECT QUARTIMIN FACTOR PATTERN MATRIX

|   | 1    | 2    | 3    | 4    | 5    |
|---|------|------|------|------|------|
| 1 | 1,00 | -,19 | ,29  | ,64  | ,25  |
| 2 | -,19 | 1,00 | ,20  | ,08  | ,16  |
| 3 | ,29  | ,20  | 1,00 | ,35  | ,25  |
| 4 | ,64  | ,08  | ,35  | 1,00 | ,25  |
| 5 | ,25  | ,16  | ,25  | ,25  | 1,00 |

DIRECT QUARTIMIN FACTOR CORRELATION MATRIX



### 7.3 Conclusion

The cognitive maps derived demonstrate clearly the existence of perceptual structuring on the part of managers, both as individuals and in their respective role-sets. The effect of the process becomes even more vivid when one compares these cognitive maps with Figures 6.4 to 6.9 which demonstrate the results that would be obtained in the absence of any such perceptual mediation.

Simon (1952) remarked:

The limit of human understanding in the presence of complex social structures leads human beings to construct simplified maps (i.e. theories or models) of the social system in which they are acting, and to behave as though the maps were reality (p.1135).

Empirical support for the existence of such maps in a defined organizational setting, the role-set of the dominant coalition of managers, has thus been provided in this dissertation.

DISCUSSION OF RESULTS

Although organizational policies and structures may be elaborated separately from their memberships, people populate and work them, and the interplay of people and structures defines the phenomena of organization (Lichtman & Hunt, 1971, p.271).

8.1 Analysis and testing of the hypotheses

A perspective has been provided by the overall analysis of the findings.

Hypothesis 1 Whatever the constructs are that managers use in the assessment of other managers the patterning of such constructs will be simplified into relatively few (2 or 3) channels or filters. A manager's perceptual construction of the interactive role-set (his cognitive map) will display patterning or structure which simplifies the total repertoire of evaluative dimensions to him.

The principal components analyses conducted on each manager's grid showed that three major interpretable components emerged, the first accounting for an average of 46,67% of the variance, the second an average of 18,37% and the third an average of 11,77%. The consensus grid for all managers, which combined their perceptual views of members within their respective role-sets, displayed a similar structuring with the first component accounting for 60,77% of the variance, the second 17,72% and the third 9,55%.

The outcomes derived from these measured grids were compared with the outcomes which would have been derived in the absence of any perceptual structuring. Multiple t tests as

well as Hotelling's multivariate  $T^2$  and Mahalanobis'  $D^2$  were used to determine inferentially whether or not the distributions could have arisen by chance. The null hypothesis may therefore be rejected and the alternative research hypothesis accepted, that is: A manager's construction of the interactive role-set (his cognitive map) will display patterning or structure which simplifies the total repertoire of evaluative dimensions available to him.

Hypothesis 2 The component structure which emerges from an analysis of these constructs will display characteristics of potency, empathy and managerial competence.

Analysis of component 1 indicates that, in fact, it is a component concerned with general management ability with a preponderance of dynamism and power factors, that is potency. The structure of the overall component is, however, not such that it could be termed power. According to French and Raven (1968) it may be necessary to identify the various bases of power within this overall clustering of constructs. However, an attempt to identify these differential power bases did not reveal positive results in this study.

Component 2 has high loadings on "people" and psychological processes as opposed to managerial role functions and could be termed empathy.

Component 3 has relatively few constructs loading on it. A visual inspection of the constructs loading on component 3 are nevertheless indicative of competence.

Hypothesis 3 The perception of managers in the functions marketing, production, finance and personnel will be relatively consistent in the companies of a particular industrial sector in terms of the level of decision making.

The role perception matrix figure does display a relatively high degree of role differentiation among the functions and levels of the Paterson (1972) decision-band

system for the higher levels of production and marketing. In a few cases where marked deviations from particular role-expectations occur they can be explained by the interview data. Absolute definition with clearly defined boundaries would, in terms of the phenomena being investigated and the multi-dimensionality of the constructs, be somewhat unexpected. Organizations are not represented by formally defined organograms but may be considered as an aggregate of structures with the informal at times dominating the formal. The amoebic forms of the venn diagrams chosen to represent the function at the respective levels are possibly more appropriate than the formal organization charts typically used by managers in representing organizational phenomena.

Daft and Wiginton (1979) remark that, as the field of organizational research moves toward richer conceptualizations or organizations, such as social culture, organizational researchers may have to reach out and utilize new forms of expression.

Hypothesis 4 In terms of the strategic contingencies theory of power-acquisition (Pfeffer and Salancik, 1978) the staff function of personnel management will be perceived markedly differently from other functions.

This proposition holds true especially for the D-level of the personnel function. In fact the overall lack of ability to influence the resources of the organization at this level is exceeded only by that of the accounting function at the equivalent level. The position of the most senior personnel functionary (E-level) is relatively lower than that of any of the other E-level functions and is exceeded by the production D-level role-occupants in general. In an overall judgement by 81 other managers it is their considered opinion (role-expectation) that the personnel manager at the E-level ideally ought to be positioned further along the dimensions

constituting component 1 and ought to be slightly less emphathetic than he actually is.

Hypothesis 5 The staff function of accounting, particularly at the D-band of decision making, will also be perceived to have a weaker power base than the other functions at equivalent levels.

The overall positioning of the accounting functionary at the D-band level is relatively the lowest on component 1. This may be for similar reasons to those discussed when discussing hypothesis 4. In addition, however, there is a high degree of variation in the responsibility accorded to financial managers across organizations in this study. As pointed out previously, the majority of companies in the study had also computerized their accounting function and the true financial decisions, which are more contingently related to various power bases, are the responsibility of the financial manager at the E-level of decision-making.

Hypothesis 6 Managers at the E-band decision-making level will display cognitively more complex patterns of perceptive structuring than those at the D-band level.

This hypothesis, which was based on the premise that managers at the E-Band level would have to be capable of a higher degree of differentiation, was borne out.

Hypothesis 7 Finance and production managers will be perceived to be relatively high on the potency dimension but relatively low on empathy.

This hypothesis is difficult to test from the data since it depends largely on the bases of power being considered.

Finance (E-level) managers emerged second to the managing

director in terms of perceived overall managerial activity. There was, however, no clear positioning of production managers at the E-level. Production managers emerged relatively low in comparison with other managers on empathy. Financial managers at the E-level, contrary to the hypothesis, did not emerge low on empathy.

Hypothesis 8 Finance and marketing will be perceived to be relatively higher on the potency dimension than production.

This research hypothesis may be accepted in terms of the results depicted in Table 7.6 and Figure 7.2.

## 8.2 Verification of fundamental postulate and certain corollaries

### - Fundamental postulate

Kelly's fundamental postulate (Chapter 3, p.84) is substantially supported by the results of this thesis. A person's perceptual processes do not operate in a random manner but rather within a system of flexible but restrictive pathways that constitute a network.

Kelly (1955) used the term "to construe" to mean to interpret, to understand, to deduce or to explain. According to Kelly, personal constructs are an individual's conclusions or interpretations about life. Kelly developed the view that life is not so much a matter of objective events as it is of what one makes of those events. For Kelly, the person is only constituted in relation to others and constructs are available through interaction with others and obtain meaning in the context of that interaction.

According to Kelly, the formation of an impression of an individual's personality is not simply a matter of characterizing his or her behaviour on the basis of one's own personal constructs. It also involves making inferences about

the psychological processes of the other. Kelly proposed the theory that an individual's behaviour develops out of his construction and anticipation of events. It has been demonstrated in this thesis that "social construction" occurs both through the processes of perceptual filtering and also through the formation of simplified cognitive maps.

Although not specifically tested on a hypothetico-deductive basis, a number of Kelly's corollaries were also confirmed:

- Corollary 2. Individual corollary

It was found in this study that there were individual differences among managers in their construing of social structure.

- Corollary 3. Organization corollary

Although Hinkle's (1965) technique of laddering was not utilized in the elicitation of constructs from managers, it was found that constructs such as "positive image", "held in high esteem", "formulates effective policy", tended to emerge earlier in the interview situation than did constructs such as "controls well", "organizes well", "plans effectively". This could, however, also have been a function of the fact that, in the process of eliciting constructs, the subject became more discriminating in his perceptions as the interviewer prompted for more constructs.

- Corollary 4. Dichotomy corollary

Each construct elicited by way of the Repertory Grid technique elicited a pair of opposites. Each construct involved a contrast. In line with Kelly's theory the construer (manager) classified someone as having a corporate

or general managerial view as a replication of something he has seen before. Critical incidents were often quoted and encouraged by the interviewer in order to emphasize the perception of behavioural events on the part of managers.

In Kelly's view it is impossible to see similarity without at the same time having a contrast in mind. The constructs elicited all had contrasts - in many cases direct opposites, and in some cases semantically diametrically opposed but not necessarily a negation of the alternate pole, for example, "has corporate view - has specialist view" or "people orientated - production orientated".

- Corollary 6. Range corollary

The constructs elicited from managers were all within the range of the objects being construed and the 90 managers in the study did not omit to complete ratings on the basis that particular constructs did not apply.

- Corollary 7. Experience corollary

Within the domain of the elements under examination, that is the behaviour of other managers, individual managers in the study did not display a maximum number of constructs which they were able to utilize. The number of constructs elicited ranged between 12 and 56. After a series of interviews the constructs generated by the Repgrid technique began to overlap.

The dynamics of the experience corollary could not be analyzed in this study. In Kelly's opinion a person does not use the same set of constructs forever. The process of learning leads to a constant revision of constructs, the abandonment of the obsolete ones and the incorporation of more significant ones.



- Corollary 11. Sociality corollary

According to Kelly the formation of an impression of an individual's personality is not simply a matter of characterizing his or her behaviour on the basis of one's own constructs. It also involves making inferences about the psychological processes of others. Although managers in this study displayed a wide range of individual differences with respect to their construction patterns, they were nevertheless able to relate, role-wise, to each other.

- Complementarity corollary (Chapter 3, p.96)

Thomas (1979) maintains that the complementarity corollary formulated by himself serves to link commonality with the other social corollaries.

One of the most important analytical aspects of this thesis has been to identify the commonality between the constructions of experience among members of a group and to reveal, by way of the consensus grid, analysis of system properties.

In contrast with traditional work done within the Kellian framework, which is primarily idiographic, this study is essentially nomothetic. Within the domain of clinical psychology most Repertory Grid studies, including dissertations, for example, those of Dresser (1964), and Topcu (1976), have been idiographic in character. In a relatively recent annotated bibliography Fransella and Bannister (1977) illustrate the diversity of grid usage. However, no reference is made to the personal construct systems of managers, neither did the researcher encounter, in subsequent literature, work done in this area, except for that done by Smith (1976). The closest work, from an organizational behaviour point of view, was found in the image area (Chapter 4) where the repertory grid technique has been applied to elicit constructs. The

subsequent analysis in these studies has, however, invariably been of a semantic differential nature.

Extension of the grid technique in the managerial area at a nomothetic level of analysis allows the concept of organization and institution to be introduced into the personal construct psychology approach to social systems, as has been noted by Thomas (1979).

Upon analysis of the constructs utilized by managers in this study, it will be seen that the constructs are mainly orientated toward what managers do, that is, behaviourally or action orientated as opposed to personality orientated. This is in contrast with the work quoted in Chapter 3, in which researchers indicated that there is an increase in the use of personality constructs with age. In this study such developmental trends were not an object of study; nevertheless it is noteworthy that the frequency of personality constructs is lower than that concerning behaviour. It would appear that this difference in the findings is not a negation of the findings of other researchers but demonstrates clearly that there are other contingencies involved, for example, the elements themselves, the setting, and the particular question posed when eliciting the constructs.

### 8.3 The within-company construct systems

The within-company social construction of managers' role-perceptions is reflected by the Figures 7.12 to 7.21 derived by a multidimensional scaling technique.

Overlays of individual role-incumbents across companies are provided in Figures 7.23 to 7.32 to highlight these role-perceptions.

There is a high degree of similarity among the ten

companies when comparing components 1 and 2 with respect to the positions (elements) of:

Managing Director  
Financial Accountant  
Financial Director  
Personnel Director  
Personnel Manager

The positions of sales manager and marketing manager, as well as director of production, tend to be far more scattered in terms of their relative positioning in different firms. Examination of the percentage of variance contributed by each element for the combined companies shows, however, that these three positions are relatively low in terms of variance. The conclusion which may be drawn is that although the positions may vary across firms, the within-firm variation is relatively low.

An overlay of the positions in the 10 companies reveals some degree of clustering according to Patersonian levels F, E and D, as well as differentiation according to function: for example, personnel (D-level), accounting (D-level), finance (E-level) (Figure 7.22).

This interpretation is, of course only in two-dimensional space. Yet a third orthogonal component exists (quantitative, scientific, analytical) on which the elements financial director, production director and financial accountant have relatively high loadings. Elements which load negatively on this component are sales manager, marketing director and personnel manager (Table 7.8).

Three positions on the overlay map are worthy of further comment. The position marked 3 (financial director, company F) though termed in the company "financial and administrative manager" turned out (as determined from interview data) to be

occupied by a manager performing primarily an administrative function and that the source and application of funds were primarily determined at corporate level. In effect, the manager was performing a senior accounting function, although designated by title and job grading level to be at the E-level. The incumbent had been with the company for many years and is close to retiring age.

The position marked 4 (manufacturing manager, company F) was that of an incumbent who left the company whilst the study was in progress in that company and was judged by other managers in the company to be most ineffective in all respects.

The relatively high degree of scatter of position No.2 (marketing director) may be explained by the varying power of marketing in the companies in the sample. Although all the companies were in the manufacturing industry, four were in engineering and four in home products and consumer goods. The marketing managers at E-level (marked 2) were not, however, distributed according to the importance of marketing from a consumer point of view. The two marketing managers rated highest on component 1 were in companies producing goods for the mining industry, whereas the marketing manager rated third was in a company producing automotive batteries primarily for the original component automotive industry. The industrial marketing managers appear to have had slightly higher loadings on component 1. Two marketing managers whose positions are marked 2 in quadrant 2 are judged to be low on constructs associated with empathy. The majority of marketing managers in these companies (8 out of 10) had been technical product managers before (five with engineering degrees) accounting for the relatively lower position on dimension 2.

Production and marketing are two functions which at the more senior (E) level could be major sources of heterogeneity in this study. Although the sample was chosen to be as

homogeneous as possible, differing technologies and market environment effects did, nevertheless, have an influence on the design of the companies.

Schepers and Grant (1969) found in their earlier studies done on the structure of African intellect that heterogeneity of samples had an important bearing on factor structure and could, in fact, cause factor structure to collapse.

In this study the effects of the "collapsing" of factor structure may be found in the percentage of variance accounted for by the first component for individual managers ( $X = 48\%$ ) to the percentage of variance accounted for by the first component in the consensus grid for 90 managers - 60,64%.

Interpretation of the perceptual space in more than three dimensions on to the surface of a globe becomes increasingly complex. Theoretically the space has as many dimensions as there are constructs. The human mind is normally capable of interpreting only in three dimensions. In this and other multi-dimensional scaling techniques there are theoretically an infinite number of possible dimensions. As one proceeds beyond three dimensions, however, the task becomes increasingly complex, if not impossible. The fact that so much structure has emerged is in itself significant.

SUMMARY AND CONCLUSIONS

It is probably no mere historical accident that the word person, in its first meaning, is a mask. ...It is rather a recognition of the fact that everyone is always and everywhere, more or less consciously, playing a role... It is in these roles that we know each other; it is in these roles that we know ourselves (Park, 1950, p.249).

9.1 Introduction

Analysis of the empirical results in Chapter 7 revealed that managers impose a certain order or structure on the social world within which they exist.

The institutions in which one functions in society are the products of human action and in their objectified form they become part of the real world in which we live. Berger and Luckman (1971) view this as a dialectical process in which individuals are engaged collectively in construing this objectivity. This in turn shapes what individuals become.

People are continually construing their social worlds. Through their interactions with each other social patterns are gradually built and eventually a set of institutional arrangements is established. Through continual interactions the arrangements previously constructed are gradually modified or replaced.

The production of social structure is itself guided and constrained by the context. The existing social structure is an important constraint in the process and it often produces a

social world which influences managers, constraining their actions.

In this study it has been demonstrated that the above phenomena are manifested in at least two ways. First, managers, as do all human beings, simplify their social worlds by construing their roles in a simplistic way, through a selected number of "filters" or "channels".

The manager's mind works with verbal codes which summarize complex events and task-relevant information (Daft & Wiginton, 1979, p.184).

Secondly, representations in three-dimensional space by means of multidimensional scaling techniques indicate the effect of organizational factors such as structure and role (function) which transcend personality differences.

## 9.2 Individual construct systems

In Table 7.2 it can be seen that although each manager in the study had the opportunity to utilize 40 different constructs, there was such a high degree of association between groups of these constructs, that 76,83% of the variance was accounted for by the sum of the first three orthogonal components. The first component or major cluster of constructs accounted for 46,67% of the variance. In an analysis of the expected distribution of quasi-grids, a theoretically derived model in which managers would not "psychologically channelize events" (Kelly, 1955), the expected proportion of variance accounted for by the first channel or filter would have been only 19,64%. Separate  $t$  tests and an overall multivariate Hotelling's  $T^2$  and Mahalanobis'  $D^2$  were computed to determine whether the observed results could have been obtained by chance. The research hypotheses set up were confirmed. The structuring or perceptual filtering which did take place could not have been attributed to chance.

Examination of Table 7.2 will reveal that that there were individual differences among the 90 managers in the sample with the lowest percentage of variance contributed by the first components being 19,73% and the highest 70,21%.

A comparison of the distribution of the correlation coefficients for the measured quasi-grids and the resultant  $\chi^2$ -test reveal that the number of construct inter-correlations above the 0,65 level is well in excess of that which may have been obtained by chance. Tables 7.6 to 7.8 are reflections of the three main components or "channels" which managers typically used in construing their social worlds in this study.

In addition to confirming the results of studies on implicit personality theory conducted outside the managerial domain (Chapter 3), the results of this study may serve to cast further light on the way in which managers actually function in organization as opposed to the way in which they ideally ought to. The classical view held is that the manager organizes, co-ordinates, plans and controls in a systematic manner. Mintzberg (1975), however, suggests otherwise. On the basis of his own research and that of others on the nature of managerial work he concludes that in fact:-

- managers are not reflective systematic planners. Study after study has shown that "... their activities are characterized by brevity, variety, and discontinuity and that they are strongly oriented to action and dislike reflective activities" (p.52).
- managers do not utilize information from well sourced comprehensive management information systems. He found in fact that "managers strongly favour the verbal media - namely telephone calls and meetings ... Managers seem to cherish "soft" information especially gossip, hearsay and speculation" (p.52).

Whilst these findings, taken from the context of Mintzberg's book, sound somewhat harsh, they are nevertheless



generally not disputed by practising managers. The findings do not necessarily reflect adversely upon managers from the point of view of value judgements but strongly emphasize man's limited capacity to process large quantities of information. Whilst managers may have many evaluative constructs or dimensions with different names, they do, either in terms of implicit personality theory (Bruner & Tagiuri, 1954), trait inference (Hays, 1958), or correlational bias (Berman & Kenny, 1976), have underlying theories of organizational behaviour (Davis, 1968).

### 9.3 Group construct systems

In this study evidence was found for the existence of a relatively well-defined set of group constructs and the patterning of group constructs giving the first empirical evidence known to the researcher in favour of Thomas' (1979) commonality corollary.

The individual company role construct maps (figures 7.12 to 7.21) as well as the consensus map for each of the ten companies (figures 7.2 to 7.4) depict clearly the existence of social structure. A synthesis of the positions of individual role incumbents leads to a well-defined clustering of particular role occupants defined in terms of the axes of differentiation defined.

### 9.4 The personnel function

The relative position of the personnel managers has already been highlighted in discussing hypothesis 4. The personnel function and its institutionalised presence in the personnel department often lack clear direction and purpose. A research study done by Ritzer and Trice (1969) found for example:

The role of the personnel department was not clearly defined. There was a lack of clear definition in management's expectations of the personnel management function... The author of the report felt that the unclear definition of personnel responsibilities was the root of many of the problems found in the personnel department. This lack of definition applied to the purpose of the personnel function, the relationship of the personnel function to line management, and the relationship to other departments on personnel matters (p.65).

In this dissertation it has been shown by comparing the perception of the E-Band personnel director with the perception of what he ought to be like, that the two domains are distinctly different. (Figures 7.22 and 7.23).

A plausible explanation of the relatively low positioning of the personnel function along the first component reflecting overall managerial ability is also related to the personnel director's relative incapability of exercising influence over the attitudes and behaviour of other individuals or groups. In order to exert influence a group or individual must possess or control something, for example status, money, information, knowledge, that is valued by and salient to those they wish to influence. Power is a contingent, not an absolute, power base.

Interview data collected in this study revealed that E-level line managers perceived their personnel departments to be primarily concerned with the technological aspects of the function. Eight out of nine managing directors and 29 out of 36 E-level managers saw the main role of the personnel function as the "appointment of the right people" (selection), "training and handling liaison committees and other industrial relations structures". Only one managing director saw the role of personnel in broader managerial terms:

A major measure of the company's success is reflected in the bottom line (financial statement). In order to achieve financial objectives we have to optimize resources, and people are one. The major role of the personnel manager is to advise, set goals and devise means of achieving goals that will maximize the human resources of the company. (Managing Director Company B, 1980)

Whenever managers interviewed in this study discussed aspects of the personnel function in their own companies they highlighted the inability of personnel managers to relate to line management's needs and perspectives. They were quoted as being "technically too specialized", "too involved in psychological theory", "having insufficient strength of conviction", "low impact", "having no or relatively low concern for profit".

Ritzer and Trice (1969), in a study based purely on interview data, found, in general, that personnel departments were:

- primarily passive - not initiators;
- defending the status quo rather than being creative and attempting to exercise leadership;
- reacting to, rather than anticipating problems;
- not standing up to be counted;
- carrying out management decisions, but not helping to shape management thinking;
- not business (profit) orientated;
- not prepared to take risks;
- lacking influence with management.

Also reporting from the U.S.A., Foulkes (1975, 1977) reports on virtually identical perceptions of personnel managers conducted in a wide range of business organizations.

Legge (1978) reports that line management in Great Britain:

- tends to have a confused, hazy and/or stereotyped perception of the potential nature and scope of a personnel department's activities;
- at the middle and junior level in particular, tends to consider that personnel departments are out of touch with the kinds of problems and constraints which face them.

If one examines the constructs used by managers in evaluating the personnel function in South African companies, many similarities may be found with the basic interview data above. However, from interview data of this dissertation both managing directors and E level managers saw, unlike the British researchers, that the greatest challenge facing personnel management was that of industrial relations and that this was one of the main areas in which they expected to find their personnel departments functioning in the future. Blau (1964) aptly summarizes expert power as a potential power base which could well lead to an increase in the power and status as well as general business involvement of personnel managers.

By supplying services in demand to others, a person establishes power over them. If he regularly renders services they cannot readily obtain elsewhere, others become dependent on and obligated to him for these services unless they in turn can supply services to the former person that he needs. The power of one individual over another thus depends on the social alternatives or lack of them available to the subjected individual (p.118).

Recent events in the field of labour relations in South Africa reinforce the need for expertise in industrial/labour relations.

Salancik and Pfeffer (1974) found that sub-units in an organization acquire power to the extent that they provide resources critical to the organization and that power affects resource allocations within organizations in so far as the resource is critical to the sub-units and scarce within the organization. In this study it has been shown that there are distinct differences in sub-unit power and that differentiation occurs even within sub-units depending on the decision-making level.

Salancik and Pfeffer (1974) point out that power in social systems may be vertical or horizontal and that it may also be interpersonal or involve relations between organizational units. Unfortunately social science research has in the past been dominated with a concern for vertical interpersonal power - the influence of one person over another.

Perrow (1970) is, however, one writer who has criticized this preoccupation with vertical power differentials and has noted that it has created a lack of attention to the important issue of power differences among sub-units in organizations. He suggests that horizontal power is the means by which interacting people obtain benefits for themselves.

In this dissertation it has been demonstrated clearly that perceptual mediation does occur when managers perceive their superiors, peers and subordinates. The two major sources of influence in the perceptual processes of managers are, first, cognitive structuring leading to a high degree of correlation among the constructs or evaluative dimensions being employed and, secondly, the context of their functioning as reflected by the role that the manager plays.

## 9.5 CONCLUSIONS

The major thesis has been that managers have certain "cognitive maps" or structures which they use in interpreting

their functional worlds and which therefore affect their behaviour.

Many theorists, ranging from Tolman (1948) to Simon (1952), to Daft and Wiginton (1979) have referred to these theories or models which managers hold about organization.

Empirical verification for the existence of these models, in particular role sets, has been provided by way of a visual representation of perceptual structuring derived from multidimensional scaling.

In this thesis the concept of role has been regarded as central in the process of organizing and the concept has been utilized as one of the major frameworks of analysis.

It is contended that the perspective and level of analysis adopted are appropriate to models of organization which alert one to the importance of the organization member in determining the content of organization.

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### Interfunctional Perception in Organization - Ph.D. Research Study

I am presently conducting research on interfunctional and interpersonal perception in organization (finance/marketing/personnel/production). The results of this research programme should have considerable benefit not only for the discipline of organizational behaviour, but also for the different professions involved in these functions as well as for individual companies who may use the results.

In terms of the sampling strategy your company has been selected for inclusion in the study. Should you decline to participate (which I hope you will not) another company will have to be selected.

The study involves a 60-minute interview and questionnaire (combined time) with each of:

1. The senior co-ordinating executive of the major functions.  
 (General Manager or Managing Director)
2. The senior manager of the functions : finance/marketing/personnel/production.
3. An immediate subordinate of each of the managers in 2.

In return for the time given to me in gathering the above data, I shall provide each participating company with a short report for management on the results of the entire study.

Should you decide to participate in the study I would welcome an opportunity to meet with you briefly to allow me to give you more details or answer any questions which may arise.

C. J. COGILL

SENIOR LECTURER IN ORGANIZATIONAL BEHAVIOUR.

CJC/m

The purpose of this research is to find out how people see others, how observant they are in noting differences between people and how they describe other people.

When interacting with superiors, subordinates and peers in the same function or in different functions, one forms judgements with regard to how they behave in the work situation along different behavioural dimensions, e.g. cautious or impulsive, energetic or lethargic.

The list of dimensions below has been obtained from a representative sample of South African managers. This list contains the dimensions, which people in organisation typically use in describing each others' behaviour. For each of the persons in the positions specified on each page of the questionnaire, attempt to get a mental picture of that person in your mind. Think of the behavioural characteristics which that person typically displays and then rate that person.

Please complete the rating for the nine role occupants on each dimension before proceeding to the next dimension.

1. There are no right or wrong answers. We are only interested in relative performance of the role incumbents along the behavioural dimension.
2. Feel free to use the entire range of the scale
  - (a) If the description is strongly characteristic of the person being rated then place your tick at one end:

|          |     |   |   |   |   |   |   |           |
|----------|-----|---|---|---|---|---|---|-----------|
| CAUTIOUS | 3   | 2 | 1 | 0 | 1 | 2 | 3 | IMPULSIVE |
|          | :✓: | : | : | : | : | : | : |           |

|             |   |   |   |   |   |   |     |           |
|-------------|---|---|---|---|---|---|-----|-----------|
| or CAUTIOUS | : | : | : | : | : | : | :✓: | IMPULSIVE |
|-------------|---|---|---|---|---|---|-----|-----------|

- (b) If the description is quite closely related to the person, but not strongly so:

|          |   |   |     |   |   |   |   |           |
|----------|---|---|-----|---|---|---|---|-----------|
| CAUTIOUS | : | : | :✓: | : | : | : | : | IMPULSIVE |
|----------|---|---|-----|---|---|---|---|-----------|

|             |   |   |   |   |   |     |   |           |
|-------------|---|---|---|---|---|-----|---|-----------|
| or CAUTIOUS | : | : | : | : | : | :✓: | : | IMPULSIVE |
|-------------|---|---|---|---|---|-----|---|-----------|

- (c) If you feel the person is slightly more one than the other:

|          |   |   |   |     |   |   |   |           |
|----------|---|---|---|-----|---|---|---|-----------|
| CAUTIOUS | : | : | : | :✓: | : | : | : | IMPULSIVE |
|----------|---|---|---|-----|---|---|---|-----------|

|             |   |   |   |   |     |   |   |           |
|-------------|---|---|---|---|-----|---|---|-----------|
| or CAUTIOUS | : | : | : | : | :✓: | : | : | IMPULSIVE |
|-------------|---|---|---|---|-----|---|---|-----------|

- (d) If the dimension is neither characteristic nor uncharacteristic of the role occupant, place your tick in the centre block.

|          |   |   |   |     |   |   |   |           |
|----------|---|---|---|-----|---|---|---|-----------|
| CAUTIOUS | : | : | : | :✓: | : | : | : | IMPULSIVE |
|----------|---|---|---|-----|---|---|---|-----------|

3. Work at a fairly high speed: do not worry or puzzle over individual items - it is your first reaction that is the most useful to us.
4. Be sure that you tick every scale : do not omit any.
5. Never put more than one check mark on a single scale.



1) FORCEFUL IN HIS VIEWS  
AND CONVICTIONS

LACKS FORCE OF VIEW  
AND CONVICTION

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(2) FORMULATES EFFECTIVE  
POLICY IN HIS AREA

DOES NOT FORMULATE  
EFFECTIVE POLICY

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(3) COMPETENT IN HIS OWN  
TECHNOLOGY/PROFESSION

NOT COMPETENT IN HIS  
OWN TECHNOLOGY/PROFESSION

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(4) HAS CORPORATE  
(OVERALL VIEW)

HAS SPECIALIST  
VIEW

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
|                                                 | : | : | : | : | : | : | : | : |
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(5) PEOPLE ORIENTATED

PRODUCTION ORIENTATED

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
|                                                 | : | : | : | : | : | : | : | : |
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(6) DECISIVE

INDECISIVE

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
|                                                 | : | : | : | : | : | : | : | : |
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

UNSCIENTIFIC

DOES NOT PLAN  
EFFECTIVELY

DOES NOT PLAN  
EFFECTIVELY

DOES NOT SET HIGH  
WORK STANDARDS AND GOALS

- 266 -

(10) REACTIVE (REACTS TO PROBLEMS  
ONLY AS THEY ARISE)

PROACTIVE (ANTICIPATES  
PROBLEMS BEFORE THEY ARIS

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(11) TAKES RISKS

NOT A RISK TAKER

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Directorer                         | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(12) HAS STRONG INFLUENCE ON  
GENERAL MANAGEMENT

INFLUENCE ON GENERAL  
MANAGEMENT IS WEAK

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |



(13) TACTFUL : : : : : : : : TACTLESS

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(14) IMAGINATIVE UNIMAGINATIVE

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(15) GOOD COMMUNICATOR POOR COMMUNICATOR

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

|                                              |          |   |   |   |   |   |   |   |            |
|----------------------------------------------|----------|---|---|---|---|---|---|---|------------|
| (16)                                         | FLEXIBLE | : | : | : | : | : | : | : | INFLEXIBLE |
| Personnel Director                           |          | : | : | : | : | : | : | : |            |
| Marketing Director                           |          | : | : | : | : | : | : | : |            |
| Financial Director                           |          | : | : | : | : | : | : | : |            |
| Manufacturing Director                       |          | : | : | : | : | : | : | : |            |
| Personnel Manager                            |          | : | : | : | : | : | : | : |            |
| National Sales Manager                       |          | : | : | : | : | : | : | : |            |
| Financial Accountant                         |          | : | : | : | : | : | : | : |            |
| Factory Manager                              |          | : | : | : | : | : | : | : |            |
| Managing Director                            |          | : | : | : | : | : | : | : |            |
| Personnel Director as he ideally ought to be |          | : | : | : | : | : | : | : |            |

|                                              |            |   |   |   |   |   |   |   |                |
|----------------------------------------------|------------|---|---|---|---|---|---|---|----------------|
| (17)                                         | PRODUCTIVE |   |   |   |   |   |   |   | NON-PRODUCTIVE |
| Personnel Director                           |            | : | : | : | : | : | : | : |                |
| Marketing Director                           |            | : | : | : | : | : | : | : |                |
| Finasncial Director                          |            | : | : | : | : | : | : | : |                |
| Manufacturing Director                       |            | : | : | : | : | : | : | : |                |
| Personnel Manager                            |            | : | : | : | : | : | : | : |                |
| National Sales Manager                       |            | : | : | : | : | : | : | : |                |
| Financial Accountant                         |            | : | : | : | : | : | : | : |                |
| Factory Manager                              |            | : | : | : | : | : | : | : |                |
| Managing Director                            |            | : | : | : | : | : | : | : |                |
| Personnel Director as he ideally ought to be |            | : | : | : | : | : | : | : |                |

|                                              |                |   |   |   |   |   |   |   |                  |
|----------------------------------------------|----------------|---|---|---|---|---|---|---|------------------|
| (18)                                         | THINKS CLEARLY |   |   |   |   |   |   |   | CONFUSED THINKER |
| Personnel Director                           |                | : | : | : | : | : | : | : |                  |
| Marketing Director                           |                | : | : | : | : | : | : | : |                  |
| Financial Director                           |                | : | : | : | : | : | : | : |                  |
| Manufacturing Director                       |                | : | : | : | : | : | : | : |                  |
| Personnel Manager                            |                | : | : | : | : | : | : | : |                  |
| National Sales Manager                       |                | : | : | : | : | : | : | : |                  |
| Financial Accountant                         |                | : | : | : | : | : | : | : |                  |
| Factory Manager                              |                | : | : | : | : | : | : | : |                  |
| Managing Director                            |                | : | : | : | : | : | : | : |                  |
| Personnel Director as he ideally ought to be |                | : | : | : | : | : | : | : |                  |

| (19)                                            | DEMONSTRATES HIGH<br>ENERGY LEVEL | : | : | : | : | : | : | : | DEMONSTRATES LOW<br>LEVEL OF ENERGY |
|-------------------------------------------------|-----------------------------------|---|---|---|---|---|---|---|-------------------------------------|
| Personnel Director                              |                                   | : | : | : | : | : | : | : |                                     |
| Marketing Director                              |                                   | : | : | : | : | : | : | : |                                     |
| Financial Director                              |                                   | : | : | : | : | : | : | : |                                     |
| Manufacturing Director                          |                                   | : | : | : | : | : | : | : |                                     |
| Personnel Manager                               |                                   | : | : | : | : | : | : | : |                                     |
| National Sales Manager                          |                                   | : | : | : | : | : | : | : |                                     |
| Financial Accountant                            |                                   | : | : | : | : | : | : | : |                                     |
| Factory Manager                                 |                                   | : | : | : | : | : | : | : |                                     |
| Managing Director                               |                                   | : | : | : | : | : | : | : |                                     |
| Personnel Director as he<br>ideally ought to be |                                   | : | : | : | : | : | : | : |                                     |

| (20)                                            | ANALYTICAL | : | : | : | : | : | : | : | NON-ANALYTICAL |
|-------------------------------------------------|------------|---|---|---|---|---|---|---|----------------|
| Personnel Director                              |            | : | : | : | : | : | : | : |                |
| Marketing Director                              |            | : | : | : | : | : | : | : |                |
| Financial Director                              |            | : | : | : | : | : | : | : |                |
| Manufacturing Director                          |            | : | : | : | : | : | : | : |                |
| Personnel Manager                               |            | : | : | : | : | : | : | : |                |
| National Sales Manager                          |            | : | : | : | : | : | : | : |                |
| Financial Accountant                            |            | : | : | : | : | : | : | : |                |
| Factory Manager                                 |            | : | : | : | : | : | : | : |                |
| Managing Director                               |            | : | : | : | : | : | : | : |                |
| Personnel Director as he<br>ideally ought to be |            | : | : | : | : | : | : | : |                |

| (21)                                            | EFFECTIVE | : | : | : | : | : | : | : | INEFFECTIVE |
|-------------------------------------------------|-----------|---|---|---|---|---|---|---|-------------|
| Personnel Director                              |           | : | : | : | : | : | : | : |             |
| Marketing Director                              |           | : | : | : | : | : | : | : |             |
| Financial Director                              |           | : | : | : | : | : | : | : |             |
| Manufacturing Director                          |           | : | : | : | : | : | : | : |             |
| Personnel Manager                               |           | : | : | : | : | : | : | : |             |
| National Sales Manager                          |           | : | : | : | : | : | : | : |             |
| Financial Accountant                            |           | : | : | : | : | : | : | : |             |
| Factory Manager                                 |           | : | : | : | : | : | : | : |             |
| Managing Director                               |           | : | : | : | : | : | : | : |             |
| Personnel Director as he<br>ideally ought to be |           | : | : | : | : | : | : | : |             |

|                                              |                 |   |   |   |   |   |   |   |                 |
|----------------------------------------------|-----------------|---|---|---|---|---|---|---|-----------------|
| (22)                                         | GOOD INTEGRATOR | : | : | : | : | : | : | : | POOR INTEGRATOR |
| Personnel Director                           |                 | : | : | : | : | : | : | : |                 |
| Marketing Director                           |                 | : | : | : | : | : | : | : |                 |
| Financial Director                           |                 | : | : | : | : | : | : | : |                 |
| Manufacturing Director                       |                 | : | : | : | : | : | : | : |                 |
| Personnel Manager                            |                 | : | : | : | : | : | : | : |                 |
| National Sales Manager                       |                 | : | : | : | : | : | : | : |                 |
| Financial Accountant                         |                 | : | : | : | : | : | : | : |                 |
| Factory Manager                              |                 | : | : | : | : | : | : | : |                 |
| Managing Director                            |                 | : | : | : | : | : | : | : |                 |
| Personnel Director as he ideally ought to be |                 | : | : | : | : | : | : | : |                 |

|                                              |          |   |   |   |   |   |   |   |          |
|----------------------------------------------|----------|---|---|---|---|---|---|---|----------|
| (23)                                         | INVOLVED | : | : | : | : | : | : | : | DETACHED |
| Personnel Director                           |          | : | : | : | : | : | : | : |          |
| Marketing Director                           |          | : | : | : | : | : | : | : |          |
| Financial Director                           |          | : | : | : | : | : | : | : |          |
| Manufacturing Director                       |          | : | : | : | : | : | : | : |          |
| Personnel Manager                            |          | : | : | : | : | : | : | : |          |
| National Sales Manager                       |          | : | : | : | : | : | : | : |          |
| Financial Accountant                         |          | : | : | : | : | : | : | : |          |
| Factory Manager                              |          | : | : | : | : | : | : | : |          |
| Managing Director                            |          | : | : | : | : | : | : | : |          |
| Personnel Director as he ideally ought to be |          | : | : | : | : | : | : | : |          |

|                                              |                     |   |   |   |   |   |   |   |                        |
|----------------------------------------------|---------------------|---|---|---|---|---|---|---|------------------------|
| 24)                                          | LISTENS ATTENTIVELY | : | : | : | : | : | : | : | IS NOT A GOOD LISTENER |
| Personnel Director                           |                     | : | : | : | : | : | : | : |                        |
| Marketing Director                           |                     | : | : | : | : | : | : | : |                        |
| Financial Director                           |                     | : | : | : | : | : | : | : |                        |
| Manufacturing Director                       |                     | : | : | : | : | : | : | : |                        |
| Personnel Manager                            |                     | : | : | : | : | : | : | : |                        |
| National Sales Manager                       |                     | : | : | : | : | : | : | : |                        |
| Financial Accountant                         |                     | : | : | : | : | : | : | : |                        |
| Factory Manager                              |                     | : | : | : | : | : | : | : |                        |
| Managing Director                            |                     | : | : | : | : | : | : | : |                        |
| Personnel Director as he ideally ought to be |                     | : | : | : | : | : | : | : |                        |



(25) CONCERN FOR PROFIT

: : : : : : : :

CONCERN FOR PEOPLE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(26) HELD IN HIGH ESTEEM

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HELD IN LOW ESTEEM

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(27) ORIGINAL

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UNORIGINAL

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(28) CONSIDERATE OF OTHERS

: : : : : : : :

DOES NOT CONSIDER NEEDS  
OF OTHER

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(29) POSITIVE IMAGE

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NEGATIVE IMAGE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(30) CONTROLS WELL

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DOES NOT CONTROL WELL

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(31) AGGRESSIVE

UNAGGRESSIVE

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(32) POWERFUL (NOT IN A PHYSICAL SENSE)

WEAK (NOT IN A PHYSICAL SENSE)

|                                              |   |   |   |   |   |   |   |   |
|----------------------------------------------|---|---|---|---|---|---|---|---|
| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(33) QUANTITATIVELY ORIENTATED

NOT QUANTITATIVELY ORIENTATED

|                                              |   |   |   |   |   |   |   |   |
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| Personnel Director                           | : | : | : | : | : | : | : | : |
| Marketing Director                           | : | : | : | : | : | : | : | : |
| Financial Director                           | : | : | : | : | : | : | : | : |
| Manufacturing Director                       | : | : | : | : | : | : | : | : |
| Personnel Manager                            | : | : | : | : | : | : | : | : |
| National Sales Manager                       | : | : | : | : | : | : | : | : |
| Financial Accountant                         | : | : | : | : | : | : | : | : |
| Factory Manager                              | : | : | : | : | : | : | : | : |
| Managing Director                            | : | : | : | : | : | : | : | : |
| Personnel Director as he ideally ought to be | : | : | : | : | : | : | : | : |

(34) EFFICIENT

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INEFFICIENT

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(35) HAS STRONG IMPACT

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HAS WEAK IMPACT

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(36) ORGANISES WELL

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DOES NOT ORGANISE  
WELL

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(37) EFFECTIVE DECISION  
MAKER

INEFFECTIVE DECISION  
MAKER

|                                                 |   |   |   |   |   |   |   |   |
|-------------------------------------------------|---|---|---|---|---|---|---|---|
|                                                 | : | : | : | : | : | : | : | : |
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(38) STRONG PERSONALITY  
CHARACTERISTICS

WEAK PERSONALITY  
CHARACTERISTICS

|                                                 |   |   |   |   |   |   |   |   |
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|                                                 | : | : | : | : | : | : | : | : |
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(39) DYNAMIC

PASSIVE

|                                                 |   |   |   |   |   |   |   |   |
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|                                                 | : | : | : | : | : | : | : | : |
| Personnel Director                              | : | : | : | : | : | : | : | : |
| Marketing Director                              | : | : | : | : | : | : | : | : |
| Financial Director                              | : | : | : | : | : | : | : | : |
| Manufacturing Director                          | : | : | : | : | : | : | : | : |
| Personnel Manager                               | : | : | : | : | : | : | : | : |
| National Sales Manager                          | : | : | : | : | : | : | : | : |
| Financial Accountant                            | : | : | : | : | : | : | : | : |
| Factory Manager                                 | : | : | : | : | : | : | : | : |
| Managing Director                               | : | : | : | : | : | : | : | : |
| Personnel Director as he<br>ideally ought to be | : | : | : | : | : | : | : | : |

(40) ALWAYS PLACES OBSTACLES  
IN THE WAY

Personnel Director

Marketing Director

Financial Director

Manufacturing Director

Personnel Manager

National Sales Manager

Financial Accountant

Factory Manager

Managing Director

Personnel Director as he  
ideally ought to be

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ALWAYS FINDS WAYS AND  
MEANS OF REMOVING  
OBSTACLES

T H A N K   Y O U

SET OUT IN THE NEXT FEW PAGES IS A LIST OF WORDS AND PHRASES WHICH ATTEMPT TO SHOW WHAT THE PEOPLE WITH WHOM YOU INTERACT MAY BE LIKE, THINGS THAT THEY MIGHT DO AND PERSONAL FEELINGS THAT YOU MIGHT HAVE ABOUT THEM

PLEASE INDICATE HOW MUCH YOU AGREE OR DISAGREE WITH THESE ITEMS ABOUT THE ROLE OCCUPANTS BY INDICATING WITH A ✓ THE NUMBER ON THE SCALE THAT BEST MATCHES EACH INDIVIDUAL.

(1) IS SOMEBODY WHO HAS THE  
RIGHT TO BE OBEYED

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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IS NOT SOMEBODY WHO HAS  
THE RIGHT TO BE OBEYED

(2) REWARDS GOOD WORK

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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DOES NOT REWARD  
GOOD WORK

(3) IS ALWAYS LOOKING FOR  
FAULTS

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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IS ALWAYS LOOKING FOR  
POSITIVE EVENTS



(4) IS FRIENDLY

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IS UNFRIENDLY

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(5) HAS THE RIGHT TO  
DIRECT MY ACTIONS

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DOES NOT HAVE THE RIGHT  
TO DIRECT MY ACTIONS

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(6) HAS BEEN GIVEN THE  
POWER TO COMMAND

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HAS NOT BEEN GIVEN THE  
POWER TO COMMAND

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(7) PLACES A STRONG  
EMPHASIS ON DISCIPLINE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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DOES NOT PLACE A STRONG  
EMPHASIS ON DISCIPLINE

(8) IS QUALIFIED TO MANAGE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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IS NOT QUALIFIED TO  
MANAGE

(9) REWARDS PEOPLE FOR DOING  
WHAT HE REQUIRES

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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DOES NOT REWARD  
PEOPLE FOR DOING WHAT  
HE REQUIRES

(10) IS STRICT

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HAS A LAISSEZ FAIRE  
APPROACH

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(11) IS LIKEABLE

IS NOT LIKEABLE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(12) IS SOMEBODY I ADMIRE

I DO NOT ADMIRE HIM/HER

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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(13) GIVES PRAISE WHERE  
IT IS DUE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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DOES NOT GIVE PRAISE  
WHERE IT IS DUE

(14) RULES BY MIGHT - i.e.  
MANAGES BY FORCE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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DOES NOT MANAGE BY MIGHT  
OR FORCE BUT BY CONSENSUS

(15) IS AN EXPERT IN HIS JOB

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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DOES NOT KNOW HIS JOB  
WELL



(16) KNOWS A GREAT DEAL

: : : : : : : :

KNOWS VERY LITTLE

Personnel Director

: : : : : : : :

Marketing Director

: : : : : : : :

Financial Director

: : : : : : : :

Manufacturing Director

: : : : : : : :

Personnel Manager

: : : : : : : :

National Sales Manager

: : : : : : : :

Financial Accountant

: : : : : : : :

Factory Manager

: : : : : : : :

Managing Director

: : : : : : : :

Personnel Director as he  
ideally ought to be

: : : : : : : :

(17) IS SOMEBODY I WOULD  
LIKE TO BE LIKE

\_\_\_\_\_

I WOULD NOT LIKE TO BE  
LIKE HIM AT ALL

Personnel Director

: : : : : : : :

Marketing Director

: : : : : : : :

Financial Director

: : : : : : : :

Manufacturing Director

: : : : : : : :

Personnel Manager

: : : : : : : :

National Sales Manager

: : : : : : : :

Financial Accountant

: : : : : : : :

Factory Manager

: : : : : : : :

Managing Director

: : : : : : : :

Personnel Director as he  
ideally ought to be

: : : : : : : :

(18) IS EXPERIENCED

\_\_\_\_\_

LACKS EXPERIENCE

Personnel Director

: : : : : : : :

Marketing Director

: : : : : : : :

Financial Director

: : : : : : : :

Manufacturing Director

: : : : : : : :

Personnel Manager

: : : : : : : :

National Sales Manager

: : : : : : : :

Financial Accountant

: : : : : : : :

Factory Manager

: : : : : : : :

Managing Director

: : : : : : : :

Personnel Director as he  
ideally ought to be

: : : : : : : :



(19) IS SOMEBODY I RESPECT  
AS A PERSON

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

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IS NOT SOMEBODY I RESPECT  
AS A PERSON

(20) IS PROFICIENT

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

|   |   |   |   |   |   |   |   |
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IS NOT PROFICIENT

(21) IS QUICK TO CRITICIZE

Personnel Director  
Marketing Director  
Financial Director  
Manufacturing Director  
Personnel Manager  
National Sales Manager  
Financial Accountant  
Factory Manager  
Managing Director  
Personnel Director as he  
ideally ought to be

|   |   |   |   |   |   |   |   |
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DOES NOT READILY  
CRITICIZE

IS RELUCTANT TO  
PROMOTE OTHERS

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DOES NOT SEEK  
RETALIATION

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| ● | ● | ● | ● | ● | ● | ● | ● |

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

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DOES NOT GIVE RECOGNITION  
FOR A JOB WELL DONE

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[illegible]

(25) OFFERS INDUCEMENTS

: : : : : : : :

DOES NOT OFFER  
INDUCEMENTS

Personnel Director

: : : : : : : :

Marketing Director

: : : : : : : :

Financial Director

: : : : : : : :

Manufacturing Director

: : : : : : : :

Personnel Manager

: : : : : : : :

National Sales Manager

: : : : : : : :

Financial Accountant

: : : : : : : :

Factory Manager

: : : : : : : :

Managing Director

: : : : : : : :

Personnel Director as he  
ideally ought to be

: : : : : : : :

THANK YOU



SEMI-STRUCTURED INTERVIEW

- 1) What do you see as the role of the personnel manager in your organization?
- 2) What are the major characteristics of a successful personnel manager?
- 3) What are the major problems/deficits encountered in the personnel function in your company?
- 4) In what ways do you see the role of the personnel manager changing over the next five years?
- 5) What are the major stumbling blocks or problems which prevent the personnel function from being fully effective in your company?
- 6) In which ways do the marketing, production, finance and personnel managers differ from each other in your company?
- 7) Please rate the following functions in terms of the power/influence which they have in your company: Marketing, Production, Finance, Personnel.
- 8) Please rate the following functions in terms of the status which they enjoy in your company: Finance, Marketing, Personnel, Production.

INTERFUNCTIONAL PERCEPTIONPh.D. RESEARCH STUDYBiographical Variables

1. Company Code. No. . . . .
2. Organisational Functional Area . . . . .
3. Job Title . . . . .
4. Please list the positions and number of years you have held these during your working career:

.....

.....

.....

.....

.....

.....

.....

.....

5. Age category of Job Holder

|             |  |
|-------------|--|
| 20-24 years |  |
| 25-29 years |  |
| 30-34 years |  |
| 35-39 years |  |
| 40-44 years |  |
| 45-49 years |  |
| 50-54 years |  |
| 55-59 years |  |
| 60-65 years |  |

## 6. Highest level of formal educational qualification held:

- |                                                                        |                          |
|------------------------------------------------------------------------|--------------------------|
| Standard 8                                                             | <input type="checkbox"/> |
| Standard 9                                                             | <input type="checkbox"/> |
| Standard 10                                                            | <input type="checkbox"/> |
| A post-matric                                                          | <input type="checkbox"/> |
| One year of post-school but non-university training<br>(e.g. technical | <input type="checkbox"/> |
| Two years of post-school but non-university training                   | <input type="checkbox"/> |
| Three years of post-school but non-university training                 | <input type="checkbox"/> |
| Four or more years of post-school but non-university training          | <input type="checkbox"/> |
- Please specify the above qualification, e.g. CIS, CMA, IPM Diploma:
- .....

- |                                                  |                          |
|--------------------------------------------------|--------------------------|
| One year of university training or equivalent    | <input type="checkbox"/> |
| Two years of university training or equivalent   | <input type="checkbox"/> |
| Three years of university training or equivalent | <input type="checkbox"/> |
| Four years of university training or equivalent  | <input type="checkbox"/> |
| Masters Degree                                   | <input type="checkbox"/> |
| Doctorate                                        | <input type="checkbox"/> |
- Please specify the above qualification, e.g. B.Comm:
- .....

7. Do you hold any other formal qualifications? Please sepcify:

.....

## 8. Do you belong to any professional organisation, e.g. Professional Society of Engineers, Personnel Managers, Chartered Accountants? Please specify:

.....

(The same analysis

MANAGER B09

(The same analysis

conducted for each

of the 90 managers)

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074 ...PRINTER3#C#HASP-11  
074 ...PRINTER3#C#HASP-11  
074 ...NULL2 #C#HASP-I
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(B09) MAN-DIR CO 1 GRID 1

HIGHEST GRADE ON CONSTRUCT SCALE 7.  
LOWEST .. .. . 1.

THE GRID

|                       |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
|-----------------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|----|------|
| CONSTRUCT 1, ELEMENT  | 1 | 3.00 | 2 | 7.00 | 3 | 5.00 | 4 | 6.00 | 5 | 2.00 | 6 | 5.00 | 7 | 5.00 | 8 | 3.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 2, ELEMENT  | 1 | 6.00 | 2 | 6.00 | 3 | 7.00 | 4 | 6.00 | 5 | 5.00 | 6 | 3.00 | 7 | 2.00 | 8 | 2.00 | 9 | 7.00 | 10 | 7.00 |
| CONSTRUCT 3, ELEMENT  | 1 | 7.00 | 2 | 6.00 | 3 | 6.00 | 4 | 5.00 | 5 | 6.00 | 6 | 5.00 | 7 | 5.00 | 8 | 6.00 | 9 | 6.00 | 10 | 7.00 |
| CONSTRUCT 4, ELEMENT  | 1 | 2.00 | 2 | 6.00 | 3 | 6.00 | 4 | 5.00 | 5 | 2.00 | 6 | 2.00 | 7 | 3.00 | 8 | 1.00 | 9 | 7.00 | 10 | 5.00 |
| CONSTRUCT 5, ELEMENT  | 1 | 6.00 | 2 | 6.00 | 3 | 3.00 | 4 | 2.00 | 5 | 5.00 | 6 | 7.00 | 7 | 1.00 | 8 | 2.00 | 9 | 5.00 | 10 | 5.00 |
| CONSTRUCT 6, ELEMENT  | 1 | 2.00 | 2 | 6.00 | 3 | 5.00 | 4 | 6.00 | 5 | 5.00 | 6 | 3.00 | 7 | 6.00 | 8 | 5.00 | 9 | 2.00 | 10 | 2.00 |
| CONSTRUCT 7, ELEMENT  | 1 | 7.00 | 2 | 2.00 | 3 | 6.00 | 4 | 5.00 | 5 | 6.00 | 6 | 5.00 | 7 | 7.00 | 8 | 5.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 8, ELEMENT  | 1 | 6.00 | 2 | 5.00 | 3 | 7.00 | 4 | 6.00 | 5 | 2.00 | 6 | 3.00 | 7 | 5.00 | 8 | 5.00 | 9 | 7.00 | 10 | 6.00 |
| CONSTRUCT 9, ELEMENT  | 1 | 6.00 | 2 | 7.00 | 3 | 5.00 | 4 | 5.00 | 5 | 5.00 | 6 | 3.00 | 7 | 5.00 | 8 | 6.00 | 9 | 7.00 | 10 | 7.00 |
| CONSTRUCT 10, ELEMENT | 1 | 6.00 | 2 | 2.00 | 3 | 5.00 | 4 | 5.00 | 5 | 6.00 | 6 | 3.00 | 7 | 3.00 | 8 | 2.00 | 9 | 2.00 | 10 | 2.00 |
| CONSTRUCT 11, ELEMENT | 1 | 1.00 | 2 | 6.00 | 3 | 2.00 | 4 | 3.00 | 5 | 3.00 | 6 | 5.00 | 7 | 1.00 | 8 | 6.00 | 9 | 6.00 | 10 | 3.00 |
| CONSTRUCT 12, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 6.00 | 4 | 7.00 | 5 | 3.00 | 6 | 2.00 | 7 | 2.00 | 8 | 6.00 | 9 | 7.00 | 10 | 6.00 |
| CONSTRUCT 13, ELEMENT | 1 | 6.00 | 2 | 2.00 | 3 | 7.00 | 4 | 3.00 | 5 | 2.00 | 6 | 5.00 | 7 | 1.00 | 8 | 5.00 | 9 | 5.00 | 10 | 6.00 |
| CONSTRUCT 14, ELEMENT | 1 | 2.00 | 2 | 7.00 | 3 | 3.00 | 4 | 3.00 | 5 | 5.00 | 6 | 5.00 | 7 | 2.00 | 8 | 6.00 | 9 | 6.00 | 10 | 5.00 |
| CONSTRUCT 15, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 7.00 | 4 | 2.00 | 5 | 5.00 | 6 | 6.00 | 7 | 1.00 | 8 | 5.00 | 9 | 7.00 | 10 | 7.00 |
| CONSTRUCT 16, ELEMENT | 1 | 3.00 | 2 | 7.00 | 3 | 2.00 | 4 | 2.00 | 5 | 3.00 | 6 | 6.00 | 7 | 1.00 | 8 | 6.00 | 9 | 5.00 | 10 | 5.00 |
| CONSTRUCT 17, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 5.00 | 4 | 7.00 | 5 | 6.00 | 6 | 5.00 | 7 | 5.00 | 8 | 6.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 18, ELEMENT | 1 | 5.00 | 2 | 5.00 | 3 | 6.00 | 4 | 6.00 | 5 | 3.00 | 6 | 3.00 | 7 | 5.00 | 8 | 6.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 19, ELEMENT | 1 | 7.00 | 2 | 7.00 | 3 | 2.00 | 4 | 3.00 | 5 | 5.00 | 6 | 7.00 | 7 | 3.00 | 8 | 6.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 20, ELEMENT | 1 | 7.00 | 2 | 5.00 | 3 | 7.00 | 4 | 7.00 | 5 | 6.00 | 6 | 3.00 | 7 | 3.00 | 8 | 5.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 21, ELEMENT | 1 | 5.00 | 2 | 5.00 | 3 | 2.00 | 4 | 1.00 | 5 | 4.00 | 6 | 6.00 | 7 | 1.00 | 8 | 1.00 | 9 | 4.00 | 10 | 4.00 |

|                       |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
|-----------------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|----|------|
| CONSTRUCT 22, ELEMENT | 1 | 6.00 | 2 | 7.00 | 3 | 6.00 | 4 | 2.00 | 5 | 3.00 | 6 | 5.00 | 7 | 1.00 | 8 | 3.00 | 9 | 6.00 | 10 | 5.00 |
| CONSTRUCT 23, ELEMENT | 1 | 6.00 | 2 | 7.00 | 3 | 2.00 | 4 | 2.00 | 5 | 3.00 | 6 | 5.00 | 7 | 2.00 | 8 | 6.00 | 9 | 7.00 | 10 | 7.00 |
| CONSTRUCT 24, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 2.00 | 4 | 3.00 | 5 | 5.00 | 6 | 6.00 | 7 | 2.00 | 8 | 2.00 | 9 | 4.00 | 10 | 3.00 |
| CONSTRUCT 25, ELEMENT | 1 | 3.00 | 2 | 5.00 | 3 | 6.00 | 4 | 6.00 | 5 | 2.00 | 6 | 5.00 | 7 | 7.00 | 8 | 6.00 | 9 | 5.00 | 10 | 4.00 |
| CONSTRUCT 26, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 6.00 | 4 | 6.00 | 5 | 5.00 | 6 | 5.00 | 7 | 4.00 | 8 | 4.00 | 9 | 7.00 | 10 | 6.00 |
| CONSTRUCT 27, ELEMENT | 1 | 2.00 | 2 | 7.00 | 3 | 2.00 | 4 | 1.00 | 5 | 5.00 | 6 | 5.00 | 7 | 1.00 | 8 | 5.00 | 9 | 6.00 | 10 | 5.00 |
| CONSTRUCT 28, ELEMENT | 1 | 6.00 | 2 | 1.00 | 3 | 2.00 | 4 | 4.00 | 5 | 6.00 | 6 | 4.00 | 7 | 4.00 | 8 | 3.00 | 9 | 4.00 | 10 | 5.00 |
| CONSTRUCT 29, ELEMENT | 1 | 3.00 | 2 | 5.00 | 3 | 6.00 | 4 | 6.00 | 5 | 4.00 | 6 | 5.00 | 7 | 1.00 | 8 | 5.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 30, ELEMENT | 1 | 6.00 | 2 | 3.00 | 3 | 7.00 | 4 | 7.00 | 5 | 6.00 | 6 | 5.00 | 7 | 1.00 | 8 | 6.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 31, ELEMENT | 1 | 2.00 | 2 | 7.00 | 3 | 2.00 | 4 | 6.00 | 5 | 5.00 | 6 | 6.00 | 7 | 7.00 | 8 | 6.00 | 9 | 5.00 | 10 | 5.00 |
| CONSTRUCT 32, ELEMENT | 1 | 3.00 | 2 | 7.00 | 3 | 6.00 | 4 | 7.00 | 5 | 5.00 | 6 | 3.00 | 7 | 5.00 | 8 | 3.00 | 9 | 7.00 | 10 | 6.00 |
| CONSTRUCT 33, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 7.00 | 4 | 7.00 | 5 | 3.00 | 6 | 2.00 | 7 | 7.00 | 8 | 3.00 | 9 | 6.00 | 10 | 5.00 |
| CONSTRUCT 34, ELEMENT | 1 | 5.00 | 2 | 6.00 | 3 | 6.00 | 4 | 7.00 | 5 | 5.00 | 6 | 4.00 | 7 | 3.00 | 8 | 3.00 | 9 | 5.00 | 10 | 6.00 |
| CONSTRUCT 35, ELEMENT | 1 | 1.00 | 2 | 6.00 | 3 | 6.00 | 4 | 7.00 | 5 | 2.00 | 6 | 3.00 | 7 | 4.00 | 8 | 5.00 | 9 | 7.00 | 10 | 6.00 |
| CONSTRUCT 36, ELEMENT | 1 | 7.00 | 2 | 5.00 | 3 | 6.00 | 4 | 7.00 | 5 | 5.00 | 6 | 4.00 | 7 | 6.00 | 8 | 6.00 | 9 | 6.00 | 10 | 6.00 |
| CONSTRUCT 37, ELEMENT | 1 | 2.00 | 2 | 7.00 | 3 | 6.00 | 4 | 7.00 | 5 | 3.00 | 6 | 4.00 | 7 | 2.00 | 8 | 5.00 | 9 | 7.00 | 10 | 5.00 |
| CONSTRUCT 38, ELEMENT | 1 | 5.00 | 2 | 7.00 | 3 | 5.00 | 4 | 7.00 | 5 | 6.00 | 6 | 4.00 | 7 | 4.00 | 8 | 3.00 | 9 | 6.00 | 10 | 5.00 |
| CONSTRUCT 39, ELEMENT | 1 | 5.00 | 2 | 7.00 | 3 | 2.00 | 4 | 2.00 | 5 | 6.00 | 6 | 5.00 | 7 | 4.00 | 8 | 5.00 | 9 | 6.00 | 10 | 5.00 |
| CONSTRUCT 40, ELEMENT | 1 | 5.00 | 2 | 7.00 | 3 | 5.00 | 4 | 5.00 | 5 | 3.00 | 6 | 4.00 | 7 | 2.00 | 8 | 6.00 | 9 | 7.00 | 10 | 6.00 |

ANY PUBLICATION USING ANY OF THESE RESULTS SHOULD INCLUDE AN ACKNOWLEDGEMENT  
THAT THEY HAVE BEEN PROVIDED BY THE M.R.C. SERVICE FOR ANALYSING REPERTORY  
GRIDS UNDER DR. PATRICK SLATER AND A COPY SHOULD BE SENT TO HIM.

| CONSTRUCT | MEAN  | VARIATION | AS PER CENT |
|-----------|-------|-----------|-------------|
| 1         | 4.800 | 23.5999   | 2.20        |
| 2         | 5.100 | 36.9000   | 3.45        |
| 3         | 5.900 | 4.9000    | 0.46        |
| 4         | 3.900 | 40.8999   | 3.82        |
| 5         | 4.200 | 37.6000   | 3.51        |
| 6         | 4.200 | 27.6000   | 2.58        |
| 7         | 5.500 | 18.5000   | 1.73        |
| 8         | 5.200 | 23.6000   | 2.20        |
| 9         | 5.600 | 14.4000   | 1.34        |
| 10        | 3.600 | 26.4000   | 2.46        |
| 11        | 3.600 | 36.4000   | 3.40        |
| 12        | 5.000 | 34.0000   | 3.17        |
| 13        | 4.200 | 37.6000   | 3.51        |
| 14        | 4.400 | 28.3999   | 2.65        |
| 15        | 5.100 | 38.9000   | 3.63        |
| 16        | 4.000 | 38.0000   | 3.55        |
| 17        | 5.700 | 4.1000    | 0.30        |
| 18        | 5.100 | 12.9000   | 1.20        |
| 19        | 5.200 | 31.6000   | 2.95        |
| 20        | 5.500 | 20.5000   | 1.91        |
| 21        | 3.300 | 32.1000   | 3.00        |
| 22        | 4.400 | 36.3999   | 3.40        |
| 23        | 4.700 | 44.0999   | 4.12        |
| 24        | 3.800 | 23.6000   | 2.20        |
| 25        | 4.900 | 20.9000   | 1.95        |
| 26        | 5.400 | 8.4000    | 0.78        |
| 27        | 3.900 | 42.8999   | 4.01        |
| 28        | 3.900 | 22.8999   | 2.14        |
| 29        | 4.700 | 24.1000   | 2.25        |
| 30        | 5.300 | 32.1000   | 3.00        |
| 31        | 5.100 | 28.9000   | 2.70        |
| 32        | 5.200 | 25.6000   | 2.39        |
| 33        | 5.100 | 30.9000   | 2.89        |
| 34        | 5.000 | 16.0000   | 1.49        |
| 35        | 4.600 | 38.3999   | 3.59        |
| 36        | 5.800 | 7.6000    | 0.71        |
| 37        | 4.800 | 35.5999   | 3.32        |
| 38        | 5.200 | 15.6000   | 1.46        |
| 39        | 4.700 | 24.0999   | 2.25        |
| 40        | 5.000 | 24.0000   | 2.24        |

TOTAL VARIATION ABOUT CONSTRUCT MEANS 1070.9966

BIAS 0.3354  
VARIABILITY 0.5749



|               |         |           |         |         |         |         |         |         |         |  |  |
|---------------|---------|-----------|---------|---------|---------|---------|---------|---------|---------|--|--|
| CONSTRUCT 1.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| -0.3705       | 0.4529  | 0.0412    | 0.2470  | -0.5764 | 0.0412  | 0.0412  | -0.3705 | 0.2470  | 0.2470  |  |  |
| CONSTRUCT 2.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.1482        | 0.1482  | 0.3128    | 0.1482  | -0.0165 | -0.3457 | -0.5103 | -0.5103 | 0.3128  | 0.3128  |  |  |
| CONSTRUCT 3.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.4969        | 0.0452  | 0.0452    | -0.4066 | 0.0452  | -0.4066 | -0.4066 | 0.0452  | 0.0452  | 0.4969  |  |  |
| CONSTRUCT 4.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| -0.2971       | 0.3284  | 0.3284    | 0.1720  | -0.2971 | -0.2971 | -0.1407 | -0.4535 | 0.4847  | 0.1720  |  |  |
| CONSTRUCT 5.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.2935        | 0.2935  | -0.1957   | -0.3588 | 0.1305  | 0.4566  | -0.5219 | -0.3588 | 0.1305  | 0.1305  |  |  |
| CONSTRUCT 6.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| -0.4188       | 0.3426  | 0.1523    | 0.3426  | 0.1523  | -0.2284 | 0.3426  | 0.1523  | -0.4188 | -0.4188 |  |  |
| CONSTRUCT 7.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.3487        | -0.1137 | 0.1162    | -0.1162 | 0.1162  | -0.1162 | 0.3487  | -0.1162 | 0.1162  | 0.1162  |  |  |
| CONSTRUCT 8.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.1647        | -0.0412 | 0.3705    | 0.1647  | -0.6587 | -0.4525 | -0.0412 | -0.0412 | 0.3705  | 0.1647  |  |  |
| CONSTRUCT 9.  | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.1054        | 0.3689  | -0.1581   | -0.1581 | -0.1581 | -0.6852 | -0.1581 | 0.1054  | 0.3689  | 0.3689  |  |  |
| CONSTRUCT 10. | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.4671        | -0.3114 | 0.2725    | 0.2725  | 0.4671  | -0.1168 | -0.1168 | -0.3114 | -0.3114 | -0.3114 |  |  |
| CONSTRUCT 11. | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| -0.4309       | 0.3978  | -0.2652   | -0.0994 | -0.0994 | 0.2320  | -0.4309 | 0.3978  | 0.3978  | -0.0994 |  |  |
| CONSTRUCT 12. | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.0           | 0.1715  | 0.1715    | 0.3430  | -0.3430 | -0.5145 | -0.5145 | 0.1715  | 0.3430  | 0.1715  |  |  |
| CONSTRUCT 13. | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| 0.2935        | -0.3588 | 0.4566    | -0.1957 | -0.3588 | 0.1305  | -0.5219 | 0.1305  | 0.1305  | 0.2935  |  |  |
| CONSTRUCT 14. | ELEMENT |           |         |         |         |         |         |         |         |  |  |
| 1             | 2       | 3         | 4       | 5       | 6       | 7       | 8       | 9       | 10      |  |  |
| -0.4504       | 0.4879  | -0.2627</ |         |         |         |         |         |         |         |  |  |

|               |           |           |           |           |           |           |           |           |            |  |  |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|
| CONSTRUCT 25. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4156     | 2 0.0219  | 3 0.2406  | 4 0.2406  | 5 -0.6343 | 6 0.0219  | 7 0.4594  | 8 0.2406  | 9 0.0219  | 10 -0.1969 |  |  |
| CONSTRUCT 26. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.1380     | 2 0.2070  | 3 0.2070  | 4 0.2070  | 5 -0.1380 | 6 -0.1380 | 7 -0.4830 | 8 -0.4830 | 9 0.5521  | 10 0.2070  |  |  |
| CONSTRUCT 27. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.2901     | 2 0.4733  | 3 -0.2901 | 4 -0.4428 | 5 0.1679  | 6 0.1679  | 7 -0.4428 | 8 0.1679  | 9 0.3206  | 10 0.1679  |  |  |
| CONSTRUCT 28. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 0.4388      | 2 -0.6060 | 3 -0.3970 | 4 0.0209  | 5 0.4388  | 6 0.0209  | 7 0.0209  | 8 -0.1881 | 9 0.0209  | 10 0.2299  |  |  |
| CONSTRUCT 29. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.3463     | 2 0.0611  | 3 0.2648  | 4 0.2648  | 5 -0.1426 | 6 0.0611  | 7 -0.7537 | 8 0.0611  | 9 0.2648  | 10 0.2648  |  |  |
| CONSTRUCT 30. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 0.1236      | 2 -0.4060 | 3 0.3001  | 4 0.3001  | 5 0.1236  | 6 -0.0530 | 7 -0.7590 | 8 0.1236  | 9 0.1236  | 10 0.1236  |  |  |
| CONSTRUCT 31. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5767     | 2 0.3534  | 3 -0.5767 | 4 0.1674  | 5 -0.0186 | 6 0.1674  | 7 0.3534  | 8 0.1674  | 9 -0.0186 | 10 -0.0186 |  |  |
| CONSTRUCT 32. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4348     | 2 0.3558  | 3 0.1581  | 4 0.3558  | 5 -0.0395 | 6 -0.4348 | 7 -0.0395 | 8 -0.4348 | 9 0.3558  | 10 0.1581  |  |  |
| CONSTRUCT 33. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.0180     | 2 0.1619  | 3 0.3418  | 4 0.3418  | 5 -0.3778 | 6 -0.5577 | 7 0.3418  | 8 -0.3778 | 9 0.1619  | 10 -0.0180 |  |  |
| CONSTRUCT 34. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 0.0         | 2 0.2500  | 3 0.2500  | 4 0.5000  | 5 0.0     | 6 -0.2500 | 7 -0.5000 | 8 -0.5000 | 9 0.0     | 10 0.2500  |  |  |
| CONSTRUCT 35. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5809     | 2 0.2259  | 3 0.0645  | 4 0.3873  | 5 -0.4196 | 6 -0.2582 | 7 -0.0968 | 8 0.0645  | 9 0.3873  | 10 0.2259  |  |  |
| CONSTRUCT 36. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 0.4353      | 2 -0.2902 | 3 0.0725  | 4 0.4353  | 5 -0.2902 | 6 -0.6529 | 7 0.0725  | 8 0.0725  | 9 0.0725  | 10 0.0725  |  |  |
| CONSTRUCT 37. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4693     | 2 0.3687  | 3 0.2011  | 4 0.3687  | 5 -0.3017 | 6 -0.1341 | 7 -0.4693 | 8 0.0335  | 9 0.3687  | 10 0.0335  |  |  |
| CONSTRUCT 38. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 -0.0506     | 2 0.4557  | 3 -0.0506 | 4 0.4557  | 5 0.2025  | 6 -0.3038 | 7 -0.3038 | 8 -0.5570 | 9 0.2025  | 10 -0.0506 |  |  |
| CONSTRUCT 39. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 0.0611      | 2 0.4685  | 3 -0.5500 | 4 -0.5500 | 5 0.2648  | 6 0.0611  | 7 -0.1426 | 8 0.0611  | 9 0.2648  | 10 0.0611  |  |  |
| CONSTRUCT 40. | ELEMENT   |           |           |           |           |           |           |           |            |  |  |
| 1 0.0         | 2 0.4082  | 3 0.0     | 4 0.0     | 5 -0.4082 | 6 -0.2041 | 7 -0.6124 | 8 0.2041  | 9 0.4082  | 10 0.2041  |  |  |

# CORRELATIONS AND ANGULAR DISTANCES BETWEEN CONSTRUCTS

|             |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
|-------------|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|
| CONSTRUCT 1 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 2           | 0.380  | 67.70  | 3  | -0.205 | 101.81 | 4  | 0.798  | 37.04  | 5  | 0.047  | 87.31  | 6  | 0.055  | 86.86  |
| 7           | -0.479 | 118.59 | 8  | 0.403  | 61.12  | 9  | 0.282  | 73.62  | 10 | -0.553 | 123.56 | 11 | 0.260  | 73.75  |
| 12          | 0.388  | 67.15  | 13 | -0.054 | 93.08  | 14 | 0.224  | 77.05  | 15 | 0.106  | 83.94  | 16 | 0.234  | 76.48  |
| 17          | 0.244  | 75.88  | 18 | 0.413  | 65.63  | 19 | -0.059 | 93.36  | 20 | -0.091 | 95.22  | 21 | 0.058  | 86.67  |
| 22          | 0.300  | 72.53  | 23 | 0.198  | 78.56  | 24 | 0.025  | 88.54  | 25 | 0.486  | 60.90  | 26 | 0.625  | 51.32  |
| 27          | 0.151  | 81.32  | 28 | -0.568 | 124.60 | 29 | 0.394  | 66.79  | 30 | -0.233 | 103.45 | 31 | 0.352  | 69.37  |
| 32          | 0.708  | 44.94  | 33 | 0.563  | 55.75  | 34 | 0.463  | 62.41  | 35 | 0.771  | 39.59  | 36 | -0.030 | 51.71  |
| 37          | 0.676  | 47.45  | 38 | 0.438  | 64.04  | 39 | -0.067 | 93.85  | 40 | 0.462  | 62.47  |    |        |        |
| CONSTRUCT 2 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 3           | 0.528  | 58.13  | 4  | 0.749  | 41.49  | 5  | 0.344  | 69.90  | 6  | -0.351 | 110.55 | 7  | -0.057 | 93.29  |
| 8           | 0.535  | 57.63  | 9  | 0.495  | 60.36  | 10 | 0.205  | 78.17  | 11 | -0.071 | 94.07  | 12 | 0.649  | 49.51  |
| 13          | 0.397  | 66.59  | 14 | 0.049  | 87.17  | 15 | 0.525  | 58.32  | 16 | -0.027 | 91.53  | 17 | 0.268  | 74.44  |
| 18          | 0.362  | 68.77  | 19 | -0.035 | 92.01  | 20 | 0.782  | 38.58  | 21 | 0.282  | 73.63  | 22 | 0.617  | 51.93  |
| 23          | 0.206  | 78.13  | 24 | 0.142  | 81.82  | 25 | -0.356 | 110.88 | 26 | 0.886  | 27.62  | 27 | 0.103  | 84.09  |
| 28          | 0.003  | 89.80  | 29 | 0.580  | 54.54  | 30 | 0.514  | 59.05  | 31 | -0.524 | 121.58 | 32 | 0.644  | 49.89  |
| 33          | 0.441  | 61.82  | 34 | 0.864  | 30.20  | 35 | 0.329  | 70.77  | 36 | 0.311  | 71.91  | 37 | 0.502  | 59.86  |
| 38          | 0.700  | 45.56  | 39 | -0.057 | 93.27  | 40 | 0.538  | 57.48  |    |        |        |    |        |        |
| CONSTRUCT 3 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 4           | 0.064  | 86.35  | 5  | 0.383  | 67.47  | 6  | -0.585 | 125.78 | 7  | 0.150  | 80.94  | 8  | 0.298  | 72.69  |
| 9           | 0.667  | 48.19  | 10 | 0.053  | 86.98  | 11 | -0.105 | 96.02  | 12 | 0.387  | 67.21  | 13 | 0.530  | 57.96  |
| 14          | 0.119  | 83.18  | 15 | 0.587  | 54.08  | 16 | 0.220  | 77.30  | 17 | -0.067 | 93.84  | 18 | 0.264  | 74.68  |
| 19          | 0.418  | 65.30  | 20 | 0.549  | 56.72  | 21 | 0.343  | 69.95  | 22 | 0.554  | 56.35  | 23 | 0.592  | 53.71  |
| 24          | 0.074  | 85.73  | 25 | -0.603 | 127.07 | 26 | 0.218  | 77.40  | 27 | 0.269  | 74.40  | 28 | 0.274  | 74.11  |
| 29          | 0.156  | 81.00  | 30 | 0.343  | 69.95  | 31 | -0.580 | 125.44 | 32 | -0.071 | 94.10  | 33 | -0.073 | 94.19  |
| 34          | 0.226  | 76.95  | 35 | -0.175 | 100.08 | 36 | 0.295  | 72.84  | 37 | -0.091 | 95.21  | 38 | 0.023  | 88.69  |
| 39          | 0.340  | 70.09  | 40 | 0.461  | 62.54  |    |        |        |    |        |        |    |        |        |
| CONSTRUCT 4 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 5           | 0.031  | 88.25  | 6  | -0.024 | 91.36  | 7  | -0.273 | 105.82 | 8  | 0.650  | 49.44  | 9  | 0.478  | 61.45  |
| 10          | -0.256 | 104.81 | 11 | 0.171  | 80.15  | 12 | 0.617  | 51.92  | 13 | 0.107  | 83.85  | 14 | 0.188  | 79.18  |
| 15          | 0.328  | 70.83  | 16 | 0.025  | 88.55  | 17 | 0.286  | 73.40  | 18 | 0.527  | 58.21  | 19 | -0.245 | 104.17 |
| 20          | 0.363  | 68.74  | 21 | 0.008  | 89.53  | 22 | 0.451  | 63.19  | 23 | 0.111  | 83.65  | 24 | -0.071 | 94.06  |
| 25          | 0.236  | 76.35  | 26 | 0.885  | 27.77  | 27 | 0.141  | 81.90  | 28 | -0.461 | 117.43 | 29 | 0.532  | 57.86  |
| 30          | 0.091  | 84.77  | 31 | -0.055 | 93.17  | 32 | 0.902  | 25.52  | 33 | 0.706  | 45.09  | 34 | 0.665  | 48.35  |
| 35          | 0.747  | 41.68  | 36 | 0.159  | 80.86  | 37 | 0.755  | 41.00  | 38 | 0.641  | 50.11  | 39 | -0.105 | 96.03  |
| 40          | 0.543  | 57.14  |    |        |        |    |        |        |    |        |        |    |        |        |
| CONSTRUCT 5 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 6           | -0.602 | 127.03 | 7  | -0.265 | 105.39 | 8  | -0.282 | 106.38 | 9  | 0.034  | 88.03  | 10 | -0.006 | 90.36  |
| 11          | 0.292  | 73.03  | 12 | -0.112 | 96.42  | 13 | 0.255  | 75.21  | 14 | 0.404  | 66.17  | 15 | 0.648  | 49.57  |
| 16          | 0.582  | 54.41  | 17 | -0.193 | 101.15 | 18 | -0.509 | 120.57 | 19 | 0.772  | 39.49  | 20 | -0.000 | 90.00  |
| 21          | 0.990  | 8.04   | 22 | 0.735  | 42.67  | 23 | 0.604  | 52.83  | 24 | 0.886  | 27.59  | 25 | -0.671 | 132.12 |
| 26          | 0.349  | 69.58  | 27 | 0.603  | 52.95  | 28 | 0.177  | 79.79  | 29 | 0.219  | 77.33  | 30 | 0.127  | 82.72  |
| 31          | -0.188 | 100.84 | 32 | -0.142 | 98.15  | 33 | -0.475 | 118.38 | 34 | 0.204  | 78.24  | 35 | -0.321 | 108.73 |
| 36          | -0.509 | 120.58 | 37 | -0.016 | 90.94  | 38 | 0.231  | 76.63  | 39 | 0.618  | 51.84  | 40 | 0.300  | 72.57  |
| CONSTRUCT 6 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 7           | -0.398 | 113.47 | 8  | -0.212 | 102.22 | 9  | -0.211 | 102.16 | 10 | 0.104  | 84.05  | 11 | -0.038 | 92.17  |
| 12          | -0.098 | 95.62  | 13 | -0.664 | 131.63 | 14 | -0.064 | 93.69  | 15 | -0.586 | 125.87 | 16 | -0.278 | 106.14 |
| 17          | 0.244  | 75.85  | 18 | -0.011 | 90.61  | 19 | -0.555 | 123.73 | 20 | -0.168 | 99.68  | 21 | -0.591 | 126.25 |
| 22          | -0.498 | 119.90 | 23 | -0.613 | 127.84 | 24 | -0.259 | 104.99 | 25 | 0.466  | 62.20  | 26 | -0.315 | 108.38 |
| 27          | -0.256 | 104.82 | 28 | -0.509 | 120.61 | 29 | -0.209 | 102.09 | 30 | -0.356 | 110.86 | 31 | 0.453  | 63.05  |
| 32          | 0.248  | 75.62  | 33 | 0.301  | 72.46  | 34 | -0.000 | 90.00  | 35 | 0.178  | 79.74  | 36 | -0.041 | 92.37  |
| 37          | 0.140  | 81.93  | 38 | 0.173  | 80.01  | 39 | -0.287 | 106.67 | 40 | -0.311 | 108.11 |    |        |        |
| CONSTRUCT 7 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 8           | 0.144  | 81.75  | 9  | -0.184 | 100.59 | 10 | 0.407  | 65.97  | 11 | -0.694 | 133.92 | 12 | -0.279 | 106.21 |
| 13          | 0.265  | 74.61  | 14 | -0.698 | 134.27 | 15 | -0.205 | 101.83 | 16 | -0.679 | 132.76 | 17 | -0.402 | 113.70 |
| 18          | 0.032  | 88.15  | 19 | -0.331 | 109.32 | 20 | 0.128  | 82.62  | 21 | -0.226 | 103.04 | 22 | -0.347 | 110.29 |
| 23          | -0.333 | 109.43 | 24 | -0.431 | 115.51 | 25 | -0.127 | 97.30  | 26 | -0.241 | 103.93 | 27 | -0.586 | 125.85 |
| 28          | 0.704  | 45.21  | 29 | -0.403 | 113.74 | 30 | 0.144  | 81.74  | 31 | -0.497 | 119.82 | 32 | -0.322 | 108.76 |
| 33          | 0.063  | 86.40  | 34 | -0.291 | 106.90 | 35 | -0.413 | 114.37 | 36 | 0.422  | 65.06  | 37 | -0.623 | 128.57 |
| 38          | -0.412 | 114.33 | 39 | -0.355 | 110.81 | 40 | -0.522 | 121.47 |    |        |        |    |        |        |

|              |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
|--------------|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|--|
| CONSTRUCT 8  |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 9            | 0.532  | 57.89  | 10 | -0.168 | 99.69  | 11 | -0.109 | 96.27  | 12 | 0.741  | 42.15  | 13 | 0.490  | 40.65  |  |
| 14           | -0.224 | 102.95 | 15 | 0.158  | 80.88  | 16 | -0.167 | 99.61  | 17 | 0.061  | 86.50  | 18 | 0.906  | 25.10  |  |
| 19           | -0.271 | 105.72 | 20 | 0.500  | 59.99  | 21 | -0.312 | 108.21 | 22 | 0.314  | 71.71  | 23 | 0.143  | 81.80  |  |
| 24           | -0.492 | 119.44 | 25 | 0.414  | 65.53  | 26 | 0.511  | 59.24  | 27 | -0.277 | 106.06 | 28 | -0.293 | 107.01 |  |
| 29           | 0.319  | 71.42  | 30 | 0.233  | 76.55  | 31 | -0.391 | 112.99 | 32 | 0.431  | 64.45  | 33 | 0.733  | 42.84  |  |
| 34           | 0.360  | 68.89  | 35 | 0.558  | 56.08  | 36 | 0.702  | 45.42  | 37 | 0.462  | 62.46  | 38 | 0.136  | 82.21  |  |
| 39           | -0.394 | 113.21 | 40 | 0.546  | 56.89  |    |        |        |    |        |        |    |        |        |  |
| CONSTRUCT 9  |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 10           | -0.390 | 112.94 | 11 | 0.236  | 76.36  | 12 | 0.678  | 47.32  | 13 | 0.077  | 85.56  | 14 | 0.376  | 67.93  |  |
| 15           | 0.313  | 71.78  | 16 | 0.299  | 72.59  | 17 | 0.364  | 68.63  | 18 | 0.616  | 51.95  | 19 | 0.272  | 74.22  |  |
| 20           | 0.407  | 65.96  | 21 | 0.009  | 89.47  | 22 | 0.376  | 67.94  | 23 | 0.627  | 51.17  | 24 | -0.098 | 55.60  |  |
| 25           | -0.138 | 97.95  | 26 | 0.418  | 65.28  | 27 | 0.386  | 67.28  | 28 | -0.132 | 97.59  | 29 | 0.204  | 78.23  |  |
| 30           | 0.009  | 89.47  | 31 | -0.029 | 91.69  | 32 | 0.458  | 62.72  | 33 | 0.351  | 69.46  | 34 | 0.264  | 74.72  |  |
| 35           | 0.442  | 63.75  | 36 | 0.401  | 66.33  | 37 | 0.362  | 68.77  | 38 | 0.320  | 71.32  | 39 | 0.416  | 65.25  |  |
| 40           | 0.699  | 45.63  |    |        |        |    |        |        |    |        |        |    |        |        |  |
| CONSTRUCT 10 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 11           | -0.665 | 131.65 | 12 | -0.167 | 99.61  | 13 | 0.025  | 88.54  | 14 | -0.635 | 129.45 | 15 | -0.237 | 103.72 |  |
| 16           | -0.663 | 131.53 | 17 | -0.115 | 96.62  | 18 | -0.303 | 107.67 | 19 | -0.353 | 110.68 | 20 | 0.516  | 58.95  |  |
| 21           | -0.027 | 91.57  | 22 | -0.142 | 98.16  | 23 | -0.592 | 126.30 | 24 | 0.088  | 84.94  | 25 | -0.443 | 116.28 |  |
| 26           | -0.094 | 95.39  | 27 | -0.576 | 125.20 | 28 | 0.472  | 61.85  | 29 | -0.206 | 101.90 | 30 | 0.385  | 67.37  |  |
| 31           | -0.601 | 126.94 | 32 | -0.162 | 99.30  | 33 | 0.049  | 87.19  | 34 | 0.292  | 73.03  | 35 | -0.584 | 125.74 |  |
| 36           | 0.297  | 72.75  | 37 | -0.385 | 112.64 | 38 | 0.237  | 76.32  | 39 | -0.404 | 113.85 | 40 | -0.477 | 118.47 |  |
| CONSTRUCT 11 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 12           | 0.313  | 71.78  | 13 | -0.005 | 90.31  | 14 | 0.921  | 22.98  | 15 | 0.436  | 64.16  | 16 | 0.860  | 30.64  |  |
| 17           | 0.393  | 66.06  | 18 | 0.018  | 88.94  | 19 | 0.525  | 58.34  | 20 | -0.220 | 102.69 | 21 | 0.240  | 76.12  |  |
| 22           | 0.319  | 71.42  | 23 | 0.594  | 53.56  | 24 | 0.314  | 71.71  | 25 | 0.094  | 84.59  | 26 | 0.263  | 74.75  |  |
| 27           | 0.825  | 34.41  | 28 | -0.464 | 117.65 | 29 | 0.533  | 57.76  | 30 | 0.064  | 86.31  | 31 | 0.475  | 61.65  |  |
| 32           | 0.124  | 82.85  | 33 | -0.376 | 112.07 | 34 | -0.083 | 94.75  | 35 | 0.465  | 62.26  | 36 | -0.469 | 117.97 |  |
| 37           | 0.617  | 51.92  | 38 | 0.076  | 85.67  | 39 | 0.533  | 57.76  | 40 | 0.643  | 50.00  |    |        |        |  |
| CONSTRUCT 12 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 13           | 0.392  | 66.95  | 14 | 0.257  | 75.08  | 15 | 0.330  | 70.73  | 16 | 0.195  | 78.77  | 17 | 0.593  | 53.64  |  |
| 18           | 0.812  | 35.73  | 19 | -0.031 | 91.75  | 20 | 0.720  | 43.97  | 21 | -0.212 | 102.23 | 22 | 0.370  | 68.31  |  |
| 23           | 0.336  | 70.38  | 24 | -0.247 | 104.31 | 25 | 0.113  | 83.54  | 26 | 0.651  | 49.39  | 27 | 0.131  | 82.48  |  |
| 28           | -0.323 | 108.82 | 29 | 0.699  | 45.68  | 30 | 0.545  | 56.99  | 31 | -0.223 | 102.90 | 32 | 0.542  | 57.16  |  |
| 33           | 0.432  | 64.41  | 34 | 0.600  | 53.11  | 35 | 0.692  | 46.22  | 36 | 0.560  | 55.95  | 37 | 0.776  | 39.10  |  |
| 38           | 0.434  | 64.27  | 39 | -0.140 | 98.03  | 40 | 0.840  | 32.84  |    |        |        |    |        |        |  |
| CONSTRUCT 13 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 14           | -0.055 | 93.16  | 15 | 0.675  | 47.50  | 16 | 0.159  | 80.87  | 17 | -0.274 | 105.89 | 18 | 0.354  | 69.26  |  |
| 19           | 0.133  | 82.33  | 20 | 0.432  | 64.39  | 21 | 0.184  | 79.38  | 22 | 0.546  | 56.91  | 23 | 0.305  | 71.98  |  |
| 24           | -0.154 | 98.88  | 25 | -0.100 | 95.73  | 26 | 0.293  | 72.99  | 27 | 0.005  | 89.71  | 28 | 0.041  | 87.66  |  |
| 29           | 0.518  | 58.79  | 30 | 0.674  | 47.66  | 31 | -0.734 | 137.23 | 32 | -0.239 | 103.80 | 33 | -0.123 | 97.08  |  |
| 34           | 0.163  | 80.61  | 35 | -0.005 | 90.30  | 36 | 0.201  | 78.40  | 37 | 0.148  | 81.51  | 38 | -0.306 | 107.79 |  |
| 39           | -0.246 | 104.23 | 40 | 0.433  | 64.36  |    |        |        |    |        |        |    |        |        |  |
| CONSTRUCT 14 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 15           | 0.560  | 55.97  | 16 | 0.883  | 28.02  | 17 | 0.389  | 67.09  | 18 | -0.073 | 94.19  | 19 | 0.574  | 54.96  |  |
| 20           | -0.166 | 99.54  | 21 | 0.358  | 69.04  | 22 | 0.386  | 67.31  | 23 | 0.656  | 49.04  | 24 | 0.379  | 67.76  |  |
| 25           | -0.148 | 98.50  | 26 | 0.285  | 73.45  | 27 | 0.957  | 16.89  | 28 | -0.376 | 112.11 | 29 | 0.505  | 69.70  |  |
| 30           | 0.026  | 88.48  | 31 | 0.440  | 63.91  | 32 | 0.193  | 78.88  | 33 | -0.419 | 114.75 | 34 | 0.000  | 90.00  |  |
| 35           | 0.382  | 67.57  | 36 | -0.550 | 123.93 | 37 | 0.528  | 58.11  | 38 | 0.152  | 81.26  | 39 | 0.696  | 45.92  |  |
| 40           | 0.613  | 52.20  |    |        |        |    |        |        |    |        |        |    |        |        |  |
| CONSTRUCT 15 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 16           | 0.598  | 53.26  | 17 | -0.135 | 97.74  | 18 | 0.040  | 87.70  | 19 | 0.451  | 63.21  | 20 | 0.266  | 74.60  |  |
| 21           | 0.586  | 54.14  | 22 | 0.040  | 32.88  | 23 | 0.611  | 52.35  | 24 | 0.304  | 72.32  | 25 | -0.382 | 112.47 |  |
| 26           | 0.531  | 57.92  | 27 | 0.663  | 48.44  | 28 | -0.164 | 99.45  | 29 | 0.630  | 50.92  | 30 | 0.444  | 63.62  |  |
| 31           | -0.421 | 114.87 | 32 | 0.057  | 86.73  | 33 | -0.291 | 106.94 | 34 | 0.241  | 76.08  | 35 | 0.088  | 84.95  |  |
| 36           | -0.337 | 109.71 | 37 | 0.355  | 69.22  | 38 | 0.032  | 88.14  | 39 | 0.369  | 68.34  | 40 | 0.622  | 51.55  |  |
| CONSTRUCT 16 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |  |
| 17           | 0.160  | 80.78  | 18 | -0.090 | 95.18  | 19 | 0.808  | 36.10  | 20 | -0.251 | 104.52 | 21 | 0.544  | 57.04  |  |
| 22           | 0.538  | 57.47  | 23 | 0.831  | 33.84  | 24 | 0.501  | 59.94  | 25 | -0.142 | 98.16  | 26 | 0.168  | 80.33  |  |
| 27           | 0.892  | 26.92  | 28 | -0.339 | 109.82 | 29 | 0.430  | 64.56  | 30 | 0.000  | 90.00  | 31 | 0.332  | 70.61  |  |
| 32           | -0.096 | 95.52  | 33 | -0.525 | 121.69 | 34 | -0.081 | 94.65  | 35 | 0.209  | 77.91  | 36 | -0.530 | 121.98 |  |

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| CONSTRUCT 17 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 18           | 0.316  | 71.56  |  | 19 | -0.035 | 92.01  |  | 20 | 0.382  | 67.56  |  | 21 | -0.270 | 105.68 |  |
| 23           | 0.082  | 89.31  |  | 24 | -0.061 | 93.50  |  | 25 | -0.032 | 91.86  |  | 26 | 0.375  | 67.98  |  |
| 28           | -0.031 | 91.77  |  | 29 | 0.513  | 59.13  |  | 30 | 0.340  | 70.13  |  | 31 | 0.395  | 66.73  |  |
| 33           | 0.115  | 83.37  |  | 34 | 0.494  | 60.41  |  | 35 | 0.622  | 51.56  |  | 36 | 0.251  | 75.48  |  |
| 38           | 0.575  | 54.09  |  | 39 | 0.010  | 89.42  |  | 40 | 0.403  | 66.22  |  | 22 | -0.229 | 103.25 |  |
| CONSTRUCT 18 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 19           | -0.307 | 107.88 |  | 20 | 0.461  | 62.54  |  | 21 | -0.555 | 123.77 |  | 22 | 0.074  | 85.77  |  |
| 24           | -0.676 | 132.55 |  | 25 | 0.493  | 60.44  |  | 26 | 0.346  | 69.77  |  | 27 | -0.208 | 102.02 |  |
| 29           | 0.357  | 69.07  |  | 30 | 0.231  | 75.65  |  | 31 | -0.161 | 99.24  |  | 32 | 0.429  | 64.58  |  |
| 34           | 0.278  | 73.83  |  | 35 | 0.692  | 46.22  |  | 36 | 0.727  | 43.35  |  | 37 | 0.523  | 58.49  |  |
| 39           | -0.380 | 112.32 |  | 40 | 0.568  | 55.37  |  |    |        |        |  | 23 | 0.138  | 82.05  |  |
| CONSTRUCT 19 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 20           | -0.196 | 101.33 |  | 21 | 0.766  | 39.99  |  | 22 | 0.507  | 59.53  |  | 23 | 0.873  | 29.16  |  |
| 25           | -0.498 | 119.07 |  | 26 | 0.012  | 89.30  |  | 27 | 0.712  | 44.64  |  | 28 | 0.156  | 81.02  |  |
| 30           | -0.050 | 92.88  |  | 31 | 0.126  | 82.78  |  | 32 | -0.366 | 111.43 |  | 33 | -0.614 | 127.91 |  |
| 35           | -0.235 | 103.62 |  | 36 | -0.361 | 111.18 |  | 37 | -0.078 | 94.43  |  | 38 | -0.063 | 93.62  |  |
| 40           | 0.436  | 64.17  |  |    |        |        |  |    |        |        |  | 24 | 0.710  | 44.73  |  |
| CONSTRUCT 20 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 21           | -0.097 | 95.59  |  | 22 | 0.293  | 72.97  |  | 23 | -0.017 | 90.95  |  | 24 | -0.136 | 97.84  |  |
| 26           | 0.533  | 57.76  |  | 27 | -0.185 | 100.69 |  | 28 | 0.162  | 80.70  |  | 29 | 0.472  | 61.81  |  |
| 31           | -0.678 | 132.62 |  | 32 | 0.349  | 69.56  |  | 33 | 0.338  | 70.26  |  | 34 | 0.718  | 44.13  |  |
| 36           | 0.641  | 50.14  |  | 37 | 0.333  | 70.54  |  | 38 | 0.903  | 59.78  |  | 39 | -0.292 | 107.00 |  |
| CONSTRUCT 21 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 22           | 0.696  | 45.87  |  | 23 | 0.582  | 54.40  |  | 24 | 0.894  | 26.65  |  | 25 | -0.645 | 130.15 |  |
| 27           | 0.374  | 54.97  |  | 28 | 0.195  | 78.73  |  | 29 | 0.104  | 84.02  |  | 30 | 0.003  | 89.82  |  |
| 32           | -0.160 | 99.23  |  | 33 | -0.454 | 117.00 |  | 34 | 0.132  | 82.39  |  | 35 | -0.365 | 111.38 |  |
| 37           | -0.101 | 95.77  |  | 38 | 0.197  | 78.66  |  | 39 | 0.644  | 49.94  |  | 40 | 0.216  | 77.52  |  |
| CONSTRUCT 22 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 23           | 0.629  | 51.03  |  | 24 | 0.505  | 59.67  |  | 25 | -0.312 | 108.17 |  | 26 | 0.595  | 53.50  |  |
| 28           | -0.298 | 107.33 |  | 29 | 0.446  | 63.53  |  | 30 | 0.228  | 76.81  |  | 31 | -0.444 | 116.36 |  |
| 33           | -0.012 | 90.68  |  | 34 | 0.373  | 68.10  |  | 35 | 0.043  | 87.55  |  | 36 | -0.192 | 101.09 |  |
| 38           | 0.260  | 74.92  |  | 39 | 0.378  | 67.78  |  | 40 | 0.677  | 47.42  |  |    |        |        |  |
| CONSTRUCT 23 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 24           | 0.415  | 65.46  |  | 25 | -0.306 | 107.84 |  | 26 | 0.270  | 74.33  |  | 27 | 0.752  | 41.25  |  |
| 29           | 0.279  | 73.79  |  | 30 | 0.024  | 88.63  |  | 31 | 0.064  | 86.31  |  | 32 | -0.071 | 94.10  |  |
| 34           | -0.038 | 92.16  |  | 35 | 0.141  | 81.90  |  | 36 | -0.142 | 98.16  |  | 37 | 0.212  | 77.76  |  |
| 39           | 0.739  | 42.33  |  | 40 | 0.738  | 42.46  |  |    |        |        |  | 28 | -0.041 | 92.34  |  |
| CONSTRUCT 24 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 25           | -0.594 | 126.17 |  | 26 | 0.199  | 78.53  |  | 27 | 0.528  | 58.13  |  | 28 | 0.120  | 83.08  |  |
| 30           | -0.087 | 95.00  |  | 31 | 0.084  | 85.17  |  | 32 | -0.106 | 96.07  |  | 33 | -0.417 | 115.91 |  |
| 35           | -0.359 | 111.02 |  | 36 | -0.553 | 123.54 |  | 37 | -0.048 | 92.77  |  | 38 | 0.386  | 67.31  |  |
| 40           | 0.126  | 82.76  |  |    |        |        |  |    |        |        |  | 29 | 0.017  | 89.04  |  |
| CONSTRUCT 25 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 26           | -0.121 | 96.94  |  | 27 | -0.337 | 109.71 |  | 28 | -0.645 | 130.13 |  | 29 | -0.013 | 90.77  |  |
| 31           | 0.370  | 68.27  |  | 32 | 0.182  | 79.54  |  | 33 | 0.476  | 61.57  |  | 34 | -0.219 | 102.64 |  |
| 36           | 0.143  | 81.79  |  | 37 | 0.323  | 71.16  |  | 38 | -0.266 | 105.42 |  | 39 | -0.503 | 120.23 |  |
| CONSTRUCT 26 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 27           | 0.284  | 73.47  |  | 28 | -0.187 | 100.80 |  | 29 | 0.717  | 44.20  |  | 30 | 0.414  | 65.54  |  |
| 32           | 0.764  | 40.20  |  | 33 | 0.410  | 65.82  |  | 34 | 0.776  | 39.07  |  | 35 | 0.590  | 53.83  |  |
| 37           | 0.740  | 42.25  |  | 38 | 0.716  | 44.25  |  | 39 | 0.014  | 89.19  |  | 40 | 0.634  | 50.66  |  |
| CONSTRUCT 27 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 28           | -0.227 | 103.09 |  | 29 | 0.395  | 66.74  |  | 30 | -0.019 | 91.08  |  | 31 | 0.315  | 71.62  |  |
| 33           | -0.492 | 119.45 |  | 34 | -0.038 | 92.19  |  | 35 | 0.187  | 79.21  |  | 36 | -0.620 | 128.34 |  |
| 38           | 0.124  | 82.86  |  | 39 | 0.830  | 33.86  |  | 40 | 0.561  | 55.88  |  | 32 | 0.097  | 84.46  |  |
| CONSTRUCT 28 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 29           | -0.311 | 108.10 |  | 30 | 0.232  | 76.56  |  | 31 | -0.268 | 105.56 |  | 32 | -0.363 | 111.31 |  |
| 34           | -0.104 | 96.00  |  | 35 | -0.553 | 123.58 |  | 36 | 0.212  | 77.75  |  | 37 | -0.637 | 129.60 |  |
| 39           | 0.072  | 85.85  |  | 40 | -0.427 | 115.25 |  |    |        |        |  | 33 | -0.335 | 109.55 |  |
| CONSTRUCT 29 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 30           | 0.715  | 44.32  |  | 31 | -0.140 | 98.06  |  | 32 | 0.427  | 64.74  |  | 33 | -0.026 | 91.47  |  |
| 35           | 0.618  | 51.03  |  | 36 | -0.044 | 92.54  |  | 37 | 0.833  | 33.59  |  | 38 | 0.340  | 70.10  |  |
| 40           | 0.707  | 45.02  |  |    |        |        |  |    |        |        |  | 34 | 0.611  | 52.33  |  |
| CONSTRUCT 30 |        |        |  |    |        |        |  |    |        |        |  |    |        |        |  |
| 31           | -0.601 | 126.93 |  | 32 | 0.014  | 89.20  |  | 33 | -0.168 | 99.69  |  | 34 | 0.485  | 60.96  |  |
| 36           | 0.295  | 72.87  |  | 37 | 0.343  | 69.93  |  | 38 | 0.152  | 81.24  |  | 39 | -0.327 | 109.10 |  |
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| ELEMENT                               | TOTAL   | SUM OF SQUARES | AS PER CENT |
|---------------------------------------|---------|----------------|-------------|
| 1                                     | -0.803  | 4.107          | 10.27       |
| 2                                     | 6.512   | 4.996          | 12.49       |
| 3                                     | 0.527   | 3.532          | 8.83        |
| 4                                     | 1.781   | 4.469          | 11.17       |
| 5                                     | -3.714  | 3.474          | 8.68        |
| 6                                     | -4.296  | 4.418          | 11.05       |
| 7                                     | -10.643 | 6.957          | 17.39       |
| 8                                     | -2.277  | 3.142          | 7.86        |
| 9                                     | 7.919   | 3.015          | 7.54        |
| 10                                    | 4.995   | 1.890          | 4.72        |
| TOTAL VARIATION ABOUT CONSTRUCT MEANS |         |                | 40.0000     |
| TCTAL PER CONSTRUCT                   |         | 1.0000         |             |
| UNIT OF EXPECTED DISTANCE             |         | 2.9814         |             |

# DISTANCES BETWEEN ELEMENTS

|                       |          |          |          |          |          |          |          |          |
|-----------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| ELEMENT 1<br>2 1.228  | 3 0.904  | 4 1.138  | 5 0.776  | 6 0.982  | 7 1.166  | 8 0.998  | 9 0.991  | 10 0.772 |
| ELEMENT 2<br>3 1.119  | 4 1.094  | 5 1.086  | 6 1.003  | 7 1.385  | 8 1.001  | 9 0.660  | 10 0.788 |          |
| ELEMENT 3<br>4 0.710  | 5 1.050  | 6 1.150  | 7 1.117  | 8 0.982  | 9 0.830  | 10 0.757 |          |          |
| ELEMENT 4<br>5 1.050  | 6 1.271  | 7 1.061  | 8 1.023  | 9 0.915  | 10 0.896 |          |          |          |
| ELEMENT 5<br>6 0.748  | 7 1.042  | 8 0.922  | 9 1.054  | 10 0.904 |          |          |          |          |
| ELEMENT 6<br>7 1.121  | 8 0.862  | 9 1.043  | 10 0.957 |          |          |          |          |          |
| ELEMENT 7<br>8 1.007  | 9 1.342  | 10 1.231 |          |          |          |          |          |          |
| ELEMENT 8<br>9 0.889  | 10 0.792 |          |          |          |          |          |          |          |
| ELEMENT 9<br>10 0.398 |          |          |          |          |          |          |          |          |



THE COMPONENT-SPACE IS LIMITED TO 9 DIMENSIONS

| COMPONENT | ROOT    | AS PER CENT |
|-----------|---------|-------------|
| 1         | 12.1279 | 30.32       |
| 2         | 9.7679  | 24.42       |
| 3         | 6.7604  | 16.90       |
| 4         | 3.7820  | 9.46        |
| 5         | 2.5346  | 6.34        |
| 6         | 2.4331  | 6.08        |
| 7         | 1.2470  | 3.12        |
| 8         | 0.9387  | 2.35        |
| 9         | 0.4081  | 1.02        |

# BARTLETT TEST

EXCLUDING 7. MAJOR COMPONENTS

CHI SQUARED 5.3136 D.F. 2

EXCLUDING 6. MAJOR COMPONENTS

CHI SQUARED 9.7240 D.F. 5

EXCLUDING 5. MAJOR COMPONENTS

CHI SQUARED 25.0730 D.F. 9

EXCLUDING 4. MAJOR COMPONENTS

CHI SQUARED 33.0883 D.F. 14

EXCLUDING 3. MAJOR COMPONENTS

CHI SQUARED 48.1960 D.F. 20

EXCLUDING 2. MAJOR COMPONENTS

CHI SQUARED 81.1529 D.F. 27

EXCLUDING 1. MAJOR COMPONENTS

CHI SQUARED 120.1506 D.F. 35

6 COMPONENTS FOUND SIGNIFICANT

| COMPONENT 1 |         |         |          | COMPONENT 2 |         |          | COMPONENT 3 |         |          |
|-------------|---------|---------|----------|-------------|---------|----------|-------------|---------|----------|
| ELEMENT     | VECTOR  | LOADING | RESIDUAL | VECTOR      | LOADING | RESIDUAL | VECTOR      | LOADING | RESIDUAL |
| 1           | -0.1455 | -0.5068 | 3.8498   | 0.1085      | 0.3390  | 3.7349   | -0.6815     | -1.7718 | 0.5955   |
| 2           | 0.4435  | 1.5447  | 2.6101   | 0.2224      | 0.6950  | 2.1271   | 0.4242      | 1.1029  | 0.9106   |
| 3           | 0.0671  | 0.2337  | 3.4778   | -0.4330     | -1.3533 | 1.6463   | -0.2434     | -0.6329 | 1.2457   |
| 4           | 0.0422  | 0.1470  | 4.4472   | -0.5711     | -1.7850 | 1.2610   | 0.1329      | 0.3457  | 1.1415   |
| 5           | -0.2579 | -0.8981 | 2.6669   | 0.2674      | 0.8358  | 1.9684   | -0.1819     | -0.4731 | 1.7446   |
| 6           | -0.1784 | -0.6211 | 4.0325   | 0.5346      | 1.6707  | 1.2414   | 0.1145      | 0.2977  | 1.1528   |
| 7           | -0.6233 | -2.1706 | 2.2458   | -0.2355     | -0.7359 | 1.7043   | 0.3713      | 0.5655  | 0.7722   |
| 8           | -0.0809 | -0.2818 | 3.0527   | 0.1098      | 0.3432  | 2.9449   | 0.2467      | 0.6414  | 2.5336   |
| 9           | 0.4494  | 1.5650  | 0.5656   | -0.0144     | -0.0451 | 0.5636   | 0.0010      | 0.0027  | 0.5636   |
| 10          | 0.2837  | 0.9881  | 0.9135   | 0.0114      | 0.0356  | 0.9122   | -0.1838     | -0.4780 | 0.6637   |
| CCESTRUCT   |         |         |          |             |         |          |             |         |          |
| 1           | 0.1708  | 0.5947  | 0.6463   | -0.0901     | -0.2817 | 0.5670   | 0.1753      | 0.4557  | 0.3593   |
| 2           | 0.2085  | 0.7260  | 0.4729   | -0.0951     | -0.2971 | 0.3847   | -0.1937     | -0.5037 | 0.1310   |
| 3           | 0.1164  | 0.4055  | 0.8356   | 0.0566      | 0.1770  | 0.8042   | -0.2579     | -0.6704 | 0.3547   |
| 4           | 0.2122  | 0.7388  | 0.4541   | -0.1470     | -0.4596 | 0.2425   | 0.0421      | 0.1095  | 0.2309   |
| 5           | 0.1132  | 0.3941  | 0.8447   | 0.2396      | 0.7488  | 0.2840   | -0.1358     | -0.3532 | 0.1592   |
| 6           | -0.0844 | -0.2930 | 0.9137   | -0.1200     | -0.3749 | 0.7731   | 0.2410      | 0.6267  | 0.3804   |
| 7           | -0.1553 | -0.5408 | 0.7076   | -0.0811     | -0.2534 | 0.6434   | -0.2236     | -0.5815 | 0.3053   |
| 8           | 0.1385  | 0.4825  | 0.7672   | -0.2119     | -0.6623 | 0.3286   | -0.0713     | -0.1853 | 0.2942   |
| 9           | 0.1879  | 0.6545  | 0.5717   | -0.0348     | -0.1086 | 0.5559   | -0.0183     | -0.0477 | 0.5576   |
| 10          | -0.1166 | -0.4062 | 0.8350   | -0.0753     | -0.2355 | 0.7795   | -0.2470     | -0.6421 | 0.3672   |
| 11          | 0.1690  | 0.5884  | 0.6538   | 0.1437      | 0.4491  | 0.4521   | 0.1982      | 0.5152  | 0.1867   |
| 12          | 0.2274  | 0.7919  | 0.3729   | -0.1478     | -0.4618 | 0.1597   | -0.0384     | -0.0958 | 0.1497   |
| 13          | 0.0995  | 0.3464  | 0.8800   | -0.0069     | -0.0215 | 0.8795   | -0.2402     | -0.6246 | 0.4894   |
| 14          | 0.1801  | 0.6274  | 0.6064   | 0.1759      | 0.5497  | 0.3043   | 0.1622      | 0.4217  | 0.1264   |
| 15          | 0.1948  | 0.6786  | 0.5396   | 0.1303      | 0.4072  | 0.3737   | -0.1355     | -0.3524 | 0.2495   |
| 16          | 0.1677  | 0.5840  | 0.6590   | 0.2228      | 0.6962  | 0.1743   | 0.1112      | 0.2892  | 0.0907   |
| 17          | 0.1308  | 0.4555  | 0.7925   | -0.0862     | -0.2695 | 0.7199   | 0.1086      | 0.2825  | 0.6401   |
| 18          | 0.1306  | 0.4549  | 0.7930   | -0.2228     | -0.6964 | 0.3080   | 0.0095      | 0.0246  | 0.3074   |
| 19          | 0.0946  | 0.3295  | 0.8914   | 0.2703      | 0.8449  | 0.1775   | -0.0342     | -0.0889 | 0.1696   |
| 20          | 0.1272  | 0.4431  | 0.8037   | -0.1502     | -0.4694 | 0.5834   | -0.2481     | -0.6450 | 0.1674   |
| 21          | 0.0909  | 0.3165  | 0.8998   | 0.2460      | 0.7689  | 0.3087   | -0.1218     | -0.3167 | 0.2084   |
| 22          | 0.2048  | 0.7131  | 0.4915   | 0.1064      | 0.3326  | 0.3809   | -0.1332     | -0.3463 | 0.2610   |
| 23          | 0.1809  | 0.6301  | 0.6029   | 0.1851      | 0.5784  | 0.2684   | -0.0215     | -0.0558 | 0.2653   |
| 24          | 0.0636  | 0.2213  | 0.9510   | 0.2349      | 0.7342  | 0.4119   | -0.0383     | -0.0997 | 0.4020   |
| 25          | -0.0275 | -0.0956 | 0.9909   | -0.1677     | -0.5241 | 0.7162   | 0.2500      | 0.6500  | 0.2938   |
| 26          | 0.2417  | 0.8417  | 0.2915   | -0.0744     | -0.2324 | 0.2375   | -0.0645     | -0.1677 | 0.2093   |
| 27          | 0.1708  | 0.5948  | 0.6462   | 0.2262      | 0.7069  | 0.1464   | 0.0944      | 0.2454  | 0.0662   |
| 28          | -0.1144 | -0.3985 | 0.8412   | 0.0570      | 0.1781  | 0.8095   | -0.2365     | -0.6150 | 0.4212   |
| 29          | 0.2272  | 0.7913  | 0.3739   | -0.0358     | -0.1120 | 0.3613   | -0.0183     | -0.0476 | 0.3591   |
| 30          | 0.1051  | 0.3660  | 0.8661   | -0.0581     | -0.1815 | 0.8331   | -0.2277     | -0.5920 | 0.4826   |
| 31          | -0.0182 | -0.0635 | 0.9960   | 0.0608      | 0.1899  | 0.9599   | 0.3477      | 0.9040  | 0.1427   |
| 32          | 0.1720  | 0.5990  | 0.6412   | -0.1678     | -0.5245 | 0.3661   | 0.1011      | 0.2628  | 0.2971   |
| 33          | 0.0557  | 0.1939  | 0.9624   | -0.2665     | -0.8328 | 0.2688   | 0.0328      | 0.0853  | 0.2616   |
| 34          | 0.1770  | 0.6164  | 0.6200   | -0.1300     | -0.4062 | 0.4550   | -0.1046     | -0.2719 | 0.3811   |
| 35          | 0.1875  | 0.6530  | 0.5737   | -0.1553     | -0.4853 | 0.3382   | 0.1973      | 0.5131  | 0.0749   |
| 36          | 0.0071  | 0.0246  | 0.9994   | -0.2346     | -0.7333 | 0.4617   | -0.1423     | -0.3699 | 0.3248   |
| 37          | 0.2376  | 0.8276  | 0.3151   | -0.0991     | -0.3097 | 0.2192   | 0.1323      | 0.3440  | 0.1008   |
| 38          | 0.1546  | 0.5384  | 0.7101   | -0.0780     | -0.2439 | 0.6506   | -0.0045     | -0.0116 | 0.6505   |
| 39          | 0.0804  | 0.2799  | 0.9217   | 0.2572      | 0.8037  | 0.2757   | 0.0492      | 0.1278  | 0.2594   |
| 40          | 0.2668  | 0.9293  | 0.1364   | 0.0114      | 0.0355  | 0.1351   | 0.0038      | 0.0099  | 0.1350   |

# POLAR CO-ORDINATES

| CONSTRUCT | H       | V      | R    |
|-----------|---------|--------|------|
| 1         | -25.34  | 34.71  | 0.80 |
| 2         | -22.25  | -32.71 | 0.93 |
| 3         | 23.58   | -56.58 | 0.80 |
| 4         | -31.88  | 7.17   | 0.88 |
| 5         | 62.24   | -22.65 | 0.92 |
| 6         | -128.09 | 52.76  | 0.79 |
| 7         | -154.90 | -44.24 | 0.83 |
| 8         | -53.93  | -12.74 | 0.84 |
| 9         | -9.42   | -4.11  | 0.67 |
| 10        | -149.90 | -53.82 | 0.80 |
| 11        | 37.35   | 34.84  | 0.90 |
| 12        | -30.25  | -6.21  | 0.92 |
| 13        | -3.54   | -60.94 | 0.71 |
| 14        | 41.22   | 26.82  | 0.93 |
| 15        | 30.97   | -24.00 | 0.87 |
| 16        | 50.01   | 17.65  | 0.95 |
| 17        | -30.61  | 28.09  | 0.60 |
| 18        | -56.85  | 1.69   | 0.83 |
| 19        | 68.69   | -5.60  | 0.91 |
| 20        | -46.65  | -44.98 | 0.91 |
| 21        | 67.63   | -20.85 | 0.89 |
| 22        | 25.00   | -23.75 | 0.86 |
| 23        | 42.55   | -3.73  | 0.86 |
| 24        | 73.22   | -7.41  | 0.77 |
| 25        | -100.34 | 50.66  | 0.84 |
| 26        | -15.44  | -10.87 | 0.99 |
| 27        | 49.92   | 14.87  | 0.96 |
| 28        | 155.92  | -54.64 | 0.75 |
| 29        | -8.05   | -3.41  | 0.80 |
| 30        | -26.38  | -55.39 | 0.72 |
| 31        | 108.49  | 77.51  | 0.93 |
| 32        | -41.20  | 18.27  | 0.84 |
| 33        | -76.90  | 5.69   | 0.86 |
| 34        | -33.38  | -20.22 | 0.79 |
| 35        | -36.62  | 32.24  | 0.96 |
| 36        | -88.08  | -26.76 | 0.92 |
| 37        | -20.52  | 21.27  | 0.95 |
| 38        | -24.37  | -1.12  | 0.59 |
| 39        | 70.80   | 8.54   | 0.86 |
| 40        | 2.19    | 0.61   | 0.93 |

# PROJECTIONS FOR ELEMENTS

| ELEMENT | H       | V      | R    |
|---------|---------|--------|------|
| 1       | -33.78  | 71.01  | 0.92 |
| 2       | -155.78 | -33.07 | 0.90 |
| 3       | 99.80   | 24.74  | 0.80 |
| 4       | 94.71   | -10.92 | 0.86 |
| 5       | -42.94  | 21.09  | 0.71 |
| 6       | -69.61  | -9.48  | 0.86 |
| 7       | 18.73   | -22.84 | 0.94 |
| 8       | -50.61  | -55.30 | 0.44 |
| 9       | 178.35  | -0.10  | 0.90 |
| 10      | -177.94 | 25.80  | 0.80 |

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|                       |           |           |           |           |           |           |           |           |            |  |  |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|
| CONSTRUCT 1, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4571             | 2 0.7166  | 3 0.0811  | 4 0.2721  | 5 -0.7297 | 6 -0.0649 | 7 -0.3295 | 8 -0.4187 | 9 0.5143  | 10 0.4157  |  |  |
| CONSTRUCT 2, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.0425              | 2 0.4702  | 3 0.3615  | 4 0.1788  | 5 -0.2037 | 6 -0.4752 | 7 -0.9628 | 8 -0.5691 | 9 0.6390  | 10 0.5188  |  |  |
| CONSTRUCT 3, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.4379              | 2 0.2250  | 3 0.0724  | 4 -0.3895 | 5 -0.0594 | 6 -0.4789 | 7 -0.6593 | 8 0.0124  | 9 0.2274  | 10 0.6120  |  |  |
| CONSTRUCT 4, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4046             | 2 0.6561  | 3 0.3779  | 4 0.2032  | 5 -0.4876 | 6 -0.4289 | 7 -0.6012 | 8 -0.5133 | 9 0.8167  | 10 0.3816  |  |  |
| CONSTRUCT 5, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.2362              | 2 0.4683  | 3 -0.1693 | 4 -0.3421 | 5 0.0288  | 6 0.3863  | 7 -0.7675 | 8 -0.3907 | 9 0.3076  | 10 0.2423  |  |  |
| CONSTRUCT 6, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.3760             | 2 0.2123  | 3 0.1326  | 4 0.3302  | 5 0.2280  | 6 -0.1760 | 7 0.5258  | 8 0.1761  | 9 -0.5508 | 10 -0.5021 |  |  |
| CONSTRUCT 7, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.4274              | 2 -1.0536 | 3 0.0800  | 4 -0.1391 | 5 0.2557  | 6 -0.0198 | 7 0.6858  | 8 -0.0725 | 9 -0.1268 | 10 -0.0372 |  |  |
| CONSTRUCT 8, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.0945              | 2 0.1728  | 3 0.4029  | 4 0.1850  | 5 -0.7031 | 6 -0.5389 | 7 -0.3419 | 8 -0.0802 | 9 0.5873  | 10 0.3016  |  |  |
| CONSTRUCT 9, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.0102              | 2 0.6592  | 3 -0.1142 | 4 -0.1305 | 5 -0.3269 | 6 -0.8019 | 7 -0.5660 | 8 0.0524  | 9 0.6630  | 10 0.5546  |  |  |
| CONSTRUCT 10, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.5262              | 2 -0.4916 | 3 0.2452  | 4 0.2553  | 5 0.5719  | 6 -0.0443 | 7 0.1364  | 8 -0.2785 | 9 -0.4940 | 10 -0.4267 |  |  |
| CONSTRUCT 11, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5166             | 2 0.6588  | 3 -0.2257 | 4 -0.0746 | 5 -0.2512 | 6 0.1271  | 7 -0.7977 | 8 0.3502  | 9 0.6622  | 10 0.0675  |  |  |
| CONSTRUCT 12, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.1152             | 2 0.5227  | 3 0.2246  | 4 0.3764  | 5 -0.5472 | 6 -0.6557 | 7 -1.0081 | 8 0.1074  | 9 0.6988  | 10 0.3962  |  |  |
| CONSTRUCT 13, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.2431              | 2 -0.2051 | 3 0.4799  | 4 -0.1811 | 5 -0.4481 | 6 0.0687  | 7 -0.7378 | 8 0.1024  | 9 0.2861  | 10 0.3918  |  |  |
| CONSTRUCT 14, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5416             | 2 0.7661  | 3 -0.2206 | 4 -0.2362 | 5 -0.0492 | 6 0.0007  | 7 -0.8414 | 8 0.2495  | 9 0.5822  | 10 0.2906  |  |  |
| CONSTRUCT 15, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.1148             | 2 0.4453  | 3 0.3502  | 4 -0.4684 | 5 -0.1910 | 6 0.0233  | 7 -1.0803 | 8 -0.0709 | 9 0.6096  | 10 0.4972  |  |  |
| CONSTRUCT 16, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.2472             | 2 0.7457  | 3 -0.2853 | 4 -0.2998 | 5 -0.3128 | 6 0.2203  | 7 -0.8506 | 8 0.2772  | 9 0.4246  | 10 0.3279  |  |  |
| CONSTRUCT 17, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4120             | 2 0.3502  | 3 -0.3151 | 4 0.6613  | 5 0.0307  | 6 -0.4269 | 7 -0.6296 | 8 0.1113  | 9 0.3528  | 10 0.2774  |  |  |
| CONSTRUCT 18, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.0940             | 2 0.1739  | 3 0.2811  | 4 0.2698  | 5 -0.7020 | 6 -0.6658 | 7 -0.3114 | 8 0.2138  | 9 0.4550  | 10 0.3797  |  |  |
| CONSTRUCT 19, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.2723              | 2 0.4664  | 3 -0.5471 | 4 -0.3774 | 5 -0.1206 | 6 0.2614  | 7 -0.5967 | 8 0.1156  | 9 0.2904  | 10 0.2358  |  |  |
| CONSTRUCT 20, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.2668              | 2 0.0861  | 3 0.3610  | 4 0.3500  | 5 -0.0038 | 6 -0.6312 | 7 -0.8283 | 8 -0.1463 | 9 0.3095  | 10 0.2361  |  |  |

|                       |           |           |           |           |           |           |           |           |            |  |  |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|
| CCNSTRUCT 24, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.2148              | 2 0.5510  | 3 -0.3557 | 4 -0.1553 | 5 0.1899  | 6 0.4134  | 7 -0.5085 | 8 -0.3884 | 9 0.1406  | 10 -0.1019 |  |  |
| CCNSTRUCT 25, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4017             | 2 -0.0205 | 3 0.2342  | 4 0.2366  | 5 -0.6097 | 6 0.0389  | 7 0.5190  | 8 0.2484  | 9 -0.0211 | 10 -0.2240 |  |  |
| CONSTRUCT 26, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.2605             | 2 0.5804  | 3 0.2635  | 4 0.2426  | 5 -0.3551 | 6 -0.2881 | 7 -1.0077 | 8 -0.5512 | 9 0.9303  | 10 0.4458  |  |  |
| CONSTRUCT 27, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.3766             | 2 0.7371  | 3 -0.2502 | 4 -0.4176 | 5 0.0145  | 6 0.0619  | 7 -0.8135 | 8 0.1198  | 9 0.5879  | 10 0.3367  |  |  |
| CCNSTRUCT 28, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.4968              | 2 -0.7828 | 3 -0.4238 | 4 0.0041  | 5 0.5416  | 6 0.0920  | 7 0.2693  | 8 -0.1558 | 9 -0.1582 | 10 0.1168  |  |  |
| CCNSTRUCT 29, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.4614             | 2 0.4121  | 3 0.3179  | 4 0.2982  | 5 -0.3467 | 6 -0.0800 | 7 -1.2469 | 8 -0.0029 | 9 0.6204  | 10 0.4893  |  |  |
| CONSTRUCT 30, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.0703              | 2 -0.2436 | 3 0.3246  | 4 0.3155  | 5 0.0292  | 6 -0.1182 | 7 -0.9871 | 8 0.0939  | 9 0.2880  | 10 0.2274  |  |  |
| CONSTRUCT 31, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5674             | 2 0.3253  | 3 -0.5809 | 4 0.1647  | 5 -0.0022 | 6 0.1787  | 7 0.3930  | 8 0.1726  | 9 -0.0471 | 10 -0.0366 |  |  |
| CCNSTRUCT 32, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5220             | 2 0.6214  | 3 0.1983  | 4 0.3810  | 5 -0.1940 | 6 -0.5416 | 7 -0.4129 | 8 -0.4833 | 9 0.6249  | 10 0.3281  |  |  |
| CONSTRUCT 33, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.0462             | 2 0.2479  | 3 0.3548  | 4 0.3500  | 5 -0.4278 | 6 -0.5923 | 7 0.2210  | 8 -0.3935 | 9 0.2490  | 10 0.0370  |  |  |
| CCNSTRUCT 34, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.0897             | 2 0.5234  | 3 0.2914  | 4 0.5260  | 5 -0.1590 | 6 -0.3599 | 7 -0.8842 | 8 -0.5499 | 9 0.2770  | 10 0.4249  |  |  |
| CONSTRUCT 35, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.6760             | 2 0.5155  | 3 0.1084  | 4 0.4149  | 5 -0.5880 | 6 -0.3747 | 7 -0.5038 | 8 0.0117  | 9 0.6807  | 10 0.4112  |  |  |
| CONSTRUCT 36, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.4317              | 2 -0.2793 | 3 0.0742  | 4 0.4363  | 5 -0.2965 | 6 -0.6573 | 7 0.0572  | 8 0.0706  | 9 0.0836  | 10 0.0795  |  |  |
| CCNSTRUCT 37, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.5897             | 2 0.7358  | 3 0.2567  | 4 0.4037  | 5 -0.5151 | 6 -0.2817 | 7 -0.9851 | 8 -0.0335 | 9 0.7406  | 10 0.2683  |  |  |
| CCNSTRUCT 38, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.1290             | 2 0.6945  | 3 -0.0145 | 4 0.4785  | 5 0.0637  | 6 -0.3998 | 7 -0.6394 | 8 -0.6006 | 9 0.4445  | 10 0.1021  |  |  |
| CONSTRUCT 39, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 0.0204              | 2 0.5926  | 3 -0.5312 | 4 -0.5382 | 5 0.1926  | 6 0.0112  | 7 -0.3170 | 8 0.0385  | 9 0.3906  | 10 0.1405  |  |  |
| CONSTRUCT 40, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |
| 1 -0.1352             | 2 0.8204  | 3 0.0624  | 4 0.0392  | 5 -0.6479 | 6 -0.3699 | 7 -1.1916 | 8 0.1289  | 9 0.8259  | 10 0.4678  |  |  |

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|                       |           |           |           |           |           |           |           |           |           |            |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| CONSTRUCT 1, ELEMENT  | 1 -0.4876 | 2 0.6540  | 3 0.2030  | 4 0.4330  | 5 -0.8051 | 6 -0.2155 | 7 -0.2632 | 8 -0.4496 | 9 0.5183  | 10 0.4125  |
| CONSTRUCT 2, ELEMENT  | 1 0.0103  | 2 0.4041  | 3 0.4901  | 4 0.3485  | 5 -0.2831 | 6 -0.6340 | 7 -0.8929 | 8 -0.6017 | 9 0.6433  | 10 0.5154  |
| CONSTRUCT 3, ELEMENT  | 1 0.4571  | 2 0.2644  | 3 -0.0043 | 4 -0.4906 | 5 -0.0121 | 6 -0.3843 | 7 -0.7010 | 8 0.0318  | 9 0.2249  | 10 0.6140  |
| CONSTRUCT 4, ELEMENT  | 1 -0.4544 | 2 0.5539  | 3 0.5770  | 4 0.4657  | 5 -0.6105 | 6 -0.6745 | 7 -0.4930 | 8 -0.5637 | 9 0.8234  | 10 0.3764  |
| CONSTRUCT 5, ELEMENT  | 1 0.3174  | 2 0.6349  | 3 -0.4935 | 4 -0.7698 | 5 0.2291  | 6 0.7866  | 7 -0.9438 | 8 -0.3084 | 9 0.2968  | 10 0.2508  |
| CONSTRUCT 6, ELEMENT  | 1 -0.4167 | 2 0.1289  | 3 0.2949  | 4 0.5443  | 5 0.1278  | 6 -0.3764 | 7 0.6140  | 8 0.1349  | 9 -0.5454 | 10 -0.5064 |
| CONSTRUCT 7, ELEMENT  | 1 0.4000  | 2 -1.1099 | 3 0.1897  | 4 0.0056  | 5 0.1880  | 6 -0.1552 | 7 0.7455  | 8 -0.1003 | 9 -0.1231 | 10 -0.0401 |
| CONSTRUCT 8, ELEMENT  | 1 0.0226  | 2 0.0255  | 3 0.6897  | 4 0.5633  | 5 -0.9603 | 6 -0.8930 | 7 -0.1859 | 8 -0.1530 | 9 0.5969  | 10 0.2940  |
| CONSTRUCT 9, ELEMENT  | 1 -0.0016 | 2 0.6351  | 3 -0.0672 | 4 -0.0685 | 5 -0.3559 | 6 -0.8599 | 7 -0.5405 | 8 0.0405  | 9 0.6646  | 10 0.5534  |
| CONSTRUCT 10, ELEMENT | 1 0.5007  | 2 -0.5439 | 3 0.3472  | 4 0.3898  | 5 0.5089  | 6 -0.1702 | 7 0.1919  | 8 -0.3044 | 9 -0.4906 | 10 -0.4293 |
| CONSTRUCT 11, ELEMENT | 1 -0.4679 | 2 0.7586  | 3 -0.4202 | 4 -0.3311 | 5 -0.1311 | 6 0.3672  | 7 -0.9034 | 8 0.3995  | 9 0.6557  | 10 0.0726  |
| CONSTRUCT 12, ELEMENT | 1 -0.1653 | 2 0.4200  | 3 0.4246  | 4 0.6402  | 5 -0.6707 | 6 -0.9026 | 7 -0.8993 | 8 0.0567  | 9 0.7055  | 10 0.3909  |
| CONSTRUCT 13, ELEMENT | 1 0.2408  | 2 -0.2099 | 3 0.4892  | 4 -0.1688 | 5 -0.4539 | 6 0.0572  | 7 -0.7327 | 8 0.1001  | 9 0.2864  | 10 0.3916  |
| CONSTRUCT 14, ELEMENT | 1 -0.4020 | 2 0.8884  | 3 -0.4586 | 4 -0.5502 | 5 0.0978  | 6 0.2945  | 7 -0.9708 | 8 0.3098  | 9 0.5742  | 10 0.2968  |
| CONSTRUCT 15, ELEMENT | 1 -0.0706 | 2 0.5358  | 3 0.1738  | 4 -0.7010 | 5 -0.0821 | 6 0.2410  | 7 -1.1762 | 8 -0.0262 | 9 0.6037  | 10 0.5018  |
| CONSTRUCT 16, ELEMENT | 1 -0.1717 | 2 0.9005  | 3 -0.5867 | 4 -0.6974 | 5 -0.1266 | 6 0.5924  | 7 -1.0146 | 8 0.3536  | 9 0.4146  | 10 0.3358  |
| CONSTRUCT 17, ELEMENT | 1 -0.4412 | 2 0.2903  | 3 -0.1984 | 4 0.8152  | 5 -0.0414 | 6 -0.5710 | 7 -0.5662 | 8 0.0817  | 9 0.3567  | 10 0.2743  |
| CONSTRUCT 18, ELEMENT | 1 -0.1696 | 2 0.0191  | 3 0.5827  | 4 0.6675  | 5 -0.8883 | 6 -1.0381 | 7 -0.1474 | 8 0.1373  | 9 0.4651  | 10 0.3717  |
| CONSTRUCT 19, ELEMENT | 1 0.3639  | 2 0.6543  | 3 -0.9130 | 4 -0.8600 | 5 0.1054  | 6 0.7131  | 7 -0.7957 | 8 0.2084  | 9 0.2782  | 10 0.2454  |
| CONSTRUCT 20, ELEMENT | 1 0.2159  | 2 -0.0183 | 3 0.5643  | 4 0.6181  | 5 -0.1294 | 6 -0.8821 | 7 -0.7178 | 8 -0.1978 | 9 0.3163  | 10 0.2308  |
| CONSTRUCT 21, ELEMENT | 1 0.3374  | 2 0.6114  | 3 -0.5412 | 4 -0.8317 | 5 0.2476  | 6 0.8311  | 7 -0.7843 | 8 -0.3471 | 9 0.2547  | 10 0.2221  |
| CONSTRUCT 22, ELEMENT | 1 0.1975  | 2 0.8212  | 3 0.1690  | 4 -0.5576 | 5 -0.3270 | 6 0.1500  | 7 -1.0863 | 8 -0.2532 | 9 0.5808  | 10 0.3056  |
| CONSTRUCT 23, ELEMENT | 1 0.1654  | 2 0.7544  | 3 0.6117  | 4 0.7487  | 5 0.2670  | 6 0.2422  | 7 0.2755  | 8 0.5227  | 9 0.4010  | 10 0.4222  |

|                       |           |           |           |           |           |           |           |           |            |  |  |  |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|--|
| CONSTRUCT 24. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.2944              | 2 0.7143  | 3 -0.6736 | 4 -0.5747 | 5 0.3863  | 6 0.8059  | 7 -0.6814 | 8 -0.3078 | 9 0.1301  | 10 -0.0935 |  |  |  |
| CONSTRUCT 25. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.4585             | 2 -0.1371 | 3 0.4611  | 4 0.5359  | 5 -0.7498 | 6 -0.2412 | 7 0.6424  | 8 0.1908  | 9 -0.0135 | 10 -0.2300 |  |  |  |
| CONSTRUCT 26. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.2857             | 2 0.5287  | 3 0.3641  | 4 0.3753  | 5 -0.4172 | 6 -0.4124 | 7 -0.9530 | 8 -0.5767 | 9 0.9337  | 10 0.4432  |  |  |  |
| CONSTRUCT 27. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.3000             | 2 0.8943  | 3 -0.5563 | 4 -0.8214 | 5 0.2036  | 6 0.4397  | 7 -0.9800 | 8 0.1974  | 9 0.5777  | 10 0.3448  |  |  |  |
| CONSTRUCT 28. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.5161              | 2 -0.7432 | 3 -0.5009 | 4 -0.0976 | 5 0.5892  | 6 0.1872  | 7 0.2274  | 8 -0.1363 | 9 -0.1608 | 10 0.1188  |  |  |  |
| CONSTRUCT 29. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.4736             | 2 0.3872  | 3 0.3664  | 4 0.3622  | 5 -0.3766 | 6 -0.1355 | 7 -1.2205 | 8 -0.0152 | 9 0.6220  | 10 0.4880  |  |  |  |
| CONSTRUCT 30. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0506              | 2 -0.2840 | 3 0.4032  | 4 0.4192  | 5 -0.0194 | 6 -0.2153 | 7 -0.9443 | 8 0.0740  | 9 0.2906  | 10 0.2253  |  |  |  |
| CONSTRUCT 31. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.5468             | 2 0.3675  | 3 -0.6631 | 4 0.0563  | 5 0.0486  | 6 0.2802  | 7 0.3483  | 8 0.1934  | 9 -0.0459 | 10 -0.0345 |  |  |  |
| CONSTRUCT 32. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.5789             | 2 0.5048  | 3 0.4254  | 4 0.6806  | 5 -0.3343 | 6 -0.8220 | 7 -0.2894 | 8 -0.5409 | 9 0.6325  | 10 0.3221  |  |  |  |
| CONSTRUCT 33. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1365             | 2 0.0627  | 3 0.7154  | 4 0.8256  | 5 -0.6505 | 6 -1.0374 | 7 0.4170  | 8 -0.4849 | 9 0.2610  | 10 0.0275  |  |  |  |
| CONSTRUCT 34. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1338             | 2 0.4331  | 3 0.4673  | 4 0.7580  | 5 -0.2676 | 6 -0.5771 | 7 -0.7886 | 8 -0.5945 | 9 0.2829  | 10 0.4203  |  |  |  |
| CONSTRUCT 35. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.7286             | 2 0.4076  | 3 0.3185  | 4 0.6920  | 5 -0.7177 | 6 -0.6341 | 7 -0.3895 | 8 -0.0416 | 9 0.6877  | 10 0.4057  |  |  |  |
| CONSTRUCT 36. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.3522              | 2 -0.4424 | 3 0.3917  | 4 0.8551  | 5 -0.4926 | 6 -1.0493 | 7 0.2299  | 8 -0.0100 | 9 0.0942  | 10 0.0712  |  |  |  |
| CONSTRUCT 37. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.6233             | 2 0.6669  | 3 0.3908  | 4 0.5805  | 5 -0.5979 | 6 -0.4472 | 7 -0.9122 | 8 -0.0675 | 9 0.7451  | 10 0.2648  |  |  |  |
| CONSTRUCT 38. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1554             | 2 0.6403  | 3 0.0911  | 4 0.6177  | 5 -0.0015 | 6 -0.5302 | 7 -0.5820 | 8 -0.6274 | 9 0.4480  | 10 0.0993  |  |  |  |
| CONSTRUCT 39. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.1076              | 2 0.7714  | 3 -0.8792 | 4 -0.9972 | 5 0.4076  | 6 0.4408  | 7 -0.5063 | 8 0.1267  | 9 0.3790  | 10 0.1497  |  |  |  |
| CONSTRUCT 40. ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1314             | 2 0.8283  | 3 0.0470  | 4 0.0189  | 5 -0.6384 | 6 -0.3509 | 7 -1.2000 | 8 0.1328  | 9 0.8253  | 10 0.4682  |  |  |  |



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|                       |           |           |           |           |           |           |           |           |            |    |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|----|
| CONSTRUCT 1, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.7982             | 2 0.8473  | 3 0.0921  | 4 0.4936  | 5 -0.8080 | 6 -0.1633 | 7 -0.0940 | 8 -0.3372 | 9 0.5188  | 10 0.3288  |    |
| CONSTRUCT 2, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.3535              | 2 0.1904  | 3 0.6128  | 4 0.2815  | 5 -0.1915 | 6 -0.6917 | 7 -1.0799 | 8 -0.7260 | 9 0.6428  | 10 0.6080  |    |
| CONSTRUCT 3, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.9140              | 2 -0.0200 | 3 0.1589  | 4 -0.5797 | 5 0.1099  | 6 -0.4610 | 7 -0.9500 | 8 -0.1336 | 9 0.2242  | 10 0.7373  |    |
| CONSTRUCT 4, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.5291             | 2 0.6003  | 3 0.5503  | 4 0.4802  | 5 -0.6305 | 6 -0.6620 | 7 -0.4524 | 8 -0.5367 | 9 0.8235  | 10 0.3563  |    |
| CONSTRUCT 5, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.5581              | 2 0.4850  | 3 -0.4075 | 4 -0.8168 | 5 0.2934  | 6 0.7462  | 7 -1.0749 | 8 -0.3956 | 9 0.2964  | 10 0.3157  |    |
| CONSTRUCT 6, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.8437             | 2 0.3948  | 3 0.1424  | 4 0.6276  | 5 0.0138  | 6 -0.3047 | 7 0.8467  | 8 0.2895  | 9 -0.5447 | 10 -0.6216 |    |
| CONSTRUCT 7, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.7962              | 2 -1.3566 | 3 0.3312  | 4 -0.0717 | 5 0.2938  | 6 -0.2218 | 7 0.5295  | 8 -0.2437 | 9 -0.1237 | 10 0.0668  |    |
| CONSTRUCT 8, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.1489              | 2 -0.0531 | 3 0.7348  | 4 0.5387  | 5 -0.9265 | 6 -0.9142 | 7 -0.2548 | 8 -0.1987 | 9 0.5967  | 10 0.3281  |    |
| CONSTRUCT 9, ELEMENT  | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.0309              | 2 0.6148  | 3 -0.0556 | 4 -0.0748 | 5 -0.3473 | 6 -0.8654 | 7 -0.5582 | 8 0.0287  | 9 0.6646  | 10 0.5622  |    |
| CONSTRUCT 10, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.9383              | 2 -0.8163 | 3 0.5035  | 4 0.3044  | 5 0.6257  | 6 -0.2437 | 7 -0.0466 | 8 -0.4628 | 9 -0.4912 | 10 -0.3113 |    |
| CONSTRUCT 11, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.8190             | 2 0.9772  | 3 -0.5466 | 4 -0.2626 | 5 -0.2248 | 6 0.4262  | 7 -0.7121 | 8 0.5266  | 9 0.6563  | 10 -0.0221 |    |
| CONSTRUCT 12, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.0973             | 2 0.3777  | 3 0.4489  | 4 0.6269  | 5 -0.6525 | 6 -0.9140 | 7 -0.9364 | 8 0.0321  | 9 0.7054  | 10 0.4093  |    |
| CONSTRUCT 13, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.6665              | 2 -0.4749 | 3 0.6412  | 4 -0.2519 | 5 -0.3402 | 6 -0.0143 | 7 -0.9647 | 8 -0.0540 | 9 0.2858  | 10 0.5064  |    |
| CONSTRUCT 14, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.7694             | 2 1.0673  | 3 -0.5613 | 4 -0.4941 | 5 0.0211  | 6 0.3428  | 7 -0.8142 | 8 0.4139  | 9 0.5747  | 10 0.2193  |    |
| CONSTRUCT 15, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.1695              | 2 0.3863  | 3 0.2596  | 4 -0.7478 | 5 -0.0180 | 6 0.2006  | 7 -1.3070 | 8 -0.1132 | 9 0.6033  | 10 0.5666  |    |
| CONSTRUCT 16, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.3687             | 2 1.0232  | 3 -0.6571 | 4 -0.6590 | 5 -0.1793 | 6 0.6255  | 7 -0.9072 | 8 0.4250  | 9 0.4149  | 10 0.2827  |    |
| CONSTRUCT 17, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.6337             | 2 0.4101  | 3 -0.2672 | 4 0.8527  | 5 -0.0928 | 6 -0.5386 | 7 -0.4613 | 8 0.1514  | 9 0.3570  | 10 0.2224  |    |
| CONSTRUCT 18, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 -0.1863             | 2 0.0295  | 3 0.5767  | 4 0.6708  | 5 -0.8927 | 6 -1.0353 | 7 -0.1383 | 8 0.1433  | 9 0.4651  | 10 0.3672  |    |
| CONSTRUCT 19, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.4245              | 2 0.6165  | 3 -0.8914 | 4 -0.8718 | 5 0.1216  | 6 0.7029  | 7 -0.8287 | 8 0.1865  | 9 0.2781  | 10 0.2618  |    |
| CONSTRUCT 20, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.6554              | 2 -0.2919 | 3 0.7213  | 4 0.5323  | 5 -0.0120 | 6 -0.9559 | 7 -0.9573 | 8 -0.3569 | 9 0.3156  | 10 0.3494  |    |
| CONSTRUCT 21, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.5532              | 2 0.4771  | 3 -0.4641 | 4 -0.8739 | 5 0.3052  | 6 0.7949  | 7 -0.9018 | 8 -0.4252 | 9 0.2544  | 10 0.2803  |    |
| CONSTRUCT 22, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.4335              | 2 0.6743  | 3 0.2533  | 4 -0.6037 | 5 -0.2640 | 6 0.1104  | 7 -1.2149 | 8 -0.3386 | 9 0.5805  | 10 0.3692  |    |
| CONSTRUCT 23, ELEMENT | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9          | 10 |
| 1 0.2048              | 2 0.7308  | 3 -0.6012 | 4 -0.7177 | 5 -0.2537 | 6 0.2356  | 7 -0.9562 | 8 0.1945  | 9 0.6211  | 10 0.5428  |    |

|                       |           |           |           |           |           |           |           |           |            |  |  |  |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|--|
| CONSTRUCT 24, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.3624              | 2 0.6720  | 3 -0.6493 | 4 -0.5879 | 5 0.4044  | 6 0.7944  | 7 -0.7184 | 8 -0.3324 | 9 0.1299  | 10 -0.0752 |  |  |  |
| CONSTRUCT 25, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.9015             | 2 0.1386  | 3 0.3029  | 4 0.6223  | 5 -0.8681 | 6 -0.1668 | 7 0.8837  | 8 0.3511  | 9 -0.0129 | 10 -0.3495 |  |  |  |
| CONSTRUCT 26, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1714             | 2 0.4576  | 3 0.4050  | 4 0.3530  | 5 -0.3867 | 6 -0.4316 | 7 -1.0152 | 8 -0.6181 | 9 0.9335  | 10 0.4740  |  |  |  |
| CONSTRUCT 27, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.4672             | 2 0.9984  | 3 -0.6160 | 4 -0.7888 | 5 0.1590  | 6 0.4678  | 7 -0.8889 | 8 0.2580  | 9 0.5780  | 10 0.2996  |  |  |  |
| CONSTRUCT 28, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.9352              | 2 -1.0041 | 3 -0.3512 | 4 -0.1794 | 5 0.7011  | 6 0.1168  | 7 -0.0010 | 8 -0.2880 | 9 -0.1614 | 10 0.2319  |  |  |  |
| CONSTRUCT 29, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.4411             | 2 0.3670  | 3 0.3780  | 4 0.3558  | 5 -0.3679 | 6 -0.1453 | 7 -1.2382 | 8 -0.0270 | 9 0.6220  | 10 0.4968  |  |  |  |
| CONSTRUCT 30, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.4540              | 2 -0.5351 | 3 0.5473  | 4 0.3405  | 5 0.0883  | 6 -0.2830 | 7 -1.1642 | 8 -0.0720 | 9 0.2900  | 10 0.3342  |  |  |  |
| CONSTRUCT 31, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -1.1629             | 2 0.7510  | 3 -0.8832 | 4 0.1765  | 5 -0.1159 | 6 0.3837  | 7 0.6840  | 8 0.4164  | 9 -0.0489 | 10 -0.2007 |  |  |  |
| CONSTRUCT 32, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.7579             | 2 0.6163  | 3 0.3614  | 4 0.7155  | 5 -0.3821 | 6 -0.7919 | 7 -0.1918 | 8 -0.4761 | 9 0.6328  | 10 0.2738  |  |  |  |
| CONSTRUCT 33, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1946             | 2 0.0989  | 3 0.6947  | 4 0.8370  | 5 -0.6660 | 6 -1.0277 | 7 0.4487  | 8 -0.4639 | 9 0.2611  | 10 0.0119  |  |  |  |
| CONSTRUCT 34, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0515              | 2 0.3177  | 3 0.5335  | 4 0.7219  | 5 -0.2181 | 6 -0.6082 | 7 -0.8895 | 8 -0.6616 | 9 0.2826  | 10 0.4703  |  |  |  |
| CONSTRUCT 35, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -1.0783             | 2 0.6253  | 3 0.1936  | 4 0.7602  | 5 -0.8111 | 6 -0.5753 | 7 -0.1990 | 8 0.0850  | 9 0.6883  | 10 0.3113  |  |  |  |
| CONSTRUCT 36, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.6043              | 2 -0.5993 | 3 0.4818  | 4 0.8060  | 5 -0.4253 | 6 -1.0916 | 7 0.0925  | 8 -0.1012 | 9 0.0938  | 10 0.1392  |  |  |  |
| CONSTRUCT 37, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.8577             | 2 0.8129  | 3 0.3070  | 4 0.6263  | 5 -0.6605 | 6 -0.4078 | 7 -0.7845 | 8 0.0174  | 9 0.7455  | 10 0.2016  |  |  |  |
| CONSTRUCT 38, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1475             | 2 0.6354  | 3 0.0939  | 4 0.6162  | 5 0.0006  | 6 -0.5315 | 7 -0.5863 | 8 -0.6302 | 9 0.4480  | 10 0.1015  |  |  |  |
| CONSTRUCT 39, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0204              | 2 0.8256  | 3 -0.9104 | 4 -0.9802 | 5 0.3843  | 6 0.4555  | 7 -0.4588 | 8 0.1583  | 9 0.3751  | 10 0.1262  |  |  |  |
| CONSTRUCT 40, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1382             | 2 0.8326  | 3 0.0446  | 4 0.0203  | 5 -0.6402 | 6 -0.3497 | 7 -1.1963 | 8 0.1353  | 9 0.8254  | 10 0.4664  |  |  |  |

## COMPONENT 4

| ELEMENT | VECTOR  | LOADING | RESIDUAL |
|---------|---------|---------|----------|
| 1       | -0.0927 | -0.1803 | 0.5630   |
| 2       | 0.2826  | 0.5495  | 0.6007   |
| 3       | -0.0602 | -0.1171 | 1.2320   |
| 4       | 0.3590  | 0.6982  | 0.6541   |
| 5       | 0.5145  | 1.0005  | 0.7435   |
| 6       | 0.0775  | 0.1507  | 1.1301   |
| 7       | -0.0888 | -0.1727 | 0.7423   |
| 8       | -0.6669 | -1.2969 | 0.8517   |
| 9       | -0.1241 | -0.2414 | 0.5053   |
| 10      | -0.2009 | -0.3906 | 0.5311   |

## CONSTRUCT

|    |         |         |        |
|----|---------|---------|--------|
| 1  | 0.0608  | 0.1183  | 0.3453 |
| 2  | 0.1600  | 0.3112  | 0.0341 |
| 3  | -0.1490 | -0.2897 | 0.2708 |
| 4  | 0.1062  | 0.2066  | 0.1882 |
| 5  | 0.1463  | 0.2844  | 0.0783 |
| 6  | 0.1616  | 0.3142  | 0.2817 |
| 7  | -0.1293 | -0.2514 | 0.2420 |
| 8  | -0.2119 | -0.4120 | 0.1245 |
| 9  | -0.1354 | -0.2634 | 0.4882 |
| 10 | 0.2574  | 0.5006  | 0.1166 |
| 11 | -0.0807 | -0.1570 | 0.1621 |
| 12 | -0.1032 | -0.2000 | 0.1094 |
| 13 | -0.2656 | -0.5166 | 0.2229 |
| 14 | -0.0269 | -0.0523 | 0.1237 |
| 15 | -0.0933 | -0.1815 | 0.2166 |
| 16 | -0.1175 | -0.2286 | 0.0385 |
| 17 | 0.1329  | 0.2584  | 0.5733 |
| 18 | -0.2687 | -0.5226 | 0.0343 |
| 19 | -0.0747 | -0.1453 | 0.1485 |
| 20 | 0.0709  | 0.1379  | 0.1484 |
| 21 | 0.1502  | 0.2922  | 0.1230 |
| 22 | -0.0110 | -0.0214 | 0.2606 |
| 23 | -0.1938 | -0.3770 | 0.1232 |
| 24 | 0.2768  | 0.5384  | 0.1121 |
| 25 | -0.1915 | -0.3725 | 0.1550 |
| 26 | 0.1575  | 0.3064  | 0.1155 |
| 27 | -0.0142 | -0.0277 | 0.0855 |
| 28 | 0.0626  | 0.1217  | 0.4164 |
| 29 | 0.0000  | 0.0000  | 0.3591 |
| 30 | -0.0165 | -0.0322 | 0.4816 |
| 31 | 0.0589  | 0.1146  | 0.1296 |
| 32 | 0.2173  | 0.4226  | 0.1185 |
| 33 | 0.0602  | 0.1171  | 0.2479 |
| 34 | 0.2794  | 0.5434  | 0.0859 |
| 35 | -0.0570 | -0.1109 | 0.0626 |
| 36 | -0.1279 | -0.2487 | 0.2630 |
| 37 | 0.0356  | 0.0692  | 0.0960 |
| 38 | 0.3930  | 0.7643  | 0.0664 |
| 39 | 0.0155  | 0.0301  | 0.2585 |
| 40 | -0.1460 | -0.2839 | 0.0544 |

## RESIDUAL DEVIATIONS AFTER EXTRACTING 4 COMPONENTS

|                       |           |           |           |           |           |           |           |           |           |            |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| CONSTRUCT 1. ELEMENT  | 1 -0.8091 | 2 0.8808  | 3 0.0850  | 4 0.5361  | 5 -0.8271 | 6 -0.1541 | 7 -0.1045 | 8 -0.4161 | 9 0.5041  | 10 0.3050  |
| CONSTRUCT 2. ELEMENT  | 1 0.3247  | 2 0.2784  | 3 0.5940  | 4 0.3933  | 5 -0.0314 | 6 -0.6675 | 7 -1.1076 | 8 -0.9335 | 9 0.6041  | 10 0.5455  |
| CONSTRUCT 3. ELEMENT  | 1 0.9408  | 2 -0.1018 | 3 0.1764  | 4 -0.6837 | 5 -0.0391 | 6 -0.4835 | 7 -0.9242 | 8 0.0596  | 9 0.2601  | 10 0.7954  |
| CONSTRUCT 4. ELEMENT  | 1 -0.5482 | 2 0.6587  | 3 0.5379  | 4 0.5544  | 5 -0.5242 | 6 -0.6460 | 7 -0.4707 | 8 -0.6745 | 9 0.7978  | 10 0.3148  |
| CONSTRUCT 5. ELEMENT  | 1 0.5317  | 2 0.5654  | 3 -0.4247 | 4 -0.7146 | 5 0.4397  | 6 0.7682  | 7 -1.1002 | 8 -0.5852 | 9 0.2611  | 10 0.2586  |
| CONSTRUCT 6. ELEMENT  | 1 -0.8728 | 2 0.4836  | 3 0.1234  | 4 0.7405  | 5 0.1754  | 6 -0.2803 | 7 0.8188  | 8 0.0799  | 9 -0.5837 | 10 -0.6847 |
| CONSTRUCT 7. ELEMENT  | 1 0.8195  | 2 -1.4276 | 3 0.3463  | 4 -0.1620 | 5 0.1644  | 6 -0.2413 | 7 0.5519  | 8 -0.0761 | 9 -0.0925 | 10 0.1173  |
| CONSTRUCT 8. ELEMENT  | 1 0.1871  | 2 -0.1695 | 3 0.7596  | 4 0.3908  | 5 -1.1385 | 6 -0.9461 | 7 -0.2182 | 8 0.0761  | 9 0.6478  | 10 0.4109  |
| CONSTRUCT 9. ELEMENT  | 1 0.0553  | 2 0.5404  | 3 -0.0357 | 4 -0.1693 | 5 -0.4828 | 6 -0.8858 | 7 -0.5348 | 8 0.2044  | 9 0.6572  | 10 0.6151  |
| CONSTRUCT 10. ELEMENT | 1 0.8918  | 2 -0.6749 | 3 0.4733  | 4 0.4842  | 5 0.8833  | 6 -0.2049 | 7 -0.0910 | 8 -0.7966 | 9 -0.5534 | 10 -0.4118 |
| CONSTRUCT 11. ELEMENT | 1 -0.8044 | 2 0.9328  | 3 -0.5361 | 4 -0.3190 | 5 -0.3056 | 6 0.4140  | 7 -0.6982 | 8 0.6313  | 9 0.6757  | 10 0.0094  |
| CONSTRUCT 12. ELEMENT | 1 -0.0787 | 2 0.3210  | 3 0.4610  | 4 0.5548  | 5 -0.7558 | 6 -0.9296 | 7 -0.9186 | 8 0.1660  | 9 0.7303  | 10 0.4496  |
| CONSTRUCT 13. ELEMENT | 1 0.7144  | 2 -0.6208 | 3 0.6723  | 4 -0.4373 | 5 -0.6060 | 6 -0.0543 | 7 -0.9188 | 8 0.2905  | 9 0.3499  | 10 0.6102  |
| CONSTRUCT 14. ELEMENT | 1 -0.7646 | 2 1.0525  | 3 -0.5581 | 4 -0.5129 | 5 -0.0059 | 6 0.3388  | 7 -0.8096 | 8 0.4488  | 9 0.5812  | 10 0.2298  |
| CONSTRUCT 15. ELEMENT | 1 0.1864  | 2 0.3351  | 3 0.2705  | 4 -0.8130 | 5 -0.1114 | 6 0.1866  | 7 -1.2909 | 8 0.0079  | 9 0.6259  | 10 0.6030  |
| CONSTRUCT 16. ELEMENT | 1 -0.3476 | 2 0.9586  | 3 -0.6433 | 4 -0.7410 | 5 -0.2968 | 6 0.6078  | 7 -0.8869 | 8 0.5774  | 9 0.4433  | 10 0.3286  |
| CONSTRUCT 17. ELEMENT | 1 -0.6577 | 2 0.4831  | 3 -0.2828 | 4 0.9455  | 5 0.0402  | 6 -0.5186 | 7 -0.4842 | 8 -0.0209 | 9 0.3249  | 10 0.1705  |
| CONSTRUCT 18. ELEMENT | 1 -0.1379 | 2 -0.1182 | 3 0.6081  | 4 0.4832  | 5 -1.1616 | 6 -1.0758 | 7 -0.0919 | 8 0.4918  | 9 0.5300  | 10 0.4722  |
| CONSTRUCT 19. ELEMENT | 1 0.4380  | 2 0.5755  | 3 -0.8826 | 4 -0.9240 | 5 0.0468  | 6 0.6917  | 7 -0.8158 | 8 0.2834  | 9 0.2962  | 10 0.2910  |
| CONSTRUCT 20. ELEMENT | 1 0.6427  | 2 -0.2529 | 3 0.7130  | 4 0.5818  | 5 0.0589  | 6 -0.9452 | 7 -0.9696 | 8 -0.4489 | 9 0.2585  | 10 0.3217  |

|                       |           |           |           |           |           |           |           |           |           |            |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| CCSTRUCT 21, ELEMENT  | 1 0.9261  | 2 0.5596  | 3 -0.4816 | 4 -0.7689 | 5 0.4555  | 6 0.8175  | 7 -0.9278 | 8 -0.6201 | 9 0.2181  | 10 0.2216  |
| CONSTRUCT 22, ELEMENT | 1 0.4354  | 2 0.6683  | 3 0.2546  | 4 -0.6113 | 5 -0.2750 | 6 0.1087  | 7 -1.2130 | 8 -0.3244 | 9 0.5831  | 10 0.3735  |
| CONSTRUCT 23, ELEMENT | 1 0.2398  | 2 0.6243  | 3 -0.5785 | 4 -0.8531 | 5 -0.4476 | 6 0.2064  | 7 -0.9228 | 8 0.4459  | 9 0.6679  | 10 0.6177  |
| CONSTRUCT 24, ELEMENT | 1 0.3125  | 2 0.8241  | 3 -0.6817 | 4 -0.3946 | 5 0.6814  | 6 0.8362  | 7 -0.7662 | 8 -0.6914 | 9 0.0631  | 10 -0.1833 |
| CCSTRUCT 25, ELEMENT  | 1 -0.8669 | 2 0.0334  | 3 0.3253  | 4 0.4886  | 5 -1.0597 | 6 -0.1957 | 7 0.9168  | 8 0.5995  | 9 0.0334  | 10 -0.2746 |
| CONSTRUCT 26, ELEMENT | 1 -0.1998 | 2 0.5441  | 3 0.3865  | 4 0.4630  | 5 -0.2291 | 6 -0.4078 | 7 -1.0425 | 8 -0.8224 | 9 0.8955  | 10 0.4125  |
| CONSTRUCT 27, ELEMENT | 1 -0.4646 | 2 0.9906  | 3 -0.6143 | 4 -0.7987 | 5 0.1447  | 6 0.4657  | 7 -0.8864 | 8 0.2764  | 9 0.5814  | 10 0.3052  |
| CONSTRUCT 28, ELEMENT | 1 0.9240  | 2 -0.9697 | 3 -0.3585 | 4 -0.1357 | 5 0.7637  | 6 0.1262  | 7 -0.0118 | 8 -0.3691 | 9 -0.1765 | 10 0.2075  |
| CCSTRUCT 29, ELEMENT  | 1 -0.4411 | 2 0.3670  | 3 0.3780  | 4 0.3558  | 5 -0.3679 | 6 -0.1453 | 7 -1.2382 | 8 -0.0270 | 9 0.6220  | 10 0.4968  |
| CONSTRUCT 30, ELEMENT | 1 0.4570  | 2 -0.5442 | 3 0.5493  | 4 0.3289  | 5 0.0718  | 6 -0.2855 | 7 -1.1613 | 8 -0.0506 | 9 0.2940  | 10 0.3406  |
| CONSTRUCT 31, ELEMENT | 1 -1.1735 | 2 0.7833  | 3 -0.8901 | 4 0.2176  | 5 -0.0570 | 6 0.3926  | 7 0.6738  | 8 0.3400  | 9 -0.0631 | 10 -0.2237 |
| CONSTRUCT 32, ELEMENT | 1 -0.7971 | 2 0.7357  | 3 0.3360  | 4 0.8672  | 5 -0.1647 | 6 -0.7592 | 7 -0.2293 | 8 -0.7578 | 9 0.5803  | 10 0.1889  |
| CCSTRUCT 33, ELEMENT  | 1 -0.2055 | 2 0.1320  | 3 0.6876  | 4 0.8790  | 5 -0.6058 | 6 -1.0186 | 7 0.4383  | 8 -0.5420 | 9 0.2466  | 10 -0.0116 |
| CONSTRUCT 34, ELEMENT | 1 0.0012  | 2 0.4713  | 3 0.5007  | 4 0.9169  | 5 0.0614  | 6 -0.5661 | 7 -0.9378 | 8 -1.0239 | 9 0.2151  | 10 0.3611  |
| CONSTRUCT 35, ELEMENT | 1 -1.0680 | 2 0.5940  | 3 0.2003  | 4 0.7204  | 5 -0.8682 | 6 -0.5839 | 7 -0.1892 | 8 0.1590  | 9 0.7020  | 10 0.3336  |
| CONSTRUCT 36, ELEMENT | 1 0.6273  | 2 -0.6695 | 3 0.4967  | 4 0.7166  | 5 -0.5533 | 6 -1.1109 | 7 0.1146  | 8 0.0647  | 9 0.1247  | 10 0.1891  |
| CCSTRUCT 37, ELEMENT  | 1 -0.8642 | 2 0.8324  | 3 0.3029  | 4 0.6511  | 5 -0.6249 | 6 -0.4025 | 7 -0.7906 | 8 -0.0287 | 9 0.7369  | 10 0.1877  |
| CCSTRUCT 38, ELEMENT  | 1 -0.2184 | 2 0.8513  | 3 0.0479  | 4 0.8906  | 5 0.3938  | 6 -0.4723 | 7 -0.6542 | 8 -1.1399 | 9 0.3531  | 10 -0.0520 |
| CONSTRUCT 39, ELEMENT | 1 0.0176  | 2 0.8341  | 3 -0.9122 | 4 -0.9694 | 5 0.3998  | 6 0.4578  | 7 -0.4615 | 8 0.1382  | 9 0.3754  | 10 0.1201  |
| CONSTRUCT 40, ELEMENT | 1 -0.1118 | 2 0.7523  | 3 0.0616  | 4 -0.0817 | 5 -0.7863 | 6 -0.3717 | 7 -1.1711 | 8 0.3246  | 9 0.8606  | 10 0.5234  |

RELATIONS BETWEEN CONSTRUCTS AND ELEMENTS  
EXPRESSED AS COSINES

|                           |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
|---------------------------|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|----|--------|
| CONSTRUCT 1 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.553 | 2 | 0.607  | 3 | 0.152  | 4 | 0.322  | 5 | -0.702 | 6 | -0.184 | 7 | -0.137 | 8 | -0.342 | 9 | 0.570  | 10 | 0.342  |
| CONSTRUCT 2 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.179  | 2 | 0.254  | 3 | 0.471  | 4 | 0.262  | 5 | -0.205 | 6 | -0.512 | 7 | -0.671 | 8 | -0.657 | 9 | 0.645  | 10 | 0.656  |
| CONSTRUCT 3 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.608  | 2 | 0.040  | 3 | 0.058  | 4 | -0.396 | 5 | -0.016 | 6 | -0.316 | 7 | -0.543 | 8 | -0.041 | 9 | 0.345  | 10 | 0.732  |
| CONSTRUCT 4 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.385 | 2 | 0.493  | 3 | 0.462  | 4 | 0.389  | 5 | -0.570 | 6 | -0.507 | 7 | -0.347 | 8 | -0.519 | 9 | 0.754  | 10 | 0.465  |
| CONSTRUCT 5 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.340  | 2 | 0.418  | 3 | -0.341 | 4 | -0.593 | 5 | 0.261  | 6 | 0.541  | 7 | -0.644 | 8 | -0.368 | 9 | 0.305  | 10 | 0.341  |
| CONSTRUCT 6 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.550 | 2 | 0.156  | 3 | 0.103  | 4 | 0.492  | 5 | 0.076  | 6 | -0.194 | 7 | 0.482  | 8 | 0.140  | 9 | -0.459 | 10 | -0.672 |
| CONSTRUCT 7 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.569  | 2 | -0.887 | 3 | 0.245  | 4 | -0.041 | 5 | 0.183  | 6 | -0.142 | 7 | 0.392  | 8 | -0.105 | 9 | -0.261 | 10 | 0.012  |
| CONSTRUCT 8 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.055  | 2 | -0.001 | 3 | 0.625  | 4 | 0.363  | 5 | -0.838 | 6 | -0.704 | 7 | -0.168 | 8 | -0.117 | 9 | 0.562  | 10 | 0.483  |
| CONSTRUCT 9 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.021  | 2 | 0.459  | 3 | -0.068 | 4 | -0.040 | 5 | -0.383 | 6 | -0.643 | 7 | -0.380 | 8 | 0.046  | 9 | 0.679  | 10 | 0.691  |
| CONSTRUCT 10 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.584  | 2 | -0.533 | 3 | 0.352  | 4 | 0.279  | 5 | 0.570  | 6 | -0.132 | 7 | 0.052  | 8 | -0.444 | 9 | -0.504 | 10 | -0.367 |
| CONSTRUCT 11 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.569 | 2 | 0.678  | 3 | -0.404 | 4 | -0.215 | 5 | -0.211 | 6 | 0.283  | 7 | -0.510 | 8 | 0.437  | 9 | 0.560  | 10 | 0.180  |
| CONSTRUCT 12 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.136 | 2 | 0.308  | 3 | 0.383  | 4 | 0.449  | 5 | -0.595 | 6 | -0.705 | 7 | -0.607 | 8 | 0.043  | 9 | 0.709  | 10 | 0.584  |
| CONSTRUCT 13 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.403  | 2 | -0.270 | 3 | 0.511  | 4 | -0.207 | 5 | -0.376 | 6 | -0.020 | 7 | -0.548 | 8 | 0.073  | 9 | 0.327  | 10 | 0.548  |
| CONSTRUCT 14 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.509 | 2 | 0.749  | 3 | -0.457 | 4 | -0.344 | 5 | -0.034 | 6 | 0.245  | 7 | -0.573 | 8 | 0.332  | 9 | 0.553  | 10 | 0.330  |
| CONSTRUCT 15 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.096  | 2 | 0.346  | 3 | 0.163  | 4 | -0.503 | 5 | -0.136 | 6 | 0.165  | 7 | -0.811 | 8 | -0.059 | 9 | 0.610  | 10 | 0.643  |

|                           |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
|---------------------------|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|----|--------|
| CONSTRUCT 15 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.096  | 2 | 0.346  | 3 | 0.163  | 4 | -0.503 | 5 | -0.136 | 6 | 0.165  | 7 | -0.811 | 8 | -0.059 | 9 | 0.610  | 10 | 0.643  |
| CONSTRUCT 16 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.259 | 2 | 0.703  | 3 | -0.509 | 4 | -0.522 | 5 | -0.167 | 6 | 0.429  | 7 | -0.601 | 8 | 0.375  | 9 | 0.475  | 10 | 0.376  |
| CONSTRUCT 17 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.459 | 2 | 0.314  | 3 | -0.173 | 4 | 0.621  | 5 | -0.034 | 6 | -0.439 | 7 | -0.339 | 8 | 0.086  | 9 | 0.363  | 10 | 0.246  |
| CONSTRUCT 18 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.150 | 2 | 0.018  | 3 | 0.497  | 4 | 0.457  | 5 | -0.815 | 6 | -0.795 | 7 | -0.113 | 8 | 0.190  | 9 | 0.494  | 10 | 0.476  |
| CONSTRUCT 19 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.267  | 2 | 0.451  | 3 | -0.706 | 4 | -0.691 | 5 | 0.114  | 6 | 0.487  | 7 | -0.502 | 8 | 0.185  | 9 | 0.298  | 10 | 0.348  |
| CONSTRUCT 20 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.365  | 2 | -0.120 | 3 | 0.543  | 4 | 0.438  | 5 | -0.054 | 6 | -0.690 | 7 | -0.557 | 8 | -0.306 | 9 | 0.326  | 10 | 0.422  |
| CONSTRUCT 21 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.347  | 2 | 0.407  | 3 | -0.386 | 4 | -0.637 | 5 | 0.275  | 6 | 0.578  | 7 | -0.538 | 8 | -0.396 | 9 | 0.257  | 10 | 0.293  |
| CONSTRUCT 22 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.236  | 2 | 0.532  | 3 | 0.177  | 4 | -0.425 | 5 | -0.279 | 6 | 0.085  | 7 | -0.747 | 8 | -0.304 | 9 | 0.599  | 10 | 0.515  |
| CONSTRUCT 23 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.124  | 2 | 0.544  | 3 | -0.470 | 4 | -0.572 | 5 | -0.263 | 6 | 0.137  | 7 | -0.607 | 8 | 0.221  | 9 | 0.640  | 10 | 0.671  |
| CONSTRUCT 24 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.201  | 2 | 0.514  | 3 | -0.523 | 4 | -0.429 | 5 | 0.420  | 6 | 0.576  | 7 | -0.435 | 8 | -0.376 | 9 | 0.106  | 10 | -0.023 |
| CONSTRUCT 25 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.595 | 2 | 0.007  | 3 | 0.317  | 4 | 0.393  | 5 | -0.707 | 6 | -0.157 | 7 | 0.493  | 8 | 0.313  | 9 | -0.024 | 10 | -0.294 |
| CONSTRUCT 26 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.174 | 2 | 0.445  | 3 | 0.346  | 4 | 0.293  | 5 | -0.355 | 6 | -0.346 | 7 | -0.671 | 8 | -0.578 | 9 | 0.833  | 10 | 0.599  |
| CONSTRUCT 27 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.299 | 2 | 0.722  | 3 | -0.517 | 4 | -0.552 | 5 | 0.071  | 6 | 0.345  | 7 | -0.603 | 8 | 0.205  | 9 | 0.549  | 10 | 0.398  |
| CONSTRUCT 28 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.643  | 2 | -0.613 | 3 | -0.296 | 4 | -0.129 | 5 | 0.598  | 6 | 0.085  | 7 | 0.068  | 8 | -0.186 | 9 | -0.237 | 10 | 0.121  |
| CONSTRUCT 29 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.355 | 2 | 0.327  | 3 | 0.330  | 4 | 0.269  | 5 | -0.346 | 6 | -0.139 | 7 | -0.803 | 8 | -0.016 | 9 | 0.648  | 10 | 0.552  |
| CONSTRUCT 30 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.232  | 2 | -0.282 | 3 | 0.431  | 4 | 0.268  | 5 | 0.031  | 6 | -0.212 | 7 | -0.681 | 8 | -0.011 | 9 | 0.270  | 10 | 0.379  |
| CONSTRUCT 31 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.731 | 2 | 0.452  | 3 | -0.648 | 4 | 0.086  | 5 | -0.017 | 6 | 0.241  | 7 | 0.341  | 8 | 0.303  | 9 | -0.036 | 10 | -0.247 |
| CONSTRUCT 32 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.521 | 2 | 0.487  | 3 | 0.304  | 4 | 0.580  | 5 | -0.332 | 6 | -0.596 | 7 | -0.197 | 8 | -0.501 | 9 | 0.585  | 10 | 0.316  |

CONSTRUCT 33 WITH ELEMENT

1 -0.149 2 0.075 3 0.578 4 0.626 5 -0.556 6 -0.765 7 0.246 8 -0.447 9 0.240 10 0.069

CONSTRUCT 34 WITH ELEMENT

1 -0.036 2 0.301 3 0.435 4 0.564 5 -0.143 6 -0.467 7 -0.561 8 -0.646 9 0.397 10 0.419

CONSTRUCT 35 WITH ELEMENT

1 -0.737 2 0.450 3 0.222 4 0.538 5 -0.699 6 -0.477 7 -0.215 8 0.060 9 0.667 10 0.394

CONSTRUCT 36 WITH ELEMENT

1 0.362 2 -0.399 3 0.408 4 0.557 5 -0.362 6 -0.825 7 0.092 8 -0.033 9 0.088 10 0.210

CONSTRUCT 37 WITH ELEMENT

1 -0.633 2 0.598 3 0.293 4 0.460 5 -0.566 6 -0.339 7 -0.562 8 -0.034 9 0.717 10 0.354

CONSTRUCT 38 WITH ELEMENT

1 -0.159 2 0.519 3 0.080 4 0.502 5 0.062 6 -0.402 7 -0.399 8 -0.680 9 0.410 10 0.164

CONSTRUCT 39 WITH ELEMENT

1 0.042 2 0.591 3 -0.765 4 -0.701 5 0.287 6 0.345 7 -0.308 8 0.113 9 0.316 10 0.230

CONSTRUCT 40 WITH ELEMENT

1 -0.155 2 0.619 3 0.061 4 -0.013 5 -0.589 6 -0.297 7 -0.778 8 0.134 9 0.838 10 0.673

INTER-ELEMENT RELATIONS  
EXPRESSED AS COSINES

ELEMENT 1 WITH ELEMENT

2 -0.475 3 0.048 4 -0.343 5 0.294 6 -0.005 7 -0.095 8 -0.222 9 -0.228 10 0.125

ELEMENT 2 WITH ELEMENT

3 -0.310 4 -0.125 5 -0.241 6 0.050 7 -0.433 8 -0.097 9 0.533 10 0.223

ELEMENT 3 WITH ELEMENT

4 0.444 5 -0.398 6 -0.481 7 -0.061 8 -0.286 9 0.065 10 0.064

ELEMENT 4 WITH ELEMENT

5 -0.235 6 -0.615 7 0.127 8 -0.226 9 0.005 10 -0.135

ELEMENT 5 WITH ELEMENT

6 0.373 7 0.079 8 -0.143 9 -0.522 10 -0.370

ELEMENT 6 WITH ELEMENT

7 0.018 8 0.128 9 -0.306 10 -0.317

ELEMENT 7 WITH ELEMENT

8 0.116 9 -0.659 10 -0.638

ELEMENT 8 WITH ELEMENT

9 -0.142 10 -0.111

ELEMENT 9 WITH ELEMENT

10 0.733



RELATIONS BETWEEN CONSTRUCTS AND ELEMENTS  
EXPRESSED IN DEGREES

|                           |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
|---------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|----|-------|
| CONSTRUCT 1 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 123.6 | 2 | 52.7  | 3 | 81.2  | 4 | 71.2  | 5 | 134.5 | 6 | 100.6 | 7 | 97.9  | 8 | 110.0 | 9 | 55.3  | 10 | 70.0  |
| CONSTRUCT 2 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 79.7  | 2 | 75.3  | 3 | 61.9  | 4 | 74.8  | 5 | 101.9 | 6 | 120.8 | 7 | 132.1 | 8 | 131.0 | 9 | 49.9  | 10 | 49.0  |
| CONSTRUCT 3 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 52.6  | 2 | 87.7  | 3 | 86.7  | 4 | 113.3 | 5 | 90.9  | 6 | 108.4 | 7 | 122.9 | 8 | 92.3  | 9 | 69.8  | 10 | 42.9  |
| CONSTRUCT 4 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 112.6 | 2 | 60.5  | 3 | 62.5  | 4 | 67.1  | 5 | 124.7 | 6 | 120.4 | 7 | 110.3 | 8 | 121.3 | 9 | 41.1  | 10 | 62.3  |
| CONSTRUCT 5 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 70.2  | 2 | 65.3  | 3 | 110.0 | 4 | 126.4 | 5 | 74.9  | 6 | 57.2  | 7 | 130.1 | 8 | 111.6 | 9 | 72.2  | 10 | 70.1  |
| CONSTRUCT 6 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 123.4 | 2 | 81.0  | 3 | 84.1  | 4 | 60.5  | 5 | 85.6  | 6 | 101.2 | 7 | 61.2  | 8 | 82.0  | 9 | 117.3 | 10 | 132.2 |
| CONSTRUCT 7 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 55.3  | 2 | 152.5 | 3 | 75.8  | 4 | 92.3  | 5 | 79.4  | 6 | 98.2  | 7 | 66.9  | 8 | 96.0  | 9 | 105.1 | 10 | 89.3  |
| CONSTRUCT 8 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 86.9  | 2 | 90.1  | 3 | 51.3  | 4 | 68.7  | 5 | 146.9 | 6 | 134.8 | 7 | 99.7  | 8 | 96.7  | 9 | 55.8  | 10 | 61.1  |
| CONSTRUCT 9 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 88.8  | 2 | 62.7  | 3 | 93.9  | 4 | 92.3  | 5 | 112.5 | 6 | 130.0 | 7 | 112.3 | 8 | 87.3  | 9 | 47.2  | 10 | 46.3  |
| CONSTRUCT 10 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 54.3  | 2 | 122.2 | 3 | 69.4  | 4 | 73.8  | 5 | 55.2  | 6 | 97.6  | 7 | 87.0  | 8 | 116.4 | 9 | 120.3 | 10 | 111.5 |
| CONSTRUCT 11 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 124.7 | 2 | 47.3  | 3 | 113.8 | 4 | 102.4 | 5 | 102.2 | 6 | 73.5  | 7 | 120.7 | 8 | 64.1  | 9 | 56.0  | 10 | 79.6  |
| CONSTRUCT 12 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 97.8  | 2 | 72.1  | 3 | 67.5  | 4 | 63.3  | 5 | 126.5 | 6 | 134.8 | 7 | 127.4 | 8 | 87.5  | 9 | 44.8  | 10 | 54.2  |
| CONSTRUCT 13 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 66.2  | 2 | 105.7 | 3 | 59.3  | 4 | 101.9 | 5 | 112.1 | 6 | 91.1  | 7 | 123.2 | 8 | 85.8  | 9 | 70.9  | 10 | 56.8  |
| CONSTRUCT 14 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 120.6 | 2 | 41.5  | 3 | 117.2 | 4 | 110.1 | 5 | 91.9  | 6 | 75.8  | 7 | 125.0 | 8 | 70.6  | 9 | 56.4  | 10 | 70.7  |
| CONSTRUCT 15 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 84.5  | 2 | 69.8  | 3 | 80.6  | 4 | 120.2 | 5 | 97.8  | 6 | 80.5  | 7 | 144.2 | 8 | 93.4  | 9 | 52.4  | 10 | 50.0  |

|                           |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
|---------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|----|-------|
| CONSTRUCT 16 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 105.0 | 2 | 45.3  | 3 | 120.6 | 4 | 121.4 | 5 | 99.6  | 6 | 64.6  | 7 | 126.9 | 8 | 68.0  | 9 | 61.6  | 10 | 67.9  |
| CONSTRUCT 17 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 117.3 | 2 | 71.7  | 3 | 100.0 | 4 | 51.6  | 5 | 92.0  | 6 | 116.1 | 7 | 109.8 | 8 | 85.1  | 9 | 68.7  | 10 | 75.7  |
| CONSTRUCT 18 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 98.6  | 2 | 88.9  | 3 | 60.2  | 4 | 62.8  | 5 | 144.5 | 6 | 142.6 | 7 | 96.5  | 8 | 79.1  | 9 | 60.4  | 10 | 61.6  |
| CONSTRUCT 19 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 74.5  | 2 | 63.2  | 3 | 134.9 | 4 | 133.7 | 5 | 83.5  | 6 | 60.9  | 7 | 120.1 | 8 | 79.3  | 9 | 72.7  | 10 | 69.6  |
| CONSTRUCT 20 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 68.6  | 2 | 96.9  | 3 | 57.1  | 4 | 64.0  | 5 | 93.1  | 6 | 133.6 | 7 | 123.8 | 8 | 107.8 | 9 | 71.0  | 10 | 65.1  |
| CONSTRUCT 21 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 69.7  | 2 | 66.0  | 3 | 112.7 | 4 | 129.5 | 5 | 74.0  | 6 | 54.7  | 7 | 122.5 | 8 | 113.3 | 9 | 75.1  | 10 | 72.9  |
| CONSTRUCT 22 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 76.4  | 2 | 57.9  | 3 | 79.8  | 4 | 115.1 | 5 | 106.2 | 6 | 85.1  | 7 | 138.3 | 8 | 107.7 | 9 | 53.2  | 10 | 59.0  |
| CONSTRUCT 23 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 82.8  | 2 | 57.0  | 3 | 118.1 | 4 | 124.9 | 5 | 105.2 | 6 | 82.2  | 7 | 127.3 | 8 | 77.2  | 9 | 50.2  | 10 | 47.8  |
| CONSTRUCT 24 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 78.4  | 2 | 59.0  | 3 | 121.6 | 4 | 115.4 | 5 | 65.2  | 6 | 54.8  | 7 | 115.8 | 8 | 112.1 | 9 | 83.9  | 10 | 91.3  |
| CONSTRUCT 25 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 126.5 | 2 | 89.6  | 3 | 71.5  | 4 | 66.8  | 5 | 135.0 | 6 | 99.0  | 7 | 60.4  | 8 | 71.7  | 9 | 91.4  | 10 | 107.1 |
| CONSTRUCT 26 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 100.0 | 2 | 63.6  | 3 | 69.7  | 4 | 72.9  | 5 | 110.8 | 6 | 110.2 | 7 | 132.1 | 8 | 125.3 | 9 | 33.6  | 10 | 53.2  |
| CONSTRUCT 27 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 107.4 | 2 | 43.8  | 3 | 121.1 | 4 | 123.5 | 5 | 86.0  | 6 | 69.8  | 7 | 127.1 | 8 | 78.2  | 9 | 56.7  | 10 | 66.5  |
| CONSTRUCT 28 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 50.0  | 2 | 127.8 | 3 | 107.2 | 4 | 97.4  | 5 | 53.3  | 6 | 85.1  | 7 | 86.1  | 8 | 100.7 | 9 | 103.7 | 10 | 83.1  |
| CONSTRUCT 29 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 110.8 | 2 | 70.9  | 3 | 70.7  | 4 | 74.4  | 5 | 110.3 | 6 | 98.0  | 7 | 143.4 | 8 | 90.9  | 9 | 49.6  | 10 | 56.5  |
| CONSTRUCT 30 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 76.6  | 2 | 106.4 | 3 | 64.4  | 4 | 74.4  | 5 | 88.2  | 6 | 102.3 | 7 | 132.9 | 8 | 90.6  | 9 | 74.4  | 10 | 67.7  |
| CONSTRUCT 31 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 137.0 | 2 | 63.1  | 3 | 130.4 | 4 | 85.1  | 5 | 91.0  | 6 | 76.1  | 7 | 70.1  | 8 | 72.4  | 9 | 92.1  | 10 | 104.3 |
| CONSTRUCT 32 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 121.4 | 2 | 60.8  | 3 | 72.3  | 4 | 54.6  | 5 | 109.4 | 6 | 126.6 | 7 | 101.4 | 8 | 120.1 | 9 | 54.2  | 10 | 71.6  |

# CONSTRUCT 33 WITH ELEMENT

|   |      |   |      |   |      |   |      |   |       |   |       |   |      |   |       |   |      |    |      |
|---|------|---|------|---|------|---|------|---|-------|---|-------|---|------|---|-------|---|------|----|------|
| 1 | 98.6 | 2 | 85.7 | 3 | 54.7 | 4 | 51.2 | 5 | 123.8 | 6 | 139.9 | 7 | 75.8 | 8 | 116.6 | 9 | 76.1 | 10 | 86.0 |
|---|------|---|------|---|------|---|------|---|-------|---|-------|---|------|---|-------|---|------|----|------|

# CONSTRUCT 34 WITH ELEMENT

|   |      |   |      |   |      |   |      |   |      |   |       |   |       |   |       |   |      |    |      |
|---|------|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 92.1 | 2 | 72.5 | 3 | 64.2 | 4 | 55.7 | 5 | 98.2 | 6 | 117.8 | 7 | 124.2 | 8 | 130.3 | 9 | 66.6 | 10 | 65.2 |
|---|------|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|----|------|

# CONSTRUCT 35 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |      |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|---|------|----|------|
| 1 | 137.5 | 2 | 63.2 | 3 | 77.2 | 4 | 57.5 | 5 | 134.4 | 6 | 118.5 | 7 | 102.4 | 8 | 86.5 | 9 | 48.2 | 10 | 66.8 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|---|------|----|------|

# CONSTRUCT 36 WITH ELEMENT

|   |      |   |       |   |      |   |      |   |       |   |       |   |      |   |      |   |      |    |      |
|---|------|---|-------|---|------|---|------|---|-------|---|-------|---|------|---|------|---|------|----|------|
| 1 | 68.8 | 2 | 113.5 | 3 | 65.9 | 4 | 56.2 | 5 | 111.2 | 6 | 145.5 | 7 | 84.7 | 8 | 91.9 | 9 | 85.0 | 10 | 77.9 |
|---|------|---|-------|---|------|---|------|---|-------|---|-------|---|------|---|------|---|------|----|------|

# CONSTRUCT 37 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |      |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|---|------|----|------|
| 1 | 129.3 | 2 | 53.3 | 3 | 73.0 | 4 | 62.6 | 5 | 124.4 | 6 | 109.8 | 7 | 124.2 | 8 | 91.9 | 9 | 44.2 | 10 | 69.3 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|---|------|----|------|

# CONSTRUCT 38 WITH ELEMENT

|   |      |   |      |   |      |   |      |   |      |   |       |   |       |   |       |   |      |    |      |
|---|------|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 99.2 | 2 | 58.8 | 3 | 85.4 | 4 | 59.8 | 5 | 86.5 | 6 | 113.7 | 7 | 113.5 | 8 | 132.8 | 9 | 65.8 | 10 | 80.5 |
|---|------|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|----|------|

# CONSTRUCT 39 WITH ELEMENT

|   |      |   |      |   |       |   |       |   |      |   |      |   |       |   |      |   |      |    |      |
|---|------|---|------|---|-------|---|-------|---|------|---|------|---|-------|---|------|---|------|----|------|
| 1 | 87.6 | 2 | 53.7 | 3 | 139.9 | 4 | 134.5 | 5 | 73.3 | 6 | 69.8 | 7 | 107.9 | 8 | 83.5 | 9 | 71.5 | 10 | 76.7 |
|---|------|---|------|---|-------|---|-------|---|------|---|------|---|-------|---|------|---|------|----|------|

# CONSTRUCT 40 WITH ELEMENT

|   |      |   |      |   |      |   |      |   |       |   |       |   |       |   |      |   |      |    |      |
|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|---|------|----|------|
| 1 | 98.9 | 2 | 51.8 | 3 | 86.5 | 4 | 90.7 | 5 | 126.1 | 6 | 107.3 | 7 | 141.1 | 8 | 82.3 | 9 | 33.1 | 10 | 47.7 |
|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|------|---|------|----|------|

## INTER-ELEMENT RELATIONS EXPRESSED IN DEGREES

|                        |       |   |      |   |       |   |      |   |      |   |      |   |       |   |       |    |      |
|------------------------|-------|---|------|---|-------|---|------|---|------|---|------|---|-------|---|-------|----|------|
| ELEMENT 1 WITH ELEMENT |       |   |      |   |       |   |      |   |      |   |      |   |       |   |       |    |      |
| 2                      | 118.4 | 3 | 87.2 | 4 | 110.1 | 5 | 72.9 | 6 | 90.3 | 7 | 95.4 | 8 | 102.9 | 9 | 103.2 | 10 | 82.8 |

|                        |       |   |      |   |       |   |      |   |       |   |      |   |      |    |      |
|------------------------|-------|---|------|---|-------|---|------|---|-------|---|------|---|------|----|------|
| ELEMENT 2 WITH ELEMENT |       |   |      |   |       |   |      |   |       |   |      |   |      |    |      |
| 3                      | 108.1 | 4 | 97.2 | 5 | 103.9 | 6 | 87.1 | 7 | 115.7 | 8 | 95.5 | 9 | 57.8 | 10 | 77.1 |

|                        |      |   |       |   |       |   |      |   |       |   |      |    |      |
|------------------------|------|---|-------|---|-------|---|------|---|-------|---|------|----|------|
| ELEMENT 3 WITH ELEMENT |      |   |       |   |       |   |      |   |       |   |      |    |      |
| 4                      | 63.7 | 5 | 113.5 | 6 | 118.8 | 7 | 93.5 | 8 | 106.6 | 9 | 86.3 | 10 | 86.3 |

|                        |       |   |       |   |      |   |       |   |      |    |      |
|------------------------|-------|---|-------|---|------|---|-------|---|------|----|------|
| ELEMENT 4 WITH ELEMENT |       |   |       |   |      |   |       |   |      |    |      |
| 5                      | 103.6 | 6 | 128.0 | 7 | 82.7 | 8 | 103.1 | 9 | 89.7 | 10 | 97.8 |

|                        |      |   |      |   |      |   |       |    |       |
|------------------------|------|---|------|---|------|---|-------|----|-------|
| ELEMENT 5 WITH ELEMENT |      |   |      |   |      |   |       |    |       |
| 6                      | 68.1 | 7 | 85.5 | 8 | 98.2 | 9 | 121.5 | 10 | 111.7 |

|                        |      |   |      |   |       |    |       |  |  |
|------------------------|------|---|------|---|-------|----|-------|--|--|
| ELEMENT 6 WITH ELEMENT |      |   |      |   |       |    |       |  |  |
| 7                      | 89.0 | 8 | 82.7 | 9 | 107.8 | 10 | 108.5 |  |  |

|                        |      |   |       |    |       |  |  |  |  |
|------------------------|------|---|-------|----|-------|--|--|--|--|
| ELEMENT 7 WITH ELEMENT |      |   |       |    |       |  |  |  |  |
| 8                      | 83.3 | 9 | 131.2 | 10 | 129.6 |  |  |  |  |

|                        |      |    |      |  |  |  |  |  |  |
|------------------------|------|----|------|--|--|--|--|--|--|
| ELEMENT 8 WITH ELEMENT |      |    |      |  |  |  |  |  |  |
| 9                      | 98.2 | 10 | 96.4 |  |  |  |  |  |  |

|                        |      |  |  |  |  |  |  |  |  |
|------------------------|------|--|--|--|--|--|--|--|--|
| ELEMENT 9 WITH ELEMENT |      |  |  |  |  |  |  |  |  |
| 10                     | 42.9 |  |  |  |  |  |  |  |  |



PROGRAM GRIDAV

PRODUCING A CONSENSUS GRID  
FOR INPUT TO INGRID72

PARAMETER SPECIFICATIONS  
-----

NUMBER OF GRIDS SPECIFIED = 9  
NUMBER OF CONSTRUCTS SPECIFIED = 40  
NUMBER OF ELEMENTS SPECIFIED = 10  
VALUE OF HIGHEST RATING = 7  
VALUE OF LOWEST RATING = 1  
PROGRAM TO DECIDE WHETHER NORMALIZATION NECESSARY  
NUMBER OF COMPONENTS TO BE EXTRACTED TO BE DETERMINED BY  
USER SPECIFICATION = 5 COMPONENTS

PROGRAM GRIDAV

PRODUCING A CONSENSUS GRID  
FOR INPUT TO INGRID72

PARAMETER SPECIFICATIONS  
-----

NUMBER OF GRIDS SPECIFIED = 9  
NUMBER OF CONSTRUCTS SPECIFIED = 40  
NUMBER OF ELEMENTS SPECIFIED = 10  
VALUE OF HIGHEST RATING = 7  
VALUE OF LOWEST RATING = 1  
PROGRAM TO DECIDE WHETHER NORMALIZATION NECESSARY  
NUMBER OF COMPONENTS TO BE EXTRACTED TO BE DETERMINED BY  
USER SPECIFICATION = 5 COMPONENTS

CONSENSUS GRID

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 1     |       |       |       |       |       |       |       |       |       |
|               | 4.111 | 5.778 | 4.889 | 5.222 | 3.667 | 4.667 | 4.333 | 5.222 | 6.111 | 5.556 |
| CONSTRUCT NO. | 2     |       |       |       |       |       |       |       |       |       |
|               | 4.444 | 5.667 | 5.222 | 5.333 | 4.222 | 4.333 | 3.778 | 4.222 | 5.778 | 6.222 |
| CONSTRUCT NO. | 3     |       |       |       |       |       |       |       |       |       |
|               | 5.333 | 5.778 | 5.889 | 5.222 | 5.333 | 5.222 | 4.444 | 5.000 | 5.889 | 6.222 |
| CONSTRUCT NO. | 4     |       |       |       |       |       |       |       |       |       |
|               | 4.444 | 4.889 | 5.444 | 5.222 | 4.000 | 3.667 | 3.556 | 3.111 | 6.000 | 5.333 |
| CONSTRUCT NO. | 5     |       |       |       |       |       |       |       |       |       |
|               | 5.667 | 3.111 | 3.889 | 3.333 | 4.667 | 4.111 | 3.222 | 2.111 | 3.889 | 4.667 |
| CONSTRUCT NO. | 6     |       |       |       |       |       |       |       |       |       |
|               | 4.111 | 5.778 | 5.333 | 5.556 | 4.667 | 4.556 | 4.333 | 4.889 | 5.556 | 5.333 |
| CONSTRUCT NO. | 7     |       |       |       |       |       |       |       |       |       |
|               | 5.444 | 3.889 | 4.778 | 4.667 | 4.333 | 4.667 | 4.778 | 5.778 | 6.000 | 5.667 |
| CONSTRUCT NO. | 8     |       |       |       |       |       |       |       |       |       |
|               | 5.111 | 5.000 | 5.222 | 4.556 | 3.556 | 4.111 | 4.556 | 4.556 | 6.111 | 5.889 |
| CONSTRUCT NO. | 9     |       |       |       |       |       |       |       |       |       |
|               | 5.111 | 5.889 | 5.556 | 5.333 | 4.889 | 4.778 | 4.444 | 5.444 | 6.111 | 6.000 |

CONSTRUCT NO. 10

5.444 2.009 4.111 4.667 3.667 3.009 4.444 3.222 4.111 3.009

CONSTRUCT NO. 11

2.000 5.009 3.333 4.333 4.556 5.000 2.333 3.009 4.444 4.000

CONSTRUCT NO. 12

4.111 6.333 6.111 6.000 3.667 4.222 3.444 4.444 7.000 5.009

CONSTRUCT NO. 13

5.444 2.333 6.333 4.667 4.556 5.222 2.556 3.444 5.009 6.222

CONSTRUCT NO. 14

4.222 6.333 4.770 4.333 4.222 4.770 3.333 3.444 6.333 8.667

CONSTRUCT NO. 15

4.222 6.222 5.009 4.222 4.667 4.009 3.000 3.009 6.009 6.667

CONSTRUCT NO. 16

5.111 5.444 4.770 4.000 4.556 4.770 3.111 4.222 5.770 5.222

CONSTRUCT NO. 17

5.444 6.333 5.667 6.000 5.111 5.000 4.111 5.009 6.333 6.444

CONSTRUCT NO. 18

4.009 5.556 6.333 6.111 4.770 4.770 4.111 5.333 6.770 6.444

CONSTRUCT NO. 19

5.556 6.667 4.556 4.333 4.111 4.667 3.667 5.222 6.000 6.000

CONSTRUCT NO. 20

5.222 5.556 6.000 5.667 4.222 3.667 4.111 4.667 6.444 6.222



|                  |       |       |       |       |       |       |       |       |       |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. 21 |       |       |       |       |       |       |       |       |       |
| 4.778            | 5.889 | 5.222 | 5.444 | 5.000 | 5.111 | 3.333 | 4.667 | 6.444 | 6.222 |
| CCNSTRCT NO. 22  |       |       |       |       |       |       |       |       |       |
| 5.556            | 5.667 | 5.667 | 4.667 | 4.667 | 5.444 | 3.000 | 3.333 | 6.333 | 6.222 |
| CCNSTRCT NO. 23  |       |       |       |       |       |       |       |       |       |
| 5.667            | 6.889 | 5.333 | 4.556 | 5.111 | 5.444 | 3.667 | 5.333 | 6.556 | 6.556 |
| CCNSTRUCT NO. 24 |       |       |       |       |       |       |       |       |       |
| 5.444            | 3.222 | 3.667 | 3.667 | 4.444 | 4.111 | 3.111 | 2.444 | 3.778 | 4.444 |
| CONSTRUCT NO. 25 |       |       |       |       |       |       |       |       |       |
| 3.111            | 5.556 | 5.667 | 5.222 | 2.889 | 5.444 | 5.222 | 5.000 | 5.444 | 3.778 |
| CONSTRUCT NO. 26 |       |       |       |       |       |       |       |       |       |
| 5.222            | 5.556 | 5.667 | 5.556 | 4.889 | 5.222 | 3.222 | 4.778 | 6.000 | 6.333 |
| CONSTRCT NO. 27  |       |       |       |       |       |       |       |       |       |
| 4.222            | 6.556 | 4.667 | 4.000 | 4.111 | 4.556 | 2.556 | 3.778 | 6.333 | 5.778 |
| CONSTRUCT NO. 28 |       |       |       |       |       |       |       |       |       |
| 5.667            | 1.667 | 3.667 | 3.889 | 5.778 | 2.444 | 4.111 | 3.222 | 3.333 | 5.667 |
| CONSTRCT NO. 29  |       |       |       |       |       |       |       |       |       |
| 4.778            | 5.667 | 5.222 | 5.111 | 4.556 | 5.333 | 2.778 | 4.556 | 5.889 | 6.333 |
| CCNSTRCT NO. 30  |       |       |       |       |       |       |       |       |       |
| 4.667            | 5.444 | 5.778 | 5.667 | 4.778 | 5.333 | 3.000 | 5.000 | 6.556 | 6.222 |
| CCNSTRUCT NO. 31 |       |       |       |       |       |       |       |       |       |
| 3.111            | 6.667 | 3.556 | 3.556 | 3.556 | 5.222 | 4.333 | 5.111 | 4.667 | 4.222 |
| CCNSTRUCT NO. 32 |       |       |       |       |       |       |       |       |       |
| 2.556            | 6.111 | 5.111 | 6.000 | 3.667 | 4.111 | 2.556 | 4.000 | 6.778 | 5.556 |

CONSTRUCT NO. 33

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.444 | 6.000 | 6.222 | 5.889 | 4.222 | 4.889 | 5.444 | 4.667 | 6.000 | 5.111 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 34

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.000 | 5.556 | 5.667 | 6.000 | 4.778 | 4.889 | 4.111 | 5.111 | 6.222 | 6.222 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 35

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.000 | 6.444 | 5.333 | 5.667 | 3.667 | 4.778 | 3.444 | 4.556 | 6.778 | 5.556 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 36

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.667 | 5.778 | 5.556 | 6.222 | 4.556 | 5.000 | 5.000 | 5.333 | 6.556 | 6.222 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 37

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.000 | 6.111 | 5.778 | 6.333 | 4.667 | 5.000 | 3.778 | 4.889 | 6.778 | 6.333 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 38

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.889 | 6.667 | 5.000 | 5.556 | 4.333 | 4.889 | 3.778 | 4.556 | 6.667 | 6.333 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 39

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.444 | 6.889 | 4.556 | 4.889 | 4.444 | 4.778 | 3.333 | 5.111 | 6.556 | 5.889 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 40

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.333 | 5.000 | 5.111 | 4.556 | 4.556 | 4.667 | 3.222 | 4.667 | 6.444 | 6.444 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

# MATRIX OF CELL STANDARD DEVIATIONS

CONSTRUCT NO. 1

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.691 | 2.108 | 1.691 | 1.787 | 1.581 | 0.866 | 1.323 | 1.202 | 1.616 | 1.590 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 2     |       |       |       |       |       |       |       |       |       |
|               | 2.068 | 1.225 | 1.563 | 1.118 | 1.394 | 0.866 | 1.716 | 1.787 | 1.787 | 1.641 |
| CONSTRUCT NO. | 3     |       |       |       |       |       |       |       |       |       |
|               | 2.000 | 1.563 | 1.900 | 1.787 | 1.414 | 1.202 | 1.667 | 2.062 | 1.965 | 1.986 |
| CONSTRUCT NO. | 4     |       |       |       |       |       |       |       |       |       |
|               | 2.007 | 2.147 | 1.810 | 1.641 | 1.000 | 1.000 | 1.740 | 1.764 | 2.000 | 1.936 |
| CONSTRUCT NO. | 5     |       |       |       |       |       |       |       |       |       |
|               | 2.062 | 2.205 | 1.453 | 1.803 | 1.414 | 2.088 | 2.048 | 1.054 | 1.764 | 1.871 |
| CONSTRUCT NO. | 6     |       |       |       |       |       |       |       |       |       |
|               | 1.691 | 1.056 | 1.732 | 1.878 | 1.500 | 1.130 | 1.803 | 1.364 | 2.351 | 2.291 |
| CONSTRUCT NO. | 7     |       |       |       |       |       |       |       |       |       |
|               | 2.128 | 1.833 | 1.856 | 1.581 | 1.871 | 0.707 | 2.048 | 0.972 | 1.581 | 1.323 |
| CONSTRUCT NO. | 8     |       |       |       |       |       |       |       |       |       |
|               | 1.900 | 1.323 | 1.481 | 2.186 | 1.236 | 1.054 | 1.424 | 1.509 | 1.965 | 1.900 |
| CONSTRUCT NO. | 9     |       |       |       |       |       |       |       |       |       |
|               | 1.616 | 1.616 | 1.236 | 1.871 | 1.537 | 1.481 | 1.878 | 1.590 | 1.965 | 1.732 |
| CONSTRUCT NO. | 10    |       |       |       |       |       |       |       |       |       |
|               | 1.130 | 1.054 | 1.537 | 1.118 | 1.658 | 1.054 | 1.130 | 1.056 | 2.421 | 2.205 |
| CONSTRUCT NO. | 11    |       |       |       |       |       |       |       |       |       |
|               | 1.500 | 0.928 | 1.414 | 1.581 | 2.128 | 1.225 | 1.658 | 2.147 | 1.740 | 1.000 |
| CONSTRUCT NO. | 12    |       |       |       |       |       |       |       |       |       |
|               | 1.691 | 0.500 | 0.928 | 1.118 | 1.500 | 1.481 | 1.424 | 1.590 | 0.0   | 0.762 |

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 13    |       |       |       |       |       |       |       |       |       |
|               | 1.130 | 1.118 | 0.500 | 1.414 | 1.944 | 1.202 | 1.333 | 2.106 | 0.782 | 0.667 |
| CONSTRUCT NO. | 14    |       |       |       |       |       |       |       |       |       |
|               | 1.394 | 0.707 | 0.972 | 1.225 | 1.563 | 1.202 | 1.323 | 1.740 | 0.500 | 0.707 |
| CONSTRUCT NO. | 15    |       |       |       |       |       |       |       |       |       |
|               | 1.563 | 0.833 | 0.928 | 1.563 | 1.323 | 1.269 | 1.500 | 1.453 | 0.333 | 0.500 |
| CONSTRUCT NO. | 16    |       |       |       |       |       |       |       |       |       |
|               | 1.269 | 1.810 | 1.394 | 1.732 | 1.590 | 1.093 | 1.833 | 2.040 | 0.833 | 0.833 |
| CONSTRUCT NO. | 17    |       |       |       |       |       |       |       |       |       |
|               | 1.130 | 0.500 | 0.500 | 0.866 | 1.269 | 1.118 | 1.537 | 0.928 | 0.500 | 0.527 |
| CONSTRUCT NO. | 18    |       |       |       |       |       |       |       |       |       |
|               | 1.616 | 1.236 | 0.707 | 0.928 | 1.093 | 0.972 | 1.537 | 1.414 | 0.441 | 0.527 |
| CONSTRUCT NO. | 19    |       |       |       |       |       |       |       |       |       |
|               | 1.333 | 0.500 | 1.424 | 1.414 | 0.782 | 1.323 | 1.658 | 1.563 | 0.866 | 0.707 |
| CONSTRUCT NO. | 20    |       |       |       |       |       |       |       |       |       |
|               | 1.563 | 0.882 | 0.707 | 0.866 | 1.093 | 0.707 | 1.616 | 1.581 | 0.527 | 0.441 |
| CONSTRUCT NO. | 21    |       |       |       |       |       |       |       |       |       |
|               | 1.202 | 0.333 | 1.481 | 1.878 | 0.866 | 0.782 | 1.658 | 1.871 | 1.014 | 0.972 |
| CONSTRUCT NO. | 22    |       |       |       |       |       |       |       |       |       |
|               | 1.236 | 1.803 | 0.500 | 1.500 | 1.118 | 1.333 | 1.658 | 1.658 | 0.707 | 0.833 |
| CONSTRUCT NO. | 23    |       |       |       |       |       |       |       |       |       |
|               | 0.866 | 0.333 | 1.658 | 2.068 | 1.651 | 1.333 | 1.936 | 1.414 | 0.726 | 0.726 |
| CONSTRUCT NO. | 24    |       |       |       |       |       |       |       |       |       |
|               | 2.007 | 2.270 | 1.500 | 1.076 | 1.323 | 1.000 | 1.833 | 1.563 | 1.316 | 1.044 |

CONSTRUCT NO. 25

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.269 | 1.014 | 0.866 | 1.302 | 1.054 | 0.527 | 1.716 | 0.866 | 1.333 | 1.394 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 26

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.093 | 1.236 | 1.225 | 1.333 | 1.364 | 0.972 | 1.394 | 1.856 | 2.000 | 0.500 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 27

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.394 | 0.726 | 1.500 | 1.581 | 1.054 | 0.882 | 1.130 | 1.302 | 0.500 | 0.833 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 28

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.118 | 0.707 | 1.225 | 0.928 | 1.202 | 1.014 | 0.782 | 1.202 | 1.000 | 1.414 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 29

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.716 | 1.225 | 1.093 | 1.453 | 0.726 | 1.000 | 1.394 | 1.424 | 1.565 | 0.707 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 30

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.323 | 1.130 | 1.202 | 1.225 | 0.833 | 1.118 | 1.223 | 1.225 | 0.527 | 0.441 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 31

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.167 | 0.707 | 1.236 | 1.878 | 1.740 | 1.093 | 1.803 | 1.965 | 1.414 | 1.302 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 32

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.333 | 0.928 | 1.900 | 0.833 | 1.500 | 0.928 | 1.509 | 1.269 | 0.441 | 0.726 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 33

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.424 | 1.000 | 1.093 | 1.167 | 1.093 | 1.537 | 1.740 | 1.658 | 1.225 | 1.269 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 34

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.323 | 0.527 | 0.866 | 1.000 | 0.972 | 0.782 | 1.764 | 1.453 | 0.667 | 0.667 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 35

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.581 | 0.527 | 1.500 | 1.581 | 1.732 | 1.093 | 1.130 | 1.130 | 0.441 | 1.505 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 36

1.500 0.833 0.726 1.093 0.726 0.500 1.803 1.414 0.527 0.667

CONSTRUCT NO. 37

1.732 0.782 1.394 0.866 1.118 1.000 1.394 1.167 0.441 0.866

CONSTRUCT NO. 38

1.537 0.500 1.509 1.810 1.323 1.167 1.716 1.667 0.500 0.767

CONSTRUCT NO. 39

1.014 0.333 1.878 1.691 1.424 0.972 1.225 1.054 0.527 0.782

CONSTRUCT NO. 40

1.323 1.803 1.364 1.590 1.667 1.000 1.481 1.500 0.726 0.527

MATRIX OF MEASURES OF SKEWNESS FOR INDIVIDUAL CELLS

CONSTRUCT NO. 1

-0.428 -1.236 -0.261 -0.645 0.825 -0.456 0.032 -0.371 -1.737 -1.062

CONSTRUCT NO. 2

-0.382 -0.887 -0.673 0.371 -0.101 0.456 0.172 0.056 -0.990 -1.821

CONSTRUCT NO. 3

-0.991 -1.421 -1.803 -1.229 -0.280 -0.371 0.086 -0.609 -1.621 -1.973

CONSTRUCT NO. 4

-0.217 -0.681 -1.493 -0.464 -0.667 -0.074 -0.019 0.216 -1.667 -1.061

CONSTRUCT NO. 5

-1.201 0.560 -0.049 0.354 -0.655 0.090 0.278 0.382 0.026 -0.588

|               |        |        |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| CONSTRUCT NO. | 6      |        |        |        |        |        |        |        |        |        |
|               | -0.290 | -1.759 | -0.841 | -1.435 | 0.505  | -0.122 | 0.013  | -0.089 | -1.062 | -0.918 |
| CONSTRUCT NO. | 7      |        |        |        |        |        |        |        |        |        |
|               | -0.728 | -0.289 | -0.757 | -0.187 | -0.023 | 0.419  | -0.278 | 0.380  | -1.687 | -0.896 |
| CONSTRUCT NO. | 8      |        |        |        |        |        |        |        |        |        |
|               | -0.917 | -1.152 | -0.950 | -0.705 | 0.064  | 0.382  | -0.446 | -0.094 | -1.894 | -1.803 |
| CONSTRUCT NO. | 9      |        |        |        |        |        |        |        |        |        |
|               | -0.157 | -1.423 | 0.064  | -1.143 | -0.205 | -0.075 | 0.026  | -0.491 | -1.894 | -1.283 |
| CONSTRUCT NO. | 10     |        |        |        |        |        |        |        |        |        |
|               | 0.122  | 0.757  | -0.163 | -0.371 | 0.325  | 0.757  | 0.122  | 0.131  | 0.026  | 0.435  |
| CONSTRUCT NO. | 11     |        |        |        |        |        |        |        |        |        |
|               | 0.988  | -0.652 | 0.655  | -0.487 | -0.241 | -1.452 | 0.591  | -0.277 | -0.613 | 0.667  |
| CONSTRUCT NO. | 12     |        |        |        |        |        |        |        |        |        |
|               | -0.428 | 0.593  | -0.182 | -0.477 | 0.505  | -0.540 | -0.247 | -0.159 | *****  | 0.149  |
| CONSTRUCT NO. | 13     |        |        |        |        |        |        |        |        |        |
|               | 0.122  | 0.371  | 0.593  | -0.655 | -0.074 | -0.371 | 0.457  | -0.061 | 0.149  | -0.176 |
| CONSTRUCT NO. | 14     |        |        |        |        |        |        |        |        |        |
|               | -0.593 | -0.419 | -0.347 | -0.564 | 0.025  | -1.165 | 0.608  | 0.272  | 0.593  | 0.419  |
| CONSTRUCT NO. | 15     |        |        |        |        |        |        |        |        |        |
|               | -0.324 | -0.346 | -0.652 | -0.324 | -0.608 | -0.472 | 0.0    | -0.049 | -2.075 | -0.593 |
| CONSTRUCT NO. | 16     |        |        |        |        |        |        |        |        |        |
|               | -0.180 | -0.819 | -0.636 | -0.128 | -0.339 | 0.891  | 0.938  | -0.187 | -0.806 | 0.806  |
| CONSTRUCT NO. | 17     |        |        |        |        |        |        |        |        |        |
|               | 0.122  | 0.593  | -0.593 | 0.000  | -0.832 | 0.000  | -0.163 | -0.652 | 0.593  | 0.188  |

CONSTRUCT NO. 18

-0.475 -0.642 -0.419 -0.182 -0.130 -0.347 0.389 -0.288 -1.120 0.188

CONSTRUCT NO. 19

-0.105 -0.593 -0.446 -0.288 -0.149 0.256 0.179 -0.324 0.000 0.000

CONSTRUCT NO. 20

-0.324 -0.148 0.000 0.570 0.130 0.419 0.475 -0.187 0.188 1.120

CONSTRUCT NO. 21

0.371 -2.074 -0.950 -1.281 0.000 -0.149 0.552 -0.588 -1.467 -1.106

CONSTRUCT NO. 22

-0.642 -0.582 -0.593 -0.285 -0.371 -0.457 0.146 0.260 -0.419 -0.346

CONSTRUCT NO. 23

0.570 -2.075 -1.056 -0.070 -0.015 -0.457 0.326 -0.288 -1.038 -1.038

CONSTRUCT NO. 24

-1.041 0.434 0.110 0.143 -0.457 -0.140 0.614 0.250 0.172 -0.289

CONSTRUCT NO. 25

-0.180 0.187 -0.456 -0.359 0.187 0.187 -0.172 0.200 0.105 -0.351

CONSTRUCT NO. 26

0.130 -0.642 -0.887 -0.668 -0.876 0.347 0.391 -0.131 -1.667 0.593

CONSTRUCT NO. 27

-0.593 -1.038 -0.285 0.0 0.382 -0.148 0.802 0.352 0.593 0.346

CONSTRUCT NO. 28

0.106 0.419 0.564 1.016 -0.397 0.453 -0.149 1.165 -0.593 -0.685



CONSTRUCT NO. 29

-0.092 -0.867 0.130 -0.820 -1.038 0.074 1.085 -0.446 -1.621 -0.419

CONSTRUCT NO. 30

-0.032 -0.802 -0.397 -0.161 0.346 -0.106 0.864 0.900 -0.188 1.120

CONSTRUCT NO. 31

-0.605 -1.467 0.064 0.074 -0.019 -0.891 0.013 -0.664 -0.655 -0.355

CONSTRUCT NO. 32

-0.387 -1.016 -0.723 -0.346 -0.483 0.652 0.294 0.180 -1.120 0.701

CONSTRUCT NO. 33

0.215 -0.667 -0.891 -0.235 -0.891 -0.205 -0.360 0.325 -0.726 0.472

CONSTRUCT NO. 34

0.0 -0.187 -0.456 -0.667 -0.347 0.149 0.459 0.949 -0.176 -0.176

CONSTRUCT NO. 35

-0.337 0.188 -0.900 -0.862 0.071 0.380 1.045 -0.122 -1.120 -1.258

CONSTRUCT NO. 36

-0.483 -0.806 -1.039 -0.891 -1.038 0.000 -0.114 -0.298 -0.188 -0.176

CONSTRUCT NO. 37

0.128 -0.149 -0.882 -0.570 -0.371 0.667 0.101 0.185 -1.120 -0.570

CONSTRUCT NO. 38

0.163 -0.593 -0.593 -0.754 -0.256 0.185 0.699 -0.936 -0.593 -0.419

CONSTRUCT NO. 39

-0.187 -2.075 -0.831 -0.123 0.446 -0.347 0.161 0.382 -0.188 0.149

CONSTRUCT NO. 40

-0.256 -0.228 -0.962 -0.670 -0.950 1.259 0.280 0.110 -0.701 0.166

MATRIX OF MEASURES OF KURTOSIS FOR INDIVIDUAL CELLS

CONSTRUCT NO. 1

1.705 3.065 1.687 1.697 2.536 2.239 1.040 2.008 4.706 3.013

CONSTRUCT NO. 2

1.464 2.831 2.431 1.564 1.457 2.239 1.076 1.349 2.452 4.898

CONSTRUCT NO. 3

2.657 3.919 4.920 3.686 1.444 2.008 1.425 1.981 4.319 5.330

CONSTRUCT NO. 4

1.147 1.794 4.161 2.143 2.222 1.630 1.252 1.451 4.389 2.957

CONSTRUCT NO. 5

3.063 1.693 1.275 1.480 1.889 1.502 1.168 1.670 2.063 2.068

CONSTRUCT NO. 6

1.180 4.943 2.091 3.965 1.653 1.410 1.353 1.572 2.227 2.045

CONSTRUCT NO. 7

1.685 1.356 2.296 1.683 1.197 1.778 1.168 1.062 4.622 2.346

CONSTRUCT NO. 8

2.693 3.120 2.803 1.794 1.195 1.670 1.671 1.903 5.114 4.920

CONSTRUCT NO. 9

1.143 3.837 1.195 3.410 1.248 1.357 1.441 1.552 5.114 3.259

CONSTRUCT NO. 10

1.410 2.150 1.354 1.564 1.264 2.150 1.410 1.247 1.029 1.217

CONSTRUCT NO. 11

2.239 2.458 1.889 1.399 1.396 4.148 2.850 1.125 2.044 2.222

CONSTRUCT NO. 12

1.705 1.184 1.059 1.564 1.653 1.450 1.563 1.181 \*\*\*\*\* 1.464

CONSTRUCT NO. 13

1.410 1.564 1.184 1.889 1.301 2.008 1.833 1.716 1.464 1.880

CONSTRUCT NO. 14

1.770 1.778 1.893 2.041 1.142 3.428 2.201 1.575 1.184 1.778

CONSTRUCT NO. 15

1.340 1.367 2.458 1.340 2.201 1.378 1.449 1.275 5.637 1.183

CONSTRUCT NO. 16

1.606 2.010 2.044 1.037 1.250 2.216 2.615 1.370 2.903 2.903

CONSTRUCT NO. 17

1.410 1.184 1.186 1.185 1.834 2.418 1.354 2.458 1.184 0.830

CONSTRUCT NO. 18

1.751 2.464 1.778 1.059 1.385 1.893 1.913 1.444 2.197 0.830

CONSTRUCT NO. 19

1.083 1.183 1.671 1.444 1.464 1.766 1.675 1.340 1.185 1.778

CONSTRUCT NO. 20

1.340 1.956 1.778 1.449 1.385 1.778 1.751 1.683 0.830 2.202

CONSTRUCT NO. 21

2.000 5.620 2.003 3.643 1.105 1.464 1.969 2.060 3.024 3.221

CONSTRUCT NO. 22

2.464 1.311 1.196 2.009 1.564 1.033 1.205 1.499 1.770 1.307

CONSTRUCT NO. 23

1.449 5.637 , 2.300 1.076 1.107 1.033 1.733 1.444 2.505 2.505

CONSTRUCT NO. 24

2.064 1.436 1.302 1.227 1.033 1.692 1.632 2.977 2.306 1.633

CONSTRUCT NO. 25

1.606 1.500 2.239 1.560 2.990 0.030 1.076 1.105 1.003 2.554

CONSTRUCT NO. 26

1.305 2.464 2.031 2.020 2.470 1.093 2.554 1.247 4.309 1.104

CONSTRUCT NO. 27

1.770 2.505 2.005 2.916 1.670 1.956 2.062 1.960 1.104 1.367

CONSTRUCT NO. 28

1.200 1.770 2.041 3.257 1.440 1.720 1.464 3.420 1.105 1.089

CONSTRUCT NO. 29

1.554 2.031 1.305 2.730 2.505 1.630 3.494 1.671 4.319 1.770

CONSTRUCT NO. 30

1.040 2.062 1.440 1.251 1.367 1.200 3.556 1.770 0.020 2.262

CONSTRUCT NO. 31

1.961 3.559 1.195 1.215 1.252 2.216 1.353 1.616 1.009 1.560

CONSTRUCT NO. 32

1.973 3.257 1.029 1.367 1.566 2.458 1.332 1.606 2.197 1.973

CONSTRUCT NO. 33

2.283 2.222 2.216 1.241 2.216 2.205 1.204 1.264 1.778 1.378

CONSTRUCT NO. 34

1.379 0.830 2.239 2.222 1.893 1.464 1.390 1.275 1.880 1.860

CONSTRUCT NO. 35

2.062 0.830 3.058 1.967 1.498 2.735 3.225 1.410 2.197 3.617

CONSTRUCT NO. 36

1.566 2.903 2.505 2.216 2.505 3.556 1.410 1.444 0.828 1.660

CONSTRUCT NO. 37

1.630 1.465 2.240 1.448 1.564 2.222 1.457 2.121 2.197 1.448

CONSTRUCT NO. 38

1.354 1.183 2.239 1.955 1.766 2.121 1.964 1.425 1.183 1.778

CONSTRUCT NO. 39

1.580 5.637 1.965 1.560 1.671 1.893 1.251 1.670 0.828 1.464

CONSTRUCT NO. 40

1.766 1.536 3.454 1.714 2.577 3.407 2.065 1.302 1.973 0.630

\*\*\*WARNING - ASYMMETRICAL MATRIX\*\*\*

SEE LEDERMAN, W. ON THE RANK OF THE REDUCED CORRELATION MATRIX IN MULTIPLE FACTOR ANALYSIS.  
PSYCHOMETRIKA, 1937, 2, 85-93

OF THE 400 CELLS IN THE GRID 167 HAVE SKEWNESSES GREATER THAN +0.50 OR LESS THAN -0.50.  
AND 24 HAVE MEASURES OF KURTOSIS GREATER THAN 3.75 AND LESS THAN -2.25

NORMALIZATION OF CONSENSUS GRID BY INGRID NOT NECESSARY

NORMAL TERMINATION OF JOB

\*\*\*\*\*

HIGHEST GRADE ON CONSTRUCT SCALE 7.  
 LOWEST .. .. .. 1.

THE GRID

|                       |        |        |        |        |        |        |        |        |        |         |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| CONSTRUCT 1, ELEMENT  | 1 4.11 | 2 5.78 | 3 4.89 | 4 5.22 | 5 3.67 | 6 4.67 | 7 4.33 | 8 5.22 | 9 6.11 | 10 5.56 |
| CONSTRUCT 2, ELEMENT  | 1 4.44 | 2 5.67 | 3 5.22 | 4 5.33 | 5 4.22 | 6 4.33 | 7 3.79 | 8 4.22 | 9 5.78 | 10 6.22 |
| CONSTRUCT 3, ELEMENT  | 1 5.33 | 2 5.78 | 3 5.89 | 4 5.22 | 5 5.33 | 6 5.22 | 7 4.44 | 8 5.00 | 9 5.89 | 10 6.22 |
| CONSTRUCT 4, ELEMENT  | 1 4.44 | 2 4.89 | 3 5.44 | 4 5.22 | 5 4.00 | 6 3.67 | 7 3.56 | 8 3.11 | 9 6.00 | 10 5.33 |
| CONSTRUCT 5, ELEMENT  | 1 5.67 | 2 3.11 | 3 3.89 | 4 3.33 | 5 4.67 | 6 4.11 | 7 3.22 | 8 2.11 | 9 3.89 | 10 4.67 |
| CONSTRUCT 6, ELEMENT  | 1 4.11 | 2 5.78 | 3 5.33 | 4 5.56 | 5 4.67 | 6 4.56 | 7 4.33 | 8 4.89 | 9 5.56 | 10 5.33 |
| CONSTRUCT 7, ELEMENT  | 1 5.44 | 2 3.89 | 3 4.78 | 4 4.67 | 5 4.33 | 6 4.67 | 7 4.78 | 8 5.78 | 9 6.00 | 10 5.67 |
| CONSTRUCT 8, ELEMENT  | 1 5.11 | 2 5.00 | 3 5.22 | 4 4.56 | 5 3.56 | 6 4.11 | 7 4.56 | 8 4.56 | 9 6.11 | 10 5.89 |
| CONSTRUCT 9, ELEMENT  | 1 5.11 | 2 5.89 | 3 5.56 | 4 5.33 | 5 4.89 | 6 4.78 | 7 4.44 | 8 5.44 | 9 6.11 | 10 6.00 |
| CONSTRUCT 10, ELEMENT | 1 5.44 | 2 2.89 | 3 4.11 | 4 4.67 | 5 3.67 | 6 3.89 | 7 4.44 | 8 3.22 | 9 4.11 | 10 3.89 |
| CONSTRUCT 11, ELEMENT | 1 2.00 | 2 5.89 | 3 3.33 | 4 4.33 | 5 4.56 | 6 5.00 | 7 2.33 | 8 3.89 | 9 4.44 | 10 4.00 |
| CONSTRUCT 12, ELEMENT | 1 4.11 | 2 6.33 | 3 6.11 | 4 6.00 | 5 3.67 | 6 4.22 | 7 3.44 | 8 4.44 | 9 7.00 | 10 5.89 |
| CONSTRUCT 13, ELEMENT | 1 5.44 | 2 2.33 | 3 6.33 | 4 4.67 | 5 4.56 | 6 5.22 | 7 2.56 | 8 3.44 | 9 5.89 | 10 6.22 |
| CONSTRUCT 14, ELEMENT | 1 4.22 | 2 6.33 | 3 4.78 | 4 4.33 | 5 4.22 | 6 4.78 | 7 3.33 | 8 3.44 | 9 6.33 | 10 5.67 |
| CONSTRUCT 15, ELEMENT | 1 4.22 | 2 6.22 | 3 5.89 | 4 4.22 | 5 4.67 | 6 4.89 | 7 3.00 | 8 3.89 | 9 6.89 | 10 6.67 |
| CONSTRUCT 16, ELEMENT | 1 5.11 | 2 5.44 | 3 4.78 | 4 4.00 | 5 4.56 | 6 4.78 | 7 3.11 | 8 4.22 | 9 5.78 | 10 5.22 |
| CONSTRUCT 17, ELEMENT | 1 5.44 | 2 6.33 | 3 5.67 | 4 6.00 | 5 5.11 | 6 5.00 | 7 4.11 | 8 5.89 | 9 6.33 | 10 6.44 |
| CONSTRUCT 18, ELEMENT | 1 4.89 | 2 5.56 | 3 6.33 | 4 6.11 | 5 4.78 | 6 4.78 | 7 4.11 | 8 5.33 | 9 6.78 | 10 6.44 |

|                       |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--|--|--|--|--|--|--|--|
| CONSTRUCT 19, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.56                | 2 6.67 | 3 4.56 | 4 4.33 | 5 4.11 | 6 4.67 | 7 3.67 | 8 5.22 | 9 6.00 | 10 6.00 |  |  |  |  |  |  |  |  |
| CONSTRUCT 20, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.22                | 2 5.56 | 3 6.00 | 4 5.67 | 5 4.22 | 6 3.67 | 7 4.11 | 8 4.67 | 9 6.44 | 10 6.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 21, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.78                | 2 5.89 | 3 5.22 | 4 5.44 | 5 5.00 | 6 5.11 | 7 3.33 | 8 4.67 | 9 6.44 | 10 6.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 22, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.56                | 2 5.67 | 3 5.67 | 4 4.67 | 5 4.67 | 6 5.44 | 7 3.00 | 8 3.33 | 9 6.33 | 10 6.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 23, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.67                | 2 6.89 | 3 5.33 | 4 4.56 | 5 5.11 | 6 5.44 | 7 3.67 | 8 5.33 | 9 6.56 | 10 6.56 |  |  |  |  |  |  |  |  |
| CONSTRUCT 24, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.44                | 2 3.22 | 3 3.67 | 4 3.67 | 5 4.44 | 6 4.11 | 7 3.11 | 8 2.44 | 9 3.78 | 10 4.44 |  |  |  |  |  |  |  |  |
| CONSTRUCT 25, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 3.11                | 2 5.56 | 3 5.67 | 4 5.22 | 5 2.89 | 6 5.44 | 7 5.22 | 8 5.00 | 9 5.44 | 10 3.78 |  |  |  |  |  |  |  |  |
| CONSTRUCT 26, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.22                | 2 5.56 | 3 5.67 | 4 5.56 | 5 4.89 | 6 5.22 | 7 3.22 | 8 4.78 | 9 6.00 | 10 6.33 |  |  |  |  |  |  |  |  |
| CONSTRUCT 27, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.22                | 2 6.56 | 3 4.67 | 4 4.00 | 5 4.11 | 6 4.56 | 7 2.55 | 8 3.78 | 9 6.33 | 10 5.78 |  |  |  |  |  |  |  |  |
| CONSTRUCT 28, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.67                | 2 1.67 | 3 3.67 | 4 3.89 | 5 5.78 | 6 2.44 | 7 4.11 | 8 3.22 | 9 3.33 | 10 5.67 |  |  |  |  |  |  |  |  |
| CONSTRUCT 29, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.78                | 2 5.67 | 3 5.22 | 4 5.11 | 5 4.56 | 6 5.33 | 7 2.78 | 8 4.56 | 9 5.89 | 10 6.33 |  |  |  |  |  |  |  |  |
| CONSTRUCT 30, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.67                | 2 5.44 | 3 5.78 | 4 5.67 | 5 4.78 | 6 5.33 | 7 3.00 | 8 5.00 | 9 6.56 | 10 6.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 31, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 3.11                | 2 6.67 | 3 3.56 | 4 3.56 | 5 3.56 | 6 5.22 | 7 4.33 | 8 5.11 | 9 4.67 | 10 4.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 32, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 3.56                | 2 6.11 | 3 5.11 | 4 6.22 | 5 3.67 | 6 4.11 | 7 3.56 | 8 4.89 | 9 6.78 | 10 5.56 |  |  |  |  |  |  |  |  |
| CONSTRUCT 33, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.44                | 2 6.00 | 3 6.22 | 4 5.89 | 5 4.22 | 6 4.89 | 7 5.44 | 8 4.67 | 9 6.00 | 10 5.11 |  |  |  |  |  |  |  |  |
| CONSTRUCT 34, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.00                | 2 5.56 | 3 5.67 | 4 6.00 | 5 4.78 | 6 4.89 | 7 4.11 | 8 5.11 | 9 6.22 | 10 6.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 35, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.00                | 2 6.44 | 3 5.33 | 4 5.67 | 5 3.67 | 6 4.78 | 7 3.44 | 8 4.56 | 9 6.78 | 10 5.56 |  |  |  |  |  |  |  |  |
| CONSTRUCT 36, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.67                | 2 5.78 | 3 5.56 | 4 6.22 | 5 4.56 | 6 5.00 | 7 5.00 | 8 5.33 | 9 6.56 | 10 6.22 |  |  |  |  |  |  |  |  |
| CONSTRUCT 37, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.00                | 2 6.11 | 3 5.78 | 4 6.33 | 5 4.67 | 6 5.00 | 7 3.78 | 8 4.89 | 9 6.78 | 10 6.33 |  |  |  |  |  |  |  |  |
| CONSTRUCT 38, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.89                | 2 6.67 | 3 5.00 | 4 5.56 | 5 4.33 | 6 4.89 | 7 3.78 | 8 4.56 | 9 6.67 | 10 6.33 |  |  |  |  |  |  |  |  |
| CONSTRUCT 39, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 4.44                | 2 6.89 | 3 4.56 | 4 4.89 | 5 4.44 | 6 4.78 | 7 3.33 | 8 5.11 | 9 6.56 | 10 5.89 |  |  |  |  |  |  |  |  |
| CONSTRUCT 40, ELEMENT |        |        |        |        |        |        |        |        |         |  |  |  |  |  |  |  |  |
| 1 5.33                | 2 5.00 | 3 5.11 | 4 4.56 | 5 4.56 | 6 4.67 | 7 3.22 | 8 4.67 | 9 6.44 | 10 6.44 |  |  |  |  |  |  |  |  |

| CCNSTRUCT | MEAN  | VARIATION | AS PER CENT |
|-----------|-------|-----------|-------------|
| 1         | 4.956 | 5.3629    | 1.57        |
| 2         | 4.922 | 6.1008    | 1.79        |
| 3         | 5.433 | 2.4321    | 0.71        |
| 4         | 4.567 | 8.2308    | 2.42        |
| 5         | 3.867 | 8.9368    | 2.62        |
| 6         | 5.011 | 2.9996    | 0.89        |
| 7         | 5.000 | 4.2469    | 1.25        |
| 8         | 4.867 | 5.2757    | 1.58        |
| 9         | 5.355 | 2.7611    | 0.81        |
| 10        | 4.033 | 4.7158    | 1.38        |
| 11        | 3.978 | 12.4166   | 3.65        |
| 12        | 5.122 | 14.5552   | 4.27        |
| 13        | 4.667 | 19.0105   | 5.58        |
| 14        | 4.744 | 10.2989   | 3.02        |
| 15        | 5.056 | 15.1680   | 4.45        |
| 16        | 4.700 | 5.4333    | 1.60        |
| 17        | 5.633 | 4.8645    | 1.43        |
| 18        | 5.511 | 6.5666    | 2.05        |
| 19        | 5.078 | 8.3967    | 2.47        |
| 20        | 5.178 | 8.3490    | 2.45        |
| 21        | 5.211 | 7.1213    | 2.09        |
| 22        | 5.056 | 11.6360   | 3.42        |
| 23        | 5.511 | 8.6475    | 2.54        |
| 24        | 3.833 | 6.3013    | 1.85        |
| 25        | 4.733 | 10.0535   | 2.95        |
| 26        | 5.244 | 6.5637    | 1.93        |
| 27        | 4.656 | 13.7879   | 4.05        |
| 28        | 3.944 | 17.7380   | 5.21        |
| 29        | 5.022 | 8.5605    | 2.51        |
| 30        | 5.244 | 8.8350    | 2.59        |
| 31        | 4.400 | 10.2265   | 3.00        |
| 32        | 4.956 | 12.9405   | 3.80        |
| 33        | 5.289 | 4.6966    | 1.38        |
| 34        | 5.356 | 4.3403    | 1.27        |
| 35        | 5.022 | 11.5508   | 3.39        |
| 36        | 5.589 | 3.6058    | 1.06        |
| 37        | 5.367 | 9.8265    | 2.89        |
| 38        | 5.267 | 9.0919    | 2.67        |
| 39        | 5.089 | 10.3650   | 3.04        |
| 40        | 5.000 | 8.0708    | 2.37        |

TOTAL VARIATION ABOUT CONSTRUCT MEANS 340.5840

BIAS 0.3494  
VARIABILITY 0.3242



DEVIATIONS FROM CONSTRUCT MEANS

|                       |           |           |           |           |           |           |           |           |          |            |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|------------|
| CONSTRUCT 1, ELEMENT  | 1 -0.8446 | 2 0.8224  | 3 -0.0666 | 4 0.2664  | 5 -1.2886 | 6 -0.2886 | 7 -0.6226 | 8 0.2664  | 9 1.1554 | 10 0.6004  |
| CONSTRUCT 2, ELEMENT  | 1 -0.4781 | 2 0.7449  | 3 0.2999  | 4 0.4109  | 5 -0.7001 | 6 -0.5891 | 7 -1.1441 | 8 -0.7001 | 9 0.8559 | 10 1.2999  |
| CONSTRUCT 3, ELEMENT  | 1 -0.1002 | 2 0.3448  | 3 0.4558  | 4 -0.2112 | 5 -0.1002 | 6 -0.2112 | 7 -0.5892 | 8 -0.4332 | 9 0.4558 | 10 0.7888  |
| CONSTRUCT 4, ELEMENT  | 1 -0.1226 | 2 0.3224  | 3 0.8774  | 4 0.6554  | 5 -0.5666 | 6 -0.8956 | 7 -1.0106 | 8 -1.4556 | 9 1.4334 | 10 0.7664  |
| CONSTRUCT 5, ELEMENT  | 1 1.8003  | 2 -0.7557 | 3 0.0223  | 4 -0.5337 | 5 0.8003  | 6 0.2443  | 7 -0.6447 | 8 -1.7557 | 9 0.0223 | 10 0.8003  |
| CONSTRUCT 6, ELEMENT  | 1 -0.9902 | 2 0.7668  | 3 0.3218  | 4 0.5448  | 5 -0.3442 | 6 -0.4552 | 7 -0.6782 | 8 -0.1222 | 9 0.5448 | 10 0.3218  |
| CONSTRUCT 7, ELEMENT  | 1 0.4439  | 2 -1.1111 | 3 -0.2221 | 4 -0.3331 | 5 -0.6671 | 6 -0.3331 | 7 -0.2221 | 8 0.7779  | 9 0.5559 | 10 0.6669  |
| CONSTRUCT 8, ELEMENT  | 1 0.2442  | 2 0.1332  | 3 0.3552  | 4 -0.3108 | 5 -1.3108 | 6 -0.7558 | 7 -0.3108 | 8 -0.3108 | 9 1.2442 | 10 1.0222  |
| CONSTRUCT 9, ELEMENT  | 1 -0.2445 | 2 0.5335  | 3 0.2005  | 4 -0.0225 | 5 -0.4665 | 6 -0.5775 | 7 -0.9115 | 8 0.0885  | 9 0.7555 | 10 0.6445  |
| CONSTRUCT 10, ELEMENT | 1 1.4107  | 2 -1.1443 | 3 0.0777  | 4 0.6337  | 5 -0.3663 | 6 -0.1443 | 7 0.4107  | 8 -0.8113 | 9 0.0777 | 10 -0.1443 |
| CONSTRUCT 11, ELEMENT | 1 -1.9777 | 2 1.9113  | 3 -0.6447 | 4 0.3553  | 5 0.5783  | 6 1.0223  | 7 -1.6447 | 8 -0.0887 | 9 0.4663 | 10 0.0223  |
| CONSTRUCT 12, ELEMENT | 1 -1.0111 | 2 1.2109  | 3 0.9889  | 4 0.8779  | 5 -1.4551 | 6 -0.9001 | 7 -1.6781 | 8 -0.6781 | 9 1.8779 | 10 0.7669  |
| CONSTRUCT 13, ELEMENT | 1 0.7774  | 2 -2.3336 | 3 1.6664  | 4 0.0004  | 5 -0.1106 | 6 0.5554  | 7 -2.1106 | 8 -1.2226 | 9 1.2224 | 10 1.5554  |
| CONSTRUCT 14, ELEMENT | 1 -0.5223 | 2 1.5887  | 3 0.0337  | 4 -0.4113 | 5 -0.5223 | 6 0.0337  | 7 -1.4113 | 8 -1.3003 | 9 1.5887 | 10 0.9227  |
| CONSTRUCT 15, ELEMENT | 1 -0.8336 | 2 1.1664  | 3 0.8334  | 4 -0.8336 | 5 -0.3886 | 6 -0.1666 | 7 -2.0556 | 8 -1.1666 | 9 1.8334 | 10 1.6114  |
| CONSTRUCT 16, ELEMENT | 1 0.4110  | 2 0.7440  | 3 0.0780  | 4 -0.7000 | 5 -0.1440 | 6 0.0780  | 7 -1.5890 | 8 -0.4780 | 9 1.0780 | 10 0.5220  |
| CONSTRUCT 17, ELEMENT | 1 -0.1892 | 2 0.6998  | 3 0.0338  | 4 0.3668  | 5 -0.5222 | 6 -0.6332 | 7 -1.5222 | 8 0.2558  | 9 0.6598 | 10 0.8108  |
| CONSTRUCT 18, ELEMENT | 1 -0.6221 | 2 0.0449  | 3 0.8219  | 4 0.5999  | 5 -0.7331 | 6 -0.7331 | 7 -1.4001 | 8 -0.1781 | 9 1.2669 | 10 0.9329  |
| CONSTRUCT 19, ELEMENT | 1 0.4781  | 2 1.5891  | 3 -0.5219 | 4 -0.7449 | 5 -0.9669 | 6 -0.4109 | 7 -1.4109 | 8 0.1441  | 9 0.9221 | 10 0.9221  |
| CONSTRUCT 20, ELEMENT | 1 0.0442  | 2 0.3782  | 3 0.8222  | 4 0.4892  | 5 -0.9558 | 6 -1.5108 | 7 -1.0668 | 8 -0.5108 | 9 1.2662 | 10 1.0442  |
| CONSTRUCT 21, ELEMENT | 1 -0.4330 | 2 0.6780  | 3 0.0110  | 4 0.2330  | 5 -0.2110 | 6 -0.1000 | 7 -1.8780 | 8 -0.5440 | 9 1.2330 | 10 1.0110  |
| CONSTRUCT 22, ELEMENT | 1 0.5004  | 2 0.6114  | 3 0.6114  | 4 -0.3896 | 5 -0.3886 | 6 0.3884  | 7 -2.0556 | 8 -1.7226 | 9 1.2774 | 10 1.1664  |
| CONSTRUCT 23, ELEMENT | 1 0.1558  | 2 1.3778  | 3 -0.1782 | 4 -0.9552 | 5 -0.4002 | 6 -0.0672 | 7 -1.8442 | 8 -0.1782 | 9 1.0448 | 10 1.0448  |

|                       |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
|-----------------------|---------|---|---------|---|---------|---|---------|---|---------|---|---------|---|---------|---|---------|---|---------|----|---------|
| CCNSTRUCT 24, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | 1.6108  | 2 | -0.6112 | 3 | -0.1662 | 4 | -0.1662 | 5 | 0.6108  | 6 | 0.2778  | 7 | -0.7222 | 8 | -1.3392 | 9 | -0.0552 | 10 | 0.6108  |
| CCNSTRUCT 25, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -1.6223 | 2 | 0.8227  | 3 | 0.9337  | 4 | 0.4897  | 5 | -1.8443 | 6 | 0.7107  | 7 | 0.4887  | 8 | 0.2667  | 9 | 0.7107  | 10 | -0.9553 |
| CCNSTRUCT 26, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.0225 | 2 | 0.3115  | 3 | 0.4225  | 4 | 0.3115  | 5 | -0.3555 | 6 | -0.0225 | 7 | -2.0225 | 8 | -0.4665 | 9 | 0.7555  | 10 | 1.0885  |
| CCNSTRUCT 27, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.4337 | 2 | 1.9003  | 3 | 0.0113  | 4 | -0.6557 | 5 | -0.5447 | 6 | -0.0997 | 7 | -2.0997 | 8 | -0.8777 | 9 | 1.6773  | 10 | 1.1223  |
| CCNSTRUCT 28, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | 1.7225  | 2 | -2.2775 | 3 | -0.2775 | 4 | -0.0555 | 5 | 1.8335  | 6 | -1.5005 | 7 | 0.1605  | 8 | -0.7225 | 9 | -0.6115 | 10 | 1.7225  |
| CCNSTRUCT 29, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.2443 | 2 | 0.6447  | 3 | 0.1997  | 4 | 0.0887  | 5 | -0.4663 | 6 | 0.3107  | 7 | -2.2443 | 8 | -0.4663 | 9 | 0.8667  | 10 | 1.3107  |
| CCNSTRUCT 30, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.5775 | 2 | 0.1995  | 3 | 0.5335  | 4 | 0.4225  | 5 | -0.4665 | 6 | 0.0885  | 7 | -2.2445 | 8 | -0.2445 | 9 | 1.3115  | 10 | 0.9775  |
| CCNSTRUCT 31, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -1.2891 | 2 | 2.2669  | 3 | -0.8441 | 4 | -0.8441 | 5 | -0.8441 | 6 | 0.8219  | 7 | -0.0671 | 8 | 0.7109  | 9 | 0.2665  | 10 | -0.1781 |
| CCNSTRUCT 32, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -1.3997 | 2 | 1.1553  | 3 | 0.1553  | 4 | 1.2663  | 5 | -1.2887 | 6 | -0.8447 | 7 | -1.3997 | 8 | -0.0667 | 9 | 1.8223  | 10 | 0.6003  |
| CCNSTRUCT 33, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.8448 | 2 | 0.7112  | 3 | 0.9332  | 4 | 0.6002  | 5 | -1.0668 | 6 | -0.3998 | 7 | 0.1552  | 8 | -0.6218 | 9 | 0.7112  | 10 | -0.1778 |
| CCNSTRUCT 34, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.3556 | 2 | 0.2004  | 3 | 0.3114  | 4 | 0.6444  | 5 | -0.5776 | 6 | -0.4666 | 7 | -1.2446 | 8 | -0.2446 | 9 | 0.8664  | 10 | 0.8664  |
| CCNSTRUCT 35, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -1.0223 | 2 | 1.4217  | 3 | 0.3107  | 4 | 0.6447  | 5 | -1.3553 | 6 | -0.2443 | 7 | -1.5783 | 8 | -0.4663 | 9 | 1.7557  | 10 | 0.5337  |
| CCNSTRUCT 36, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | 0.0780  | 2 | 0.1890  | 3 | -0.0330 | 4 | 0.6330  | 5 | -1.0330 | 6 | -0.5890 | 7 | -0.5890 | 8 | -0.2560 | 9 | 0.9670  | 10 | 0.6330  |
| CCNSTRUCT 37, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -1.3667 | 2 | 0.7443  | 3 | 0.4113  | 4 | 0.9663  | 5 | -0.6997 | 6 | -0.3667 | 7 | -1.5887 | 8 | -0.4777 | 9 | 1.4113  | 10 | 0.9663  |
| CCNSTRUCT 38, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.3778 | 2 | 1.4002  | 3 | -0.2668 | 4 | 0.2892  | 5 | -0.9338 | 6 | -0.3778 | 7 | -1.4888 | 8 | -0.7108 | 9 | 1.4002  | 10 | 1.0662  |
| CCNSTRUCT 39, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | -0.6449 | 2 | 1.8001  | 3 | -0.5329 | 4 | -0.1999 | 5 | -0.6449 | 6 | -0.3105 | 7 | -1.7559 | 8 | 0.0221  | 9 | 1.4671  | 10 | 0.8001  |
| CCNSTRUCT 40, ELEMENT |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |   |         |    |         |
| 1                     | 0.3330  | 2 | 0.0000  | 3 | 0.1110  | 4 | -0.4440 | 5 | -0.4440 | 6 | -0.3330 | 7 | -1.7780 | 8 | -0.3330 | 9 | 1.4440  | 10 | 1.4440  |

# CORRELATIONS AND ANGULAR DISTANCES BETWEEN CONSTRUCTS

|             |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
|-------------|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|
| CONSTRUCT 1 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 2           | 0.782  | 38.55  | 3  | 0.546  | 56.90  | 4  | 0.577  | 54.77  | 5  | -0.426 | 115.20 | 6  | 0.823  | 34.59  |
| 7           | 0.313  | 71.75  | 8  | 0.720  | 43.94  | 9  | 0.843  | 32.52  | 10 | -0.383 | 112.49 | 11 | 0.477  | 61.51  |
| 12          | 0.866  | 30.06  | 13 | 0.062  | 86.42  | 14 | 0.703  | 45.37  | 15 | 0.664  | 48.39  | 16 | 0.492  | 60.51  |
| 17          | 0.783  | 38.45  | 18 | 0.764  | 40.15  | 19 | 0.691  | 46.26  | 20 | 0.693  | 46.16  | 21 | 0.702  | 45.37  |
| 22          | 0.420  | 65.13  | 23 | 0.621  | 51.61  | 24 | -0.410 | 114.18 | 25 | 0.586  | 54.15  | 26 | 0.583  | 54.37  |
| 27          | 0.717  | 44.15  | 28 | -0.535 | 122.37 | 29 | 0.638  | 50.39  | 30 | 0.688  | 46.49  | 31 | 0.545  | 56.68  |
| 32          | 0.922  | 22.74  | 33 | 0.665  | 49.30  | 34 | 0.772  | 39.44  | 35 | 0.916  | 23.68  | 36 | 0.809  | 36.01  |
| 37          | 0.837  | 33.17  | 38 | 0.841  | 32.74  | 39 | 0.832  | 33.72  | 40 | 0.580  | 54.56  |    |        |        |
| CONSTRUCT 2 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 3           | 0.883  | 28.04  | 4  | 0.869  | 29.69  | 5  | 0.093  | 84.67  | 6  | 0.836  | 33.26  | 7  | 0.167  | 80.36  |
| 8           | 0.749  | 41.47  | 9  | 0.901  | 25.73  | 10 | -0.172 | 99.93  | 11 | 0.424  | 64.94  | 12 | 0.912  | 24.27  |
| 13          | 0.416  | 65.42  | 14 | 0.846  | 32.24  | 15 | 0.871  | 29.44  | 16 | 0.678  | 47.33  | 17 | 0.868  | 29.82  |
| 18          | 0.889  | 27.31  | 19 | 0.686  | 46.65  | 20 | 0.881  | 28.25  | 21 | 0.898  | 26.15  | 22 | 0.766  | 40.04  |
| 23          | 0.731  | 42.95  | 24 | 0.099  | 84.35  | 25 | 0.174  | 79.98  | 26 | 0.863  | 30.33  | 27 | 0.840  | 32.81  |
| 28          | -0.096 | 95.49  | 29 | 0.855  | 31.28  | 30 | 0.840  | 32.89  | 31 | 0.176  | 79.89  | 32 | 0.842  | 32.61  |
| 33          | 0.575  | 54.90  | 34 | 0.937  | 20.51  | 35 | 0.873  | 29.21  | 36 | 0.837  | 33.14  | 37 | 0.911  | 24.42  |
| 38          | 0.930  | 21.61  | 39 | 0.796  | 37.25  | 40 | 0.795  | 37.34  |    |        |        |    |        |        |
| CONSTRUCT 3 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 4           | 0.787  | 38.12  | 5  | 0.341  | 70.06  | 6  | 0.645  | 49.82  | 7  | 0.169  | 80.27  | 8  | 0.651  | 45.35  |
| 9           | 0.845  | 32.34  | 10 | -0.207 | 101.94 | 11 | 0.384  | 67.42  | 12 | 0.762  | 40.34  | 13 | 0.614  | 52.15  |
| 14          | 0.831  | 33.80  | 15 | 0.949  | 18.46  | 16 | 0.847  | 32.12  | 17 | 0.796  | 37.26  | 18 | 0.805  | 36.01  |
| 19          | 0.682  | 46.96  | 20 | 0.774  | 39.25  | 21 | 0.896  | 26.39  | 22 | 0.895  | 26.51  | 23 | 0.836  | 33.23  |
| 24          | 0.317  | 71.53  | 25 | -0.046 | 92.61  | 26 | 0.922  | 22.83  | 27 | 0.868  | 29.90  | 28 | 0.044  | 87.48  |
| 29          | 0.910  | 24.53  | 30 | 0.864  | 30.26  | 31 | 0.071  | 85.92  | 32 | 0.600  | 53.12  | 33 | 0.331  | 70.66  |
| 34          | 0.826  | 34.35  | 35 | 0.711  | 44.66  | 36 | 0.598  | 53.29  | 37 | 0.759  | 40.66  | 38 | 0.802  | 36.68  |
| 39          | 0.725  | 43.51  | 40 | 0.886  | 27.61  |    |        |        |    |        |        |    |        |        |
| CONSTRUCT 4 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 5           | 0.278  | 73.86  | 6  | 0.703  | 45.34  | 7  | 0.150  | 81.36  | 8  | 0.733  | 42.85  | 9  | 0.736  | 42.47  |
| 10          | 0.168  | 80.34  | 11 | 0.174  | 80.00  | 12 | 0.873  | 29.20  | 13 | 0.562  | 55.78  | 14 | 0.750  | 41.41  |
| 15          | 0.776  | 39.10  | 16 | 0.607  | 52.65  | 17 | 0.660  | 48.72  | 18 | 0.856  | 31.09  | 19 | 0.441  | 63.81  |
| 20          | 0.904  | 25.28  | 21 | 0.767  | 39.88  | 22 | 0.776  | 39.07  | 23 | 0.516  | 58.95  | 24 | 0.263  | 74.74  |
| 25          | 0.155  | 81.06  | 26 | 0.754  | 41.09  | 27 | 0.686  | 46.68  | 28 | 0.034  | 98.04  | 29 | 0.673  | 47.70  |
| 30          | 0.741  | 42.19  | 31 | -0.151 | 98.70  | 32 | 0.735  | 42.70  | 33 | 0.666  | 48.24  | 34 | 0.848  | 31.97  |
| 35          | 0.766  | 40.03  | 36 | 0.806  | 36.28  | 37 | 0.800  | 36.89  | 38 | 0.773  | 39.39  | 39 | 0.555  | 56.01  |
| 40          | 0.709  | 44.88  |    |        |        |    |        |        |    |        |        |    |        |        |
| CONSTRUCT 5 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 6           | -0.376 | 112.11 | 7  | 0.086  | 85.07  | 8  | 0.126  | 82.78  | 9  | -0.076 | 94.35  | 10 | 0.583  | 54.33  |
| 11          | -0.309 | 107.98 | 12 | -0.144 | 98.26  | 13 | 0.616  | 51.99  | 14 | 0.171  | 80.18  | 15 | 0.205  | 77.94  |
| 16          | 0.396  | 66.65  | 17 | -0.067 | 93.93  | 18 | -0.029 | 91.68  | 19 | 0.068  | 96.12  | 20 | 0.100  | 64.25  |
| 21          | 0.175  | 79.94  | 22 | 0.564  | 55.64  | 23 | 0.201  | 78.39  | 24 | 0.986  | 9.76   | 25 | -0.698 | 134.27 |
| 26          | 0.299  | 72.62  | 27 | 0.135  | 82.22  | 28 | 0.673  | 47.71  | 29 | 0.236  | 76.33  | 30 | 0.105  | 63.98  |
| 31          | -0.567 | 124.53 | 32 | -0.350 | 110.48 | 33 | -0.377 | 112.16 | 34 | 0.038  | 87.79  | 35 | -0.206 | 101.89 |
| 36          | 0.008  | 89.54  | 37 | -0.161 | 99.28  | 38 | 0.039  | 87.75  | 39 | -0.130 | 97.48  | 40 | 0.391  | 66.98  |
| CONSTRUCT 6 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 7           | -0.086 | 94.96  | 8  | 0.468  | 62.12  | 9  | 0.810  | 35.90  | 10 | -0.470 | 118.05 | 11 | 0.646  | 49.60  |
| 12          | 0.914  | 23.99  | 13 | 0.077  | 85.60  | 14 | 0.705  | 45.18  | 15 | 0.700  | 45.56  | 16 | 0.433  | 64.32  |
| 17          | 0.793  | 37.54  | 18 | 0.817  | 35.24  | 19 | 0.493  | 60.48  | 20 | 0.721  | 43.94  | 21 | 0.756  | 40.86  |
| 22          | 0.446  | 61.50  | 23 | 0.527  | 58.19  | 24 | -0.362 | 111.22 | 25 | 0.489  | 60.73  | 26 | 0.651  | 49.39  |
| 27          | 0.705  | 45.18  | 28 | -0.434 | 115.74 | 29 | 0.655  | 49.08  | 30 | 0.734  | 42.82  | 31 | 0.385  | 67.38  |
| 32          | 0.940  | 19.93  | 33 | 0.742  | 42.14  | 34 | 0.821  | 34.85  | 35 | 0.900  | 25.90  | 36 | 0.667  | 48.16  |
| 37          | 0.936  | 20.56  | 38 | 0.801  | 36.81  | 39 | 0.769  | 39.73  | 40 | 0.467  | 62.18  |    |        |        |
| CONSTRUCT 7 |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
| 8           | 0.599  | 53.17  | 9  | 0.357  | 69.10  | 10 | 0.273  | 74.17  | 11 | -0.403 | 113.76 | 12 | 0.152  | 81.23  |
| 13          | 0.471  | 61.89  | 14 | -0.004 | 90.21  | 15 | 0.149  | 81.41  | 16 | 0.218  | 77.39  | 17 | 0.296  | 72.78  |
| 19          | 0.384  | 67.45  | 19 | 0.260  | 74.91  | 20 | -0.369 | 68.35  | 21 | 0.191  | 79.00  | 22 | 0.115  | 83.15  |
| 23          | 0.198  | 78.60  | 24 | 0.081  | 85.36  | 25 | -0.128 | 97.37  | 26 | 0.238  | 76.21  | 27 | 0.068  | 86.12  |
| 28          | 0.298  | 72.64  | 29 | 0.197  | 78.66  | 30 | 0.296  | 72.75  | 31 | -0.245 | 104.20 | 32 | 0.170  | 80.20  |
| 33          | -0.146 | 98.41  | 34 | 0.328  | 70.87  | 35 | 0.110  | 83.71  | 36 | 0.467  | 62.17  | 37 | 0.121  | 83.08  |

|              |        |        |    |        |        |    |        |        |    |        |        |
|--------------|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|
| CCNSTRUCT 9  |        |        |    | 11     |        |    |        | 13     |    |        |        |
| 9            | 0.777  | 39.05  | 10 | 0.136  | 82.17  | 11 | -0.117 | 96.73  | 12 | 0.727  | 43.34  |
| 14           | 0.624  | 51.36  | 15 | 0.672  | 47.75  | 16 | 0.572  | 55.10  | 17 | 0.626  | 51.24  |
| 19           | 0.660  | 40.60  | 20 | 0.855  | 31.22  | 21 | 0.580  | 54.55  | 22 | 0.596  | 53.42  |
| 24           | 0.087  | 85.01  | 25 | 0.197  | 70.65  | 26 | 0.572  | 55.10  | 27 | 0.616  | 51.97  |
| 29           | 0.546  | 56.88  | 30 | 0.565  | 55.61  | 31 | 0.052  | 87.02  | 32 | 0.616  | 51.97  |
| 34           | 0.701  | 45.49  | 35 | 0.657  | 40.94  | 36 | 0.851  | 31.65  | 37 | 0.577  | 54.78  |
| 39           | 0.563  | 55.60  | 40 | 0.762  | 40.33  |    |        |        |    |        |        |
| CCNSTRUCT 9  |        |        |    | 12     |        |    |        | 14     |    |        |        |
| 10           | -0.327 | 109.09 | 11 | 0.404  | 66.19  | 12 | 0.892  | 26.91  | 13 | 0.327  | 70.39  |
| 15           | 0.847  | 32.08  | 16 | 0.751  | 41.37  | 17 | 0.952  | 17.03  | 18 | 0.892  | 26.89  |
| 20           | 0.879  | 28.49  | 21 | 0.872  | 29.29  | 22 | 0.650  | 48.84  | 23 | 0.626  | 34.31  |
| 25           | 0.102  | 79.45  | 26 | 0.823  | 34.63  | 27 | 0.855  | 31.24  | 28 | -0.178 | 100.26 |
| 30           | 0.842  | 32.69  | 31 | 0.283  | 73.55  | 32 | 0.850  | 31.73  | 33 | 0.476  | 61.57  |
| 35           | 0.867  | 29.87  | 36 | 0.804  | 36.52  | 37 | 0.850  | 31.84  | 38 | 0.653  | 26.90  |
| 40           | 0.840  | 32.91  |    |        |        |    |        |        |    |        |        |
| CCNSTRUCT 10 |        |        |    | 13     |        |    |        | 15     |    |        |        |
| 11           | -0.749 | 138.51 | 12 | -0.196 | 101.27 | 13 | 0.407  | 65.99  | 14 | -0.310 | 109.06 |
| 16           | -0.183 | 100.52 | 17 | -0.302 | 107.56 | 18 | -0.101 | 55.78  | 19 | -0.318 | 109.54 |
| 21           | -0.263 | 195.27 | 22 | 0.051  | 97.07  | 23 | -0.392 | 113.07 | 24 | 0.610  | 52.38  |
| 26           | -0.103 | 95.93  | 27 | -0.393 | 113.14 | 28 | 0.534  | 57.73  | 29 | -0.244 | 104.12 |
| 31           | -0.775 | 140.78 | 32 | -0.301 | 107.54 | 33 | -0.097 | 55.55  | 34 | -0.086 | 94.94  |
| 36           | 0.171  | 80.15  | 37 | -0.312 | 108.15 | 38 | -0.253 | 104.65 | 39 | -0.514 | 120.96 |
| CCNSTRUCT 11 |        |        |    | 14     |        |    |        | 16     |    |        |        |
| 12           | 0.442  | 63.78  | 13 | -0.155 | 98.93  | 14 | 0.604  | 52.83  | 15 | 0.512  | 59.21  |
| 17           | 0.476  | 61.68  | 18 | 0.296  | 72.76  | 19 | 0.306  | 67.29  | 20 | 0.050  | 96.65  |
| 22           | 0.331  | 70.69  | 23 | 0.517  | 59.85  | 24 | -0.268 | 105.54 | 25 | 0.313  | 71.77  |
| 27           | 0.624  | 51.36  | 28 | -0.575 | 125.99 | 29 | 0.566  | 55.55  | 30 | 0.525  | 59.34  |
| 32           | 0.543  | 57.08  | 33 | 0.228  | 76.80  | 34 | 0.381  | 67.62  | 35 | 0.601  | 53.03  |
| 37           | 0.612  | 52.27  | 38 | 0.561  | 55.80  | 39 | 0.695  | 45.98  | 40 | 0.217  | 77.46  |
| CCNSTRUCT 12 |        |        |    | 15     |        |    |        | 17     |    |        |        |
| 13           | 0.334  | 70.49  | 14 | 0.800  | 36.87  | 15 | 0.806  | 36.25  | 16 | 0.619  | 51.77  |
| 18           | 0.925  | 22.34  | 19 | 0.611  | 92.33  | 20 | 0.882  | 20.13  | 21 | 0.833  | 33.58  |
| 23           | 0.634  | 50.62  | 24 | -0.136 | 97.80  | 25 | 0.466  | 62.24  | 26 | 0.777  | 39.03  |
| 28           | -0.358 | 110.95 | 29 | 0.754  | 41.06  | 30 | 0.835  | 33.39  | 31 | 0.242  | 75.98  |
| 33           | 0.779  | 39.07  | 34 | 0.916  | 23.62  | 35 | 0.963  | 15.55  | 36 | 0.052  | 31.61  |
| 38           | 0.886  | 27.61  | 39 | 0.785  | 38.25  | 40 | 0.679  | 47.25  |    |        |        |
| CCNSTRUCT 13 |        |        |    | 16     |        |    |        | 18     |    |        |        |
| 14           | 0.283  | 73.54  | 15 | 0.499  | 60.04  | 16 | 0.476  | 61.56  | 17 | 0.312  | 71.83  |
| 19           | 0.082  | 85.30  | 20 | 0.463  | 62.40  | 21 | 0.496  | 60.24  | 22 | 0.676  | 47.44  |
| 24           | 0.602  | 52.96  | 25 | -0.217 | 102.54 | 26 | 0.666  | 48.22  | 27 | 0.281  | 73.67  |
| 29           | 0.570  | 55.27  | 30 | 0.635  | 50.55  | 31 | -0.561 | 124.15 | 32 | 0.150  | 81.40  |
| 34           | 0.541  | 57.26  | 35 | 0.223  | 77.14  | 36 | 0.371  | 68.20  | 37 | 0.360  | 68.88  |
| 39           | 0.073  | 85.81  | 40 | 0.685  | 46.80  |    |        |        |    |        |        |
| CCNSTRUCT 14 |        |        |    | 17     |        |    |        | 19     |    |        |        |
| 15           | 0.934  | 20.92  | 16 | 0.855  | 31.27  | 17 | 0.705  | 45.20  | 18 | 0.663  | 40.47  |
| 20           | 0.647  | 49.70  | 21 | 0.883  | 27.96  | 22 | 0.854  | 31.31  | 23 | 0.865  | 30.16  |
| 25           | 0.215  | 77.61  | 26 | 0.759  | 40.59  | 27 | 0.974  | 13.20  | 28 | -0.310 | 108.06 |
| 30           | 0.753  | 41.17  | 31 | 0.438  | 64.04  | 32 | 0.711  | 44.69  | 33 | 0.497  | 60.22  |
| 35           | 0.858  | 30.96  | 36 | 0.624  | 51.40  | 37 | 0.702  | 38.59  | 38 | 0.930  | 21.51  |
| 40           | 0.746  | 41.75  |    |        |        |    |        |        |    |        |        |
| CCNSTRUCT 15 |        |        |    | 18     |        |    |        | 20     |    |        |        |
| 16           | 0.866  | 30.05  | 17 | 0.748  | 41.50  | 18 | 0.786  | 38.23  | 19 | 0.708  | 44.90  |
| 21           | 0.909  | 24.60  | 22 | 0.879  | 28.53  | 23 | 0.864  | 30.29  | 24 | 0.169  | 99.29  |
| 26           | 0.848  | 32.05  | 27 | 0.939  | 20.04  | 28 | -0.158 | 99.07  | 29 | 0.681  | 20.27  |
| 31           | 0.275  | 74.06  | 32 | 0.678  | 47.34  | 33 | 0.440  | 63.88  | 34 | 0.787  | 39.12  |
| 36           | 0.595  | 53.47  | 37 | 0.806  | 36.25  | 38 | 0.859  | 30.82  | 39 | 0.815  | 35.38  |
| CCNSTRUCT 16 |        |        |    | 19     |        |    |        | 21     |    |        |        |
| 17           | 0.717  | 44.15  | 18 | 0.550  | 53.91  | 19 | 0.831  | 33.77  | 20 | 0.578  | 54.72  |
| 22           | 0.898  | 26.07  | 23 | 0.946  | 18.94  | 24 | 0.396  | 66.65  | 25 | -0.087 | 94.96  |
| 27           | 0.915  | 23.85  | 28 | -0.105 | 96.02  | 29 | 0.855  | 31.23  | 30 | 0.771  | 39.60  |
| 32           | 0.485  | 61.01  | 33 | 0.135  | 82.25  | 34 | 0.639  | 50.27  | 35 | 0.668  | 48.12  |
| 37           | 0.575  | 54.93  | 38 | 0.788  | 37.98  | 39 | 0.802  | 36.68  | 40 | 0.874  | 29.05  |
| CCNSTRUCT 17 |        |        |    | 20     |        |    |        | 22     |    |        |        |
| 18           | 0.854  | 31.33  | 19 | 0.794  | 37.46  | 20 | 0.887  | 36.16  | 21 | 0.887  | 27.56  |
| 23           | 0.797  | 37.15  | 24 | -0.017 | 90.97  | 25 | 0.093  | 80.64  | 26 | 0.871  | 29.43  |
| 28           | -0.154 | 98.93  | 29 | 0.860  | 30.68  | 30 | 0.865  | 30.06  | 31 | 0.247  | 75.73  |
| 33           | 0.351  | 69.45  | 34 | 0.912  | 24.17  | 35 | 0.833  | 33.62  | 36 | 0.784  | 39.40  |
| 38           | 0.873  | 29.22  | 39 | 0.870  | 29.56  | 40 | 0.802  | 36.71  |    |        |        |

# CONSTRUCT 18

|    |        |       |    |       |       |    |        |       |    |       |       |    |        |       |
|----|--------|-------|----|-------|-------|----|--------|-------|----|-------|-------|----|--------|-------|
| 19 | 0.508  | 59.46 | 20 | 0.909 | 24.68 | 21 | 0.839  | 32.99 | 22 | 0.653 | 49.25 | 23 | 0.580  | 54.56 |
| 24 | -0.024 | 91.37 | 25 | 0.265 | 74.65 | 26 | 0.047  | 32.13 | 27 | 0.685 | 45.70 | 28 | -0.086 | 94.91 |
| 29 | 0.785  | 39.32 | 30 | 0.905 | 25.23 | 31 | -0.017 | 90.96 | 32 | 0.865 | 30.10 | 33 | 0.592  | 53.68 |
| 34 | 0.969  | 14.22 | 35 | 0.839 | 32.93 | 36 | 0.835  | 33.33 | 37 | 0.916 | 23.60 | 38 | 0.778  | 36.51 |
| 39 | 0.669  | 48.02 | 40 | 0.789 | 37.95 |    |        |       |    |       |       |    |        |       |

# CONSTRUCT 19

|    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |
|----|-------|-------|----|-------|-------|----|-------|-------|----|--------|--------|----|-------|-------|
| 20 | 0.549 | 53.88 | 21 | 0.721 | 42.85 | 22 | 0.638 | 50.38 | 23 | 0.937  | 20.41  | 24 | 0.087 | 84.99 |
| 25 | 0.032 | 88.16 | 26 | 0.656 | 48.99 | 27 | 0.062 | 30.40 | 28 | -0.252 | 104.52 | 29 | 0.727 | 43.33 |
| 30 | 0.593 | 53.65 | 31 | 0.519 | 58.71 | 32 | 0.569 | 55.30 | 33 | 0.186  | 79.25  | 34 | 0.592 | 53.65 |
| 35 | 0.691 | 46.26 | 36 | 0.617 | 51.92 | 37 | 0.527 | 58.20 | 38 | 0.835  | 33.35  | 39 | 0.890 | 27.16 |
| 40 | 0.744 | 41.96 |    |       |       |    |       |       |    |        |        |    |       |       |

# CONSTRUCT 20

|    |        |       |    |       |       |    |       |       |    |       |       |    |       |       |
|----|--------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|
| 21 | 0.728  | 43.30 | 22 | 0.635 | 50.58 | 23 | 0.573 | 55.03 | 24 | 0.092 | 84.73 | 25 | 0.129 | 82.60 |
| 26 | 0.740  | 42.25 | 27 | 0.656 | 48.97 | 28 | 0.057 | 86.75 | 29 | 0.652 | 47.28 | 30 | 0.723 | 43.71 |
| 31 | -0.095 | 95.47 | 32 | 0.778 | 38.89 | 33 | 0.604 | 52.83 | 34 | 0.888 | 37.43 | 35 | 0.757 | 40.82 |
| 36 | 0.889  | 27.22 | 37 | 0.772 | 39.50 | 38 | 0.773 | 39.36 | 39 | 0.619 | 51.77 | 40 | 0.756 | 40.74 |

# CONSTRUCT 21

|    |       |       |    |        |       |    |       |       |    |       |       |    |       |       |
|----|-------|-------|----|--------|-------|----|-------|-------|----|-------|-------|----|-------|-------|
| 22 | 0.847 | 32.13 | 23 | 0.046  | 32.23 | 24 | 0.202 | 78.35 | 25 | 0.065 | 86.27 | 26 | 0.945 | 19.13 |
| 27 | 0.916 | 23.72 | 28 | -0.131 | 97.54 | 29 | 0.960 | 16.27 | 30 | 0.950 | 18.26 | 31 | 0.220 | 77.32 |
| 32 | 0.788 | 38.03 | 33 | 0.347  | 69.69 | 34 | 0.904 | 25.29 | 35 | 0.859 | 30.77 | 36 | 0.710 | 44.79 |
| 37 | 0.893 | 26.74 | 38 | 0.920  | 23.14 | 39 | 0.075 | 28.97 | 40 | 0.876 | 28.94 |    |       |       |

# CONSTRUCT 22

|    |       |       |    |       |       |    |        |       |    |       |       |    |       |       |
|----|-------|-------|----|-------|-------|----|--------|-------|----|-------|-------|----|-------|-------|
| 23 | 0.794 | 37.45 | 24 | 0.559 | 56.02 | 25 | -0.056 | 93.21 | 26 | 0.074 | 29.03 | 27 | 0.842 | 32.70 |
| 28 | 0.011 | 89.38 | 29 | 0.873 | 29.18 | 30 | 0.795  | 37.34 | 31 | 0.023 | 98.70 | 32 | 0.473 | 61.78 |
| 33 | 0.279 | 73.80 | 34 | 0.707 | 45.00 | 35 | 0.659  | 48.76 | 36 | 0.569 | 55.31 | 37 | 0.635 | 50.54 |
| 38 | 0.770 | 39.60 | 39 | 0.641 | 50.15 | 40 | 0.047  | 32.12 |    |       |       |    |       |       |

# CONSTRUCT 23

|    |       |       |    |        |       |    |       |       |    |       |       |    |        |        |
|----|-------|-------|----|--------|-------|----|-------|-------|----|-------|-------|----|--------|--------|
| 24 | 0.202 | 78.32 | 25 | -0.029 | 91.64 | 26 | 0.788 | 38.01 | 27 | 0.940 | 18.53 | 28 | -0.195 | 101.26 |
| 29 | 0.859 | 30.77 | 30 | 0.737  | 42.93 | 31 | 0.452 | 63.12 | 32 | 0.551 | 56.53 | 33 | 0.146  | 81.48  |
| 34 | 0.647 | 49.71 | 35 | 0.708  | 44.95 | 36 | 0.525 | 58.35 | 37 | 0.610 | 52.43 | 38 | 0.845  | 32.36  |
| 39 | 0.903 | 25.49 | 40 | 0.839  | 32.93 |    |       |       |    |       |       |    |        |        |

# CONSTRUCT 24

|    |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|-------|
| 25 | -0.707 | 135.00 | 26 | 0.336  | 70.38  | 27 | 0.130  | 82.51  | 28 | 0.652  | 49.30  | 29 | 0.271  | 74.30 |
| 30 | 0.136  | 82.15  | 31 | -0.564 | 124.37 | 32 | -0.316 | 108.39 | 33 | -0.406 | 113.96 | 34 | 0.072  | 85.80 |
| 35 | -0.182 | 100.45 | 36 | 0.048  | 87.23  | 37 | -0.139 | 97.97  | 38 | 0.065  | 86.26  | 39 | -0.105 | 56.05 |
| 40 | 0.389  | 67.08  |    |        |        |    |        |        |    |        |        |    |        |       |

# CONSTRUCT 25

|    |        |       |    |       |       |    |        |        |    |       |       |    |        |       |
|----|--------|-------|----|-------|-------|----|--------|--------|----|-------|-------|----|--------|-------|
| 26 | -0.017 | 90.96 | 27 | 0.149 | 81.45 | 28 | -0.868 | 150.25 | 29 | 0.041 | 97.65 | 30 | 0.166  | 80.44 |
| 31 | 0.534  | 57.73 | 32 | 0.507 | 59.54 | 33 | 0.784  | 38.35  | 34 | 0.181 | 79.57 | 35 | 0.520  | 58.68 |
| 36 | 0.253  | 75.37 | 37 | 0.392 | 66.95 | 38 | 0.227  | 76.88  | 39 | 0.228 | 76.83 | 40 | -0.152 | 58.83 |

|              |       |       |              |        |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |              |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |     |       |       |
|--------------|-------|-------|--------------|--------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|----|-------|-------|-----|-------|-------|
| CONSTRUCT 26 |       |       | CONSTRUCT 27 |        |       | CONSTRUCT 28 |       |       | CONSTRUCT 29 |       |       | CONSTRUCT 30 |       |       | CONSTRUCT 31 |       |       | CONSTRUCT 32 |       |       | CONSTRUCT 33 |       |       | CONSTRUCT 34 |       |       | CONSTRUCT 35 |       |       | CONSTRUCT 36 |       |       | CONSTRUCT 37 |       |       | CONSTRUCT 38 |       |       | CONSTRUCT 39 |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |     |       |       |
| 27           | 0.814 | 35.52 | 28           | -0.008 | 90.46 | 29           | 0.976 | 12.61 | 30           | 0.959 | 16.42 | 31           | 0.026 | 66.54 | 32           | 0.351 | 69.42 | 33           | 0.723 | 43.71 | 34           | 0.519 | 58.72 | 35           | 0.864 | 30.20 | 36           | 0.808 | 36.09 | 37           | 0.774 | 39.31 | 38           | 0.871 | 29.44 | 39           | 0.935 | 20.85 | 40           | 0.721 | 43.85 | 41 | 0.976 | 12.61 | 42 | 0.959 | 16.42 | 43 | 0.026 | 66.54 | 44 | 0.351 | 69.42 | 45 | 0.723 | 43.71 | 46 | 0.519 | 58.72 | 47 | 0.864 | 30.20 | 48 | 0.808 | 36.09 | 49 | 0.774 | 39.31 | 50 | 0.871 | 29.44 | 51 | 0.935 | 20.85 | 52 | 0.721 | 43.85 | 53 | 0.976 | 12.61 | 54 | 0.959 | 16.42 | 55 | 0.026 | 66.54 | 56 | 0.351 | 69.42 | 57 | 0.723 | 43.71 | 58 | 0.519 | 58.72 | 59 | 0.864 | 30.20 | 60 | 0.808 | 36.09 | 61 | 0.774 | 39.31 | 62 | 0.871 | 29.44 | 63 | 0.935 | 20.85 | 64 | 0.721 | 43.85 | 65 | 0.976 | 12.61 | 66 | 0.959 | 16.42 | 67 | 0.026 | 66.54 | 68 | 0.351 | 69.42 | 69 | 0.723 | 43.71 | 70 | 0.519 | 58.72 | 71 | 0.864 | 30.20 | 72 | 0.808 | 36.09 | 73 | 0.774 | 39.31 | 74 | 0.871 | 29.44 | 75 | 0.935 | 20.85 | 76 | 0.721 | 43.85 | 77 | 0.976 | 12.61 | 78 | 0.959 | 16.42 | 79 | 0.026 | 66.54 | 80 | 0.351 | 69.42 | 81 | 0.723 | 43.71 | 82 | 0.519 | 58.72 | 83 | 0.864 | 30.20 | 84 | 0.808 | 36.09 | 85 | 0.774 | 39.31 | 86 | 0.871 | 29.44 | 87 | 0.935 | 20.85 | 88 | 0.721 | 43.85 | 89 | 0.976 | 12.61 | 90 | 0.959 | 16.42 | 91 | 0.026 | 66.54 | 92 | 0.351 | 69.42 | 93 | 0.723 | 43.71 | 94 | 0.519 | 58.72 | 95 | 0.864 | 30.20 | 96 | 0.808 | 36.09 | 97 | 0.774 | 39.31 | 98 | 0.871 | 29.44 | 99 | 0.935 | 20.85 | 100 | 0.721 | 43.85 |
| 32           | 0.675 | 47.55 | 33           | 0.276  | 74.00 | 34           | 0.908 | 24.74 | 35           | 0.758 | 40.69 | 36           | 0.689 | 46.46 | 37           | 0.394 | 66.81 | 38           | 0.070 | 94.04 | 39           | 0.378 | 67.82 | 40           | 0.817 | 35.17 | 41           | 0.808 | 36.09 | 42           | 0.774 | 39.31 | 43           | 0.871 | 29.44 | 44           | 0.935 | 20.85 | 45           | 0.721 | 43.85 | 46 | 0.976 | 12.61 | 47 | 0.959 | 16.42 | 48 | 0.026 | 66.54 | 49 | 0.351 | 69.42 | 50 | 0.723 | 43.71 | 51 | 0.519 | 58.72 | 52 | 0.864 | 30.20 | 53 | 0.808 | 36.09 | 54 | 0.774 | 39.31 | 55 | 0.871 | 29.44 | 56 | 0.935 | 20.85 | 57 | 0.721 | 43.85 | 58 | 0.976 | 12.61 | 59 | 0.959 | 16.42 | 60 | 0.026 | 66.54 | 61 | 0.351 | 69.42 | 62 | 0.723 | 43.71 | 63 | 0.519 | 58.72 | 64 | 0.864 | 30.20 | 65 | 0.808 | 36.09 | 66 | 0.774 | 39.31 | 67 | 0.871 | 29.44 | 68 | 0.935 | 20.85 | 69 | 0.721 | 43.85 | 70 | 0.976 | 12.61 | 71 | 0.959 | 16.42 | 72 | 0.026 | 66.54 | 73 | 0.351 | 69.42 | 74 | 0.723 | 43.71 | 75 | 0.519 | 58.72 | 76 | 0.864 | 30.20 | 77 | 0.808 | 36.09 | 78 | 0.774 | 39.31 | 79 | 0.871 | 29.44 | 80 | 0.935 | 20.85 | 81 | 0.721 | 43.85 | 82 | 0.976 | 12.61 | 83 | 0.959 | 16.42 | 84 | 0.026 | 66.54 | 85 | 0.351 | 69.42 | 86 | 0.723 | 43.71 | 87 | 0.519 | 58.72 | 88 | 0.864 | 30.20 | 89 | 0.808 | 36.09 | 90 | 0.774 | 39.31 | 91 | 0.871 | 29.44 | 92 | 0.935 | 20.85 | 93 | 0.721 | 43.85 | 94 | 0.976 | 12.61 | 95 | 0.959 | 16.42 | 96 |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |    |       |       |     |       |       |

| ELEMENT                   | TOTAL   | SUM OF SQUARES | AS PER CENT |
|---------------------------|---------|----------------|-------------|
| 1                         | -8.470  | 31.940         | 9.38        |
| 2                         | 21.203  | 51.587         | 15.15       |
| 3                         | 9.091   | 12.119         | 3.56        |
| 4                         | 3.979   | 12.708         | 3.73        |
| 5                         | -21.351 | 28.396         | 8.34        |
| 6                         | -9.800  | 13.948         | 4.10        |
| 7                         | -47.803 | 79.716         | 23.41       |
| 8                         | -18.468 | 22.121         | 6.50        |
| 9                         | 40.089  | 52.423         | 15.39       |
| 10                        | 31.531  | 35.627         | 10.46       |
| UNIT OF EXPECTED DISTANCE |         | 8.6997         |             |

# DISTANCES BETWEEN ELEMENTS

|           |          |          |          |          |          |          |          |          |  |  |
|-----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
| ELEMENT 1 |          |          |          |          |          |          |          |          |  |  |
| 2 1.373   | 3 0.814  | 4 0.896  | 5 0.578  | 6 0.790  | 7 1.042  | 8 0.920  | 9 1.259  | 10 0.945 |  |  |
| ELEMENT 2 |          |          |          |          |          |          |          |          |  |  |
| 3 0.942   | 4 0.920  | 5 1.300  | 6 0.945  | 7 1.627  | 8 1.032  | 9 0.740  | 10 0.925 |          |  |  |
| ELEMENT 3 |          |          |          |          |          |          |          |          |  |  |
| 4 0.444   | 5 0.868  | 6 0.668  | 7 1.245  | 8 0.826  | 9 0.717  | 10 0.639 |          |          |  |  |
| ELEMENT 4 |          |          |          |          |          |          |          |          |  |  |
| 5 0.848   | 6 0.698  | 7 1.138  | 8 0.695  | 9 0.845  | 10 0.796 |          |          |          |  |  |
| ELEMENT 5 |          |          |          |          |          |          |          |          |  |  |
| 6 0.619   | 7 0.877  | 8 0.751  | 9 1.368  | 10 1.080 |          |          |          |          |  |  |
| ELEMENT 6 |          |          |          |          |          |          |          |          |  |  |
| 7 0.995   | 8 0.607  | 9 1.088  | 10 0.982 |          |          |          |          |          |  |  |
| ELEMENT 7 |          |          |          |          |          |          |          |          |  |  |
| 8 0.810   | 9 1.809  | 10 1.664 |          |          |          |          |          |          |  |  |
| ELEMENT 8 |          |          |          |          |          |          |          |          |  |  |
| 9 1.220   | 10 1.127 |          |          |          |          |          |          |          |  |  |
| ELEMENT 9 |          |          |          |          |          |          |          |          |  |  |
| 10 0.498  |          |          |          |          |          |          |          |          |  |  |

# SUMS OF PRODUCTS

|           |            |            |            |            |          |          |           |           |  |  |
|-----------|------------|------------|------------|------------|----------|----------|-----------|-----------|--|--|
| ELEMENT 1 |            |            |            |            |          |          |           |           |  |  |
| 2 -29.556 | 3 -3.069   | 4 -8.069   | 5 17.540   | 6 -0.685   | 7 14.744 | 8 -5.022 | 9 -17.780 | 10 -0.044 |  |  |
| ELEMENT 2 |            |            |            |            |          |          |           |           |  |  |
| 3 -1.720  | 4 0.089    | 5 -23.941  | 6 -1.041   | 7 -34.473  | 8 -3.426 | 9 31.276 | 10 11.208 |           |  |  |
| ELEMENT 3 |            |            |            |            |          |          |           |           |  |  |
| 4 4.958   | 5 -8.243   | 6 -3.853   | 7 -12.763  | 8 -8.683   | 9 12.834 | 10 8.420 |           |           |  |  |
| ELEMENT 4 |            |            |            |            |          |          |           |           |  |  |
| 5 -6.691  | 6 -5.127   | 7 -2.753   | 8 -0.845   | 9 5.523    | 10 0.208 |          |           |           |  |  |
| ELEMENT 5 |            |            |            |            |          |          |           |           |  |  |
| 6 6.656   | 7 24.954   | 8 3.898    | 9 -30.418  | 10 -12.152 |          |          |           |           |  |  |
| ELEMENT 6 |            |            |            |            |          |          |           |           |  |  |
| 7 9.339   | 8 4.072    | 9 -11.632  | 10 -11.678 |            |          |          |           |           |  |  |
| ELEMENT 7 |            |            |            |            |          |          |           |           |  |  |
| 8 26.115  | 9 -57.829  | 10 -47.050 |            |            |          |          |           |           |  |  |
| ELEMENT 8 |            |            |            |            |          |          |           |           |  |  |
| 9 -19.045 | 10 -19.186 |            |            |            |          |          |           |           |  |  |
| ELEMENT 9 |            |            |            |            |          |          |           |           |  |  |
| 10 34.649 |            |            |            |            |          |          |           |           |  |  |



THE COMPONENT-SPACE IS LIMITED TO 9 DIMENSIONS

| COMPONENT | RGCT     | AS PER CENT |
|-----------|----------|-------------|
| 1         | 204.0194 | 59.90       |
| 2         | 66.3007  | 19.47       |
| 3         | 28.0375  | 8.23        |
| 4         | 13.8637  | 4.07        |
| 5         | 11.0450  | 3.24        |
| 6         | 9.0834   | 2.67        |
| 7         | 4.4985   | 1.32        |
| 8         | 2.3280   | 0.68        |
| 9         | 1.4072   | 0.41        |

BARTLETT TEST NOT APPLIED

| COMPONENT 1 |         |         |          | COMPONENT 2 |         |          |         | COMPONENT 3 |          |  |  |
|-------------|---------|---------|----------|-------------|---------|----------|---------|-------------|----------|--|--|
| ELEMENT     | VECTOR  | LOADING | RESIDUAL | VECTOR      | LOADING | RESIDUAL | VECTOR  | LOADING     | RESIDUAL |  |  |
| 1           | -0.1871 | -2.6721 | 24.7995  | 0.5463      | 4.4485  | 5.0104   | -0.1695 | -0.6976     | 4.2049   |  |  |
| 2           | 0.3435  | 4.9058  | 27.5159  | -0.5540     | -4.5108 | 7.1723   | -0.4123 | -2.1833     | 2.4054   |  |  |
| 3           | 0.1109  | 1.5835  | 9.6116   | 0.1227      | 0.9993  | 8.6131   | 0.3957  | 2.0952      | 4.2231   |  |  |
| 4           | 0.0471  | 0.6733  | 12.2544  | -0.0694     | -0.5651 | 11.9250  | 0.5147  | 2.7256      | 4.5064   |  |  |
| 5           | -0.2739 | -3.9119 | 13.0932  | 0.2436      | 1.9838  | 9.1579   | -0.3754 | -2.0939     | 4.7735   |  |  |
| 6           | -0.0988 | -1.4108 | 11.9575  | -0.1220     | -0.9535 | 10.9705  | -0.3144 | -1.8236     | 7.6451   |  |  |
| 7           | -0.5917 | -8.4519 | 8.2914   | -0.2258     | -1.8388 | 4.9004   | 0.2609  | 1.3815      | 2.9919   |  |  |
| 8           | -0.1978 | -2.6830 | 14.9229  | -0.3367     | -2.7420 | 7.4044   | 0.0450  | 0.2384      | 7.3476   |  |  |
| 9           | 0.4943  | 7.0600  | 2.5786   | 0.0274      | 0.2230  | 2.5289   | 0.1733  | 0.5174      | 1.6673   |  |  |
| 10          | 0.3436  | 4.9073  | 11.5456  | 0.3679      | 2.9957  | 2.5712   | -0.0679 | -0.3597     | 2.4416   |  |  |
| CONSTRUCT   |         |         |          |             |         |          |         |             |          |  |  |
| 1           | 0.1346  | 1.9228  | 1.6658   | -0.1129     | -0.9190 | 0.8212   | 0.1006  | 0.8327      | 0.5374   |  |  |
| 2           | 0.1629  | 2.3260  | 0.6907   | 0.0284      | 0.2315  | 0.6371   | 0.0593  | 0.3138      | 0.5386   |  |  |
| 3           | 0.0972  | 1.3890  | 0.5026   | 0.0612      | 0.4982  | 0.2545   | -0.0365 | -0.1934     | 0.2171   |  |  |
| 4           | 0.1645  | 2.3491  | 2.7126   | 0.1017      | 0.8279  | 2.0271   | 0.1839  | 0.9733      | 1.0758   |  |  |
| 5           | 0.0094  | 0.1349  | 8.9186   | 0.3241      | 2.6390  | 1.9541   | -0.1909 | -0.9578     | 1.0367   |  |  |
| 6           | 0.1006  | 1.4365  | 0.9362   | -0.0756     | -0.6156 | 0.5572   | 0.0807  | 0.4271      | 0.3748   |  |  |
| 7           | 0.0294  | 0.4193  | 4.0711   | 0.0974      | 0.7930  | 3.4423   | 0.1147  | 0.6071      | 3.0737   |  |  |
| 8           | 0.1167  | 1.6669  | 2.5972   | 0.0593      | 0.4827  | 2.3642   | 0.1348  | 0.7139      | 1.8545   |  |  |
| 9           | 0.1087  | 1.5525  | 0.3507   | -0.0015     | -0.0123 | 0.3506   | 0.0239  | 0.1259      | 0.3347   |  |  |
| 10          | -0.0424 | -0.6057 | 4.3490   | 0.1754      | 1.4280  | 2.3097   | 0.1658  | 0.8781      | 1.5387   |  |  |
| 11          | 0.1358  | 1.9404  | 8.6516   | -0.2216     | -1.8047 | 5.3948   | -0.2757 | -1.4556     | 3.2642   |  |  |
| 12          | 0.2489  | 3.5555  | 1.9136   | -0.0573     | -0.4666 | 1.6959   | 0.2277  | 1.2056      | 0.2425   |  |  |
| 13          | 0.1281  | 1.8304  | 15.6602  | 0.4079      | 3.3213  | 4.6251   | 0.1592  | 0.8429      | 3.9186   |  |  |
| 14          | 0.2065  | 2.9490  | 1.6021   | -0.0153     | -0.1246 | 1.5866   | -0.1491 | -0.7842     | 0.9717   |  |  |
| 15          | 0.2540  | 3.6278  | 2.0068   | 0.0595      | 0.4843  | 1.7722   | -0.1149 | -0.6086     | 1.4019   |  |  |
| 16          | 0.1350  | 1.9282  | 1.7153   | 0.0697      | 0.5673  | 1.3934   | -0.1814 | -0.9606     | 0.4707   |  |  |
| 17          | 0.1386  | 1.9795  | 0.9462   | 0.0016      | 0.0128  | 0.9460   | 0.0096  | 0.0508      | 0.9434   |  |  |
| 18          | 0.1633  | 2.3330  | 1.5237   | 0.0441      | 0.3594  | 1.3945   | 0.1976  | 1.0461      | 0.3001   |  |  |
| 19          | 0.1575  | 2.2491  | 3.3381   | -0.0224     | -0.1823 | 3.3049   | -0.2015 | -1.0669     | 2.1667   |  |  |
| 20          | 0.1651  | 2.3586  | 2.7859   | 0.0816      | 0.6648  | 2.3439   | 0.2189  | 1.1591      | 1.0004   |  |  |
| 21          | 0.1795  | 2.5640  | 0.5474   | 0.0426      | 0.3468  | 0.4272   | -0.0630 | -0.3335     | 0.3159   |  |  |
| 22          | 0.1964  | 2.8059  | 3.7627   | 0.1723      | 1.4030  | 1.7943   | -0.1411 | -0.7469     | 1.2364   |  |  |
| 23          | 0.1747  | 2.4956  | 2.4193   | 0.0204      | 0.1664  | 2.3916   | -0.2558 | -1.3544     | 0.5571   |  |  |
| 24          | 0.0097  | 0.1386  | 6.2821   | 0.2676      | 2.1788  | 1.5350   | -0.1533 | -0.8116     | 0.8763   |  |  |
| 25          | 0.0582  | 0.8313  | 9.3624   | -0.2861     | -2.3256 | 3.9353   | 0.2585  | 1.3689      | 2.0615   |  |  |
| 26          | 0.1613  | 2.3041  | 1.2549   | 0.0978      | 0.7965  | 0.6205   | -0.0265 | -0.1405     | 0.6008   |  |  |
| 27          | 0.2440  | 3.4851  | 1.6419   | -0.0165     | -0.1347 | 1.6238   | -0.2203 | -1.1663     | 0.6625   |  |  |
| 28          | -0.0816 | -1.1651 | 16.3806  | 0.4452      | 3.6250  | 3.2400   | 0.0167  | 0.0884      | 3.2322   |  |  |
| 29          | 0.1880  | 2.6848  | 1.3526   | 0.0671      | 0.5460  | 1.0544   | -0.1072 | -0.5678     | 0.7321   |  |  |
| 30          | 0.1913  | 2.7328  | 1.3670   | 0.0578      | 0.4704  | 1.1457   | 0.0307  | 0.1624      | 1.1193   |  |  |
| 31          | 0.0709  | 1.0133  | 9.1997   | -0.3185     | -2.5935 | 2.4736   | -0.2571 | -1.3611     | 0.6210   |  |  |
| 32          | 0.2184  | 3.1197  | 3.2083   | -0.1320     | -1.0751 | 1.1814   | 0.2231  | 1.1814      | 0.6566   |  |  |
| 33          | 0.0827  | 1.1811  | 3.3016   | -0.1063     | -0.8654 | 2.5527   | 0.2333  | 1.2355      | 1.0263   |  |  |
| 34          | 0.1339  | 1.9128  | 0.6914   | 0.0391      | 0.3103  | 0.5851   | 0.1090  | 0.5772      | 0.2520   |  |  |
| 35          | 0.2249  | 3.2124  | 1.2316   | -0.1099     | -0.8952 | 0.4302   | 0.0939  | 0.4971      | 0.1830   |  |  |
| 36          | 0.1057  | 1.5096  | 1.3268   | 0.0232      | 0.1887  | 1.2912   | 0.1476  | 0.7923      | 0.6635   |  |  |
| 37          | 0.2023  | 2.8897  | 1.4763   | -0.0476     | -0.3875 | 1.3261   | 0.1390  | 0.7308      | 0.7521   |  |  |
| 38          | 0.2031  | 2.9016  | 0.6729   | -0.0258     | -0.2101 | 0.6287   | -0.0417 | -0.2209     | 0.5799   |  |  |
| 39          | 0.2039  | 2.9126  | 1.8856   | -0.0978     | -0.7966 | 1.2510   | -0.1590 | -0.8419     | 0.5422   |  |  |
| 40          | 0.1686  | 2.4080  | 2.2722   | 0.1527      | 1.2433  | 0.7264   | -0.0524 | -0.2776     | 0.6493   |  |  |

# POLAR CO-ORDINATES

| CONSTRUCT | H      | V      | R    |
|-----------|--------|--------|------|
| 1         | -25.55 | 14.04  | 0.95 |
| 2         | 5.69   | 7.65   | 0.95 |
| 3         | 19.73  | -7.47  | 0.95 |
| 4         | 19.42  | 21.34  | 0.93 |
| 5         | 87.07  | -19.92 | 0.94 |
| 6         | -23.20 | 15.29  | 0.94 |
| 7         | 62.13  | 34.09  | 0.52 |
| 8         | 16.15  | 22.36  | 0.81 |
| 9         | -0.45  | 4.63   | 0.94 |
| 10        | 112.98 | 29.51  | 0.82 |
| 11        | -42.92 | -28.85 | 0.86 |
| 12        | -7.48  | 18.58  | 0.99 |
| 13        | 61.14  | 12.53  | 0.89 |
| 14        | -2.42  | -14.88 | 0.95 |
| 15        | 7.60   | -9.44  | 0.95 |
| 16        | 16.39  | -25.54 | 0.96 |
| 17        | 0.37   | 1.47   | 0.90 |
| 18        | 8.76   | 23.90  | 0.98 |
| 19        | -4.63  | -25.30 | 0.86 |
| 20        | 15.74  | 25.31  | 0.94 |
| 21        | 7.70   | -7.35  | 0.98 |
| 22        | 26.57  | -13.39 | 0.95 |
| 23        | 3.82   | -28.44 | 0.97 |
| 24        | 86.36  | -20.39 | 0.93 |
| 25        | -70.36 | 28.96  | 0.89 |
| 26        | 19.07  | -3.30  | 0.95 |
| 27        | -2.21  | -18.49 | 0.99 |
| 28        | 107.82 | 1.33   | 0.90 |
| 29        | 11.50  | -11.71 | 0.96 |
| 30        | 9.77   | 3.35   | 0.93 |
| 31        | -68.66 | -26.05 | 0.97 |
| 32        | -19.02 | 19.70  | 0.97 |
| 33        | -36.23 | 40.16  | 0.88 |
| 34        | 9.21   | 16.59  | 0.97 |
| 35        | -15.57 | 8.48   | 0.99 |
| 36        | 7.13   | 27.51  | 0.90 |
| 37        | -7.64  | 14.07  | 0.96 |
| 38        | -4.14  | -4.34  | 0.97 |
| 39        | -15.30 | -15.58 | 0.97 |
| 40        | 27.31  | -5.85  | 0.96 |

# PROJECTIONS FOR ELEMENTS

| ELEMENT | H       | V      | R    |
|---------|---------|--------|------|
| 1       | 120.99  | -9.81  | 0.93 |
| 2       | -42.60  | -18.14 | 0.98 |
| 3       | 32.25   | 48.21  | 0.81 |
| 4       | -40.01  | 72.12  | 0.80 |
| 5       | 153.11  | -25.52 | 0.91 |
| 6       | -144.85 | -46.58 | 0.67 |
| 7       | -167.73 | 9.07   | 0.98 |
| 8       | -134.38 | 3.56   | 0.82 |
| 9       | 1.81    | 7.40   | 0.98 |
| 10      | 31.40   | -3.58  | 0.97 |

## COMPONENT 4

## COMPONENT 5

| ELEMENT   | VECTOR  | LOADING | RESIDUAL | VECTOR  | LOADING | RESIDUAL |
|-----------|---------|---------|----------|---------|---------|----------|
| 1         | -0.3455 | -1.2864 | 2.5499   | 0.3677  | 1.2219  | 1.0568   |
| 2         | -0.1667 | -0.6206 | 2.0202   | 0.1755  | 0.5833  | 1.6800   |
| 3         | 0.3771  | 1.4042  | 2.2512   | 0.2194  | 0.7291  | 1.7197   |
| 4         | 0.2000  | 0.7446  | 3.9519   | -0.3451 | -1.1470 | 2.6363   |
| 5         | 0.2416  | 0.8997  | 3.9640   | -0.4761 | -1.5823 | 1.4602   |
| 6         | 0.6079  | 2.2636  | 2.5213   | 0.2236  | 0.7432  | 1.9650   |
| 7         | -0.2216 | -0.8252 | 2.3110   | 0.3316  | 1.1020  | 1.0965   |
| 8         | -0.3561 | -1.3260 | 5.5894   | -0.4363 | -1.4501 | 3.4866   |
| 9         | -0.0977 | -0.3637 | 1.5550   | 0.1796  | 0.5969  | 1.1987   |
| 10        | -0.2391 | -0.8903 | 1.6492   | -0.2398 | -0.7568 | 1.0143   |
| CONSTRUCT |         |         |          |         |         |          |
| 1         | -0.1389 | -0.5172 | 0.2699   | 0.0051  | 0.0171  | 0.2696   |
| 2         | -0.0490 | -0.1825 | 0.5053   | -0.0455 | -0.1513 | 0.4824   |
| 3         | 0.0254  | 0.0946  | 0.2091   | -0.0148 | -0.0492 | 0.2057   |
| 4         | 0.0499  | 0.1858  | 1.0452   | 0.1264  | 0.4201  | 0.8688   |
| 5         | 0.0865  | 0.3221  | 0.9329   | 0.2276  | 0.7564  | 0.3608   |
| 6         | 0.0315  | 0.1173  | 0.3610   | -0.1211 | -0.4026 | 0.1989   |
| 7         | -0.2598 | -0.9672 | 2.1382   | -0.0348 | -0.1158 | 2.1248   |
| 8         | -0.2679 | -0.9974 | 0.8597   | 0.2300  | 0.7644  | 0.2755   |
| 9         | -0.1221 | -0.4545 | 0.1281   | -0.0636 | -0.2112 | 0.0835   |
| 10        | -0.0247 | -0.0921 | 1.5302   | 0.2398  | 0.7971  | 0.8945   |
| 11        | 0.3489  | 1.2991  | 1.5766   | -0.3402 | -1.1308 | 0.2979   |
| 12        | 0.0118  | 0.0438  | 0.2406   | 0.0418  | 0.1391  | 0.2212   |
| 13        | 0.3952  | 1.4716  | 1.7529   | 0.0297  | 0.0988  | 1.7431   |
| 14        | 0.0377  | 0.1404  | 0.9520   | 0.1973  | 0.6558  | 0.5219   |
| 15        | 0.0947  | 0.3526  | 1.2775   | 0.0863  | 0.2868  | 1.1953   |
| 16        | -0.0193 | -0.0717 | 0.4655   | 0.1133  | 0.3765  | 0.3238   |
| 17        | -0.1322 | -0.4923 | 0.7011   | -0.1938 | -0.6440 | 0.2864   |
| 18        | 0.0111  | 0.0415  | 0.2984   | -0.1340 | -0.4452 | 0.1002   |
| 19        | -0.3514 | -1.3085 | 0.4546   | 0.1142  | 0.3795  | 0.3106   |
| 20        | -0.2081 | -0.7749 | 0.4000   | 0.0173  | 0.0576  | 0.3967   |
| 21        | 0.0600  | 0.2233  | 0.2661   | -0.1343 | -0.4464 | 0.0667   |
| 22        | 0.1841  | 0.6856  | 0.7663   | 0.2561  | 0.8512  | 0.0418   |
| 23        | -0.1501 | -0.5590 | 0.2447   | 0.0507  | 0.1685  | 0.2162   |
| 24        | 0.0752  | 0.2800  | 0.7979   | 0.1467  | 0.4875  | 0.5603   |
| 25        | 0.2190  | 0.8153  | 1.3967   | 0.3080  | 1.0235  | 0.3492   |
| 26        | 0.0962  | 0.3582  | 0.4725   | -0.1193 | -0.3966 | 0.3152   |
| 27        | -0.0377 | -0.1403 | 0.2438   | 0.1075  | 0.3587  | 0.1151   |
| 28        | -0.2504 | -0.9322 | 2.3632   | -0.3517 | -1.1690 | 0.9968   |
| 29        | 0.1105  | 0.4116  | 0.5627   | -0.1117 | -0.3713 | 0.4248   |
| 30        | 0.1654  | 0.6157  | 0.7402   | -0.1807 | -0.6006 | 0.3795   |
| 31        | -0.0928 | -0.3457 | 0.5015   | 0.1125  | 0.3739  | 0.3617   |
| 32        | 0.0563  | 0.2097  | 0.6126   | -0.1630 | -0.5418 | 0.3191   |
| 33        | 0.0818  | 0.3046  | 0.9335   | 0.2177  | 0.7234  | 0.4101   |
| 34        | -0.0044 | -0.0163 | 0.2517   | -0.1315 | -0.4371 | 0.0606   |
| 35        | 0.0277  | 0.1031  | 0.1724   | 0.0534  | 0.1774  | 0.1410   |
| 36        | -0.1547 | -0.5761 | 0.3316   | 0.0405  | 0.1346  | 0.3135   |
| 37        | 0.1230  | 0.4578  | 0.5825   | -0.1988 | -0.6606 | 0.1462   |
| 38        | -0.1100 | -0.4096 | 0.4121   | 0.0364  | 0.1209  | 0.3975   |
| 39        | -0.1655 | -0.6164 | 0.1623   | -0.0758 | -0.2518 | 0.0989   |
| 40        | -0.1196 | -0.4454 | 0.4509   | -0.0283 | -0.0942 | 0.4421   |

RELATIONS BETWEEN CONSTRUCTS AND ELEMENTS  
EXPRESSED AS COSINES

|                           |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
|---------------------------|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|----|--------|
| CONSTRUCT 1 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.696 | 2 | 0.734  | 3 | 0.281  | 4 | 0.317  | 5 | -0.924 | 6 | -0.381 | 7 | -0.650 | 8 | -0.124 | 9 | 0.853  | 10 | 0.521  |
| CONSTRUCT 2 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.403 | 2 | 0.579  | 3 | 0.485  | 4 | 0.308  | 5 | -0.681 | 6 | -0.548 | 7 | -0.871 | 8 | -0.622 | 9 | 0.907  | 10 | 0.862  |
| CONSTRUCT 3 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.197 | 2 | 0.451  | 3 | 0.539  | 4 | -0.023 | 5 | -0.449 | 6 | -0.378 | 7 | -0.930 | 8 | -0.709 | 9 | 0.933  | 10 | 0.518  |
| CONSTRUCT 4 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.206 | 2 | 0.332  | 3 | 0.704  | 4 | 0.408  | 5 | -0.591 | 6 | -0.596 | 7 | -0.745 | 8 | -0.802 | 9 | 0.849  | 10 | 0.758  |
| CONSTRUCT 5 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.763  | 2 | -0.387 | 3 | 0.132  | 4 | -0.354 | 5 | 0.388  | 6 | -0.021 | 7 | -0.242 | 8 | -0.737 | 9 | 0.037  | 10 | 0.444  |
| CONSTRUCT 6 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.787 | 2 | 0.733  | 3 | 0.430  | 4 | 0.528  | 5 | -0.710 | 6 | -0.437 | 7 | -0.691 | 8 | -0.285 | 9 | 0.783  | 10 | 0.512  |
| CONSTRUCT 7 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.244  | 2 | -0.283 | 3 | 0.154  | 4 | -0.063 | 5 | -0.291 | 6 | -0.387 | 7 | -0.224 | 8 | 0.053  | 9 | 0.344  | 10 | 0.430  |
| CONSTRUCT 8 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.085 | 2 | 0.303  | 3 | 0.489  | 4 | 0.061  | 5 | -0.758 | 6 | -0.632 | 7 | -0.589 | 8 | -0.455 | 9 | 0.907  | 10 | 0.728  |
| CONSTRUCT 9 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.430 | 2 | 0.628  | 3 | 0.394  | 4 | 0.163  | 5 | -0.727 | 6 | -0.586 | 7 | -0.868 | 8 | -0.374 | 9 | 0.920  | 10 | 0.816  |
| CONSTRUCT 10 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.735  | 2 | -0.677 | 3 | 0.224  | 4 | 0.201  | 5 | 0.155  | 6 | -0.193 | 7 | 0.226  | 8 | -0.351 | 9 | -0.170 | 10 | -0.005 |
| CONSTRUCT 11 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.750 | 2 | 0.778  | 3 | -0.110 | 4 | 0.099  | 5 | -0.257 | 6 | 0.270  | 7 | -0.544 | 8 | -0.090 | 9 | 0.428  | 10 | 0.204  |
| CONSTRUCT 12 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.577 | 2 | 0.639  | 3 | 0.603  | 4 | 0.452  | 5 | -0.843 | 6 | -0.501 | 7 | -0.802 | 8 | -0.490 | 9 | 0.938  | 10 | 0.669  |
| CONSTRUCT 13 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.293  | 2 | -0.330 | 3 | 0.695  | 4 | 0.069  | 5 | -0.102 | 6 | -0.152 | 7 | -0.571 | 8 | -0.661 | 9 | 0.462  | 10 | 0.673  |
| CONSTRUCT 14 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.415 | 2 | 0.759  | 3 | 0.298  | 4 | -0.041 | 5 | -0.605 | 6 | -0.204 | 7 | -0.854 | 8 | -0.664 | 9 | 0.884  | 10 | 0.726  |
| CONSTRUCT 15 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.370 | 2 | 0.601  | 3 | 0.486  | 4 | -0.064 | 5 | -0.553 | 6 | -0.275 | 7 | -0.911 | 8 | -0.664 | 9 | 0.901  | 10 | 0.641  |

|                           |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
|---------------------------|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|----|--------|
| CONSTRUCT 16 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.076 | 2 | 0.537  | 3 | 0.244  | 4 | -0.289 | 5 | -0.416 | 6 | -0.145 | 7 | -0.893 | 8 | -0.619 | 9 | 0.793  | 10 | 0.780  |
| CONSTRUCT 17 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.399 | 2 | 0.601  | 3 | 0.288  | 4 | 0.262  | 5 | -0.644 | 6 | -0.527 | 7 | -0.887 | 8 | -0.325 | 9 | 0.846  | 10 | 0.791  |
| CONSTRUCT 18 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.420 | 2 | 0.373  | 3 | 0.690  | 4 | 0.459  | 5 | -0.705 | 6 | -0.582 | 7 | -0.830 | 8 | -0.483 | 9 | 0.904  | 10 | 0.752  |
| CONSTRUCT 19 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.201 | 2 | 0.722  | 3 | -0.033 | 4 | -0.255 | 5 | -0.598 | 6 | -0.306 | 7 | -0.742 | 8 | -0.290 | 9 | 0.732  | 10 | 0.668  |
| CONSTRUCT 20 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.205 | 2 | 0.348  | 3 | 0.621  | 4 | 0.376  | 5 | -0.688 | 6 | -0.797 | 7 | -0.725 | 8 | -0.554 | 9 | 0.849  | 10 | 0.792  |
| CONSTRUCT 21 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.380 | 2 | 0.591  | 3 | 0.364  | 4 | 0.163  | 5 | -0.545 | 6 | -0.311 | 7 | -0.904 | 8 | -0.610 | 9 | 0.915  | 10 | 0.865  |
| CONSTRUCT 22 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.016 | 2 | 0.381  | 3 | 0.487  | 4 | -0.092 | 5 | -0.403 | 6 | -0.151 | 7 | -0.885 | 8 | -0.868 | 9 | 0.790  | 10 | 0.831  |
| CONSTRUCT 23 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.225 | 2 | 0.690  | 3 | 0.102  | 4 | -0.308 | 5 | -0.488 | 6 | -0.192 | 7 | -0.874 | 8 | -0.451 | 9 | 0.786  | 10 | 0.772  |
| CONSTRUCT 24 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.760  | 2 | -0.373 | 3 | 0.081  | 4 | -0.278 | 5 | 0.376  | 6 | -0.008 | 7 | -0.268 | 8 | -0.715 | 9 | 0.036  | 10 | 0.438  |
| CONSTRUCT 25 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.765 | 2 | 0.483  | 3 | 0.355  | 4 | 0.386  | 5 | -0.722 | 6 | 0.165  | 7 | -0.023 | 8 | 0.195  | 9 | 0.310  | 10 | -0.248 |
| CONSTRUCT 26 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.208 | 2 | 0.407  | 3 | 0.496  | 4 | 0.177  | 5 | -0.490 | 6 | -0.306 | 7 | -0.977 | 8 | -0.647 | 9 | 0.842  | 10 | 0.891  |
| CONSTRUCT 27 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.402 | 2 | 0.778  | 3 | 0.244  | 4 | -0.103 | 5 | -0.595 | 6 | -0.224 | 7 | -0.907 | 8 | -0.569 | 9 | 0.886  | 10 | 0.764  |
| CONSTRUCT 28 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.767  | 2 | -0.713 | 3 | -0.012 | 4 | -0.117 | 5 | 0.604  | 6 | -0.389 | 7 | 0.101  | 8 | -0.273 | 9 | -0.258 | 10 | 0.292  |
| CONSTRUCT 29 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.297 | 2 | 0.530  | 3 | 0.379  | 4 | 0.067  | 5 | -0.513 | 6 | -0.181 | 7 | -0.983 | 8 | -0.591 | 9 | 0.847  | 10 | 0.863  |
| CONSTRUCT 30 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.393 | 2 | 0.447  | 3 | 0.540  | 4 | 0.265  | 5 | -0.582 | 6 | -0.265 | 7 | -0.960 | 8 | -0.533 | 9 | 0.892  | 10 | 0.819  |
| CONSTRUCT 31 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.686 | 2 | 0.850  | 3 | -0.363 | 4 | -0.243 | 5 | -0.446 | 6 | 0.310  | 7 | -0.173 | 8 | 0.301  | 9 | 0.250  | 10 | -0.055 |
| CONSTRUCT 32 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.705 | 2 | 0.682  | 3 | 0.401  | 4 | 0.555  | 5 | -0.032 | 6 | -0.483 | 7 | -0.719 | 8 | -0.275 | 9 | 0.875  | 10 | 0.558  |

CCNSTRUCT 33 WITH ELEMENT

1 -0.642 2 0.512 3 0.634 4 0.556 5 -0.790 6 -0.332 7 -0.293 8 -0.290 9 0.589 10 0.156

CCNSTRUCT 34 WITH ELEMENT

1 -0.389 2 0.426 3 0.556 4 0.463 5 -0.682 6 -0.553 7 -0.888 8 -0.530 9 0.908 10 0.640

CCNSTRUCT 35 WITH ELEMENT

1 -0.659 2 0.772 3 0.430 4 0.363 5 -0.861 6 -0.326 7 -0.817 8 -0.416 9 0.938 10 0.613

CCNSTRUCT 36 WITH ELEMENT

1 -0.247 2 0.367 3 0.431 4 0.471 5 -0.808 6 -0.659 7 -0.678 8 -0.448 9 0.852 10 0.704

CCNSTRUCT 37 WITH ELEMENT

1 -0.657 2 0.615 3 0.511 4 0.497 5 -0.715 6 -0.397 7 -0.839 8 -0.456 9 0.900 10 0.696

CONSTRUCT 38 WITH ELEMENT

1 -0.448 2 0.757 3 0.263 4 0.180 5 -0.730 6 -0.358 7 -0.882 8 -0.546 9 0.930 10 0.775

CONSTRUCT 39 WITH ELEMENT

1 -0.546 2 0.860 3 0.067 4 0.011 5 -0.663 6 -0.273 7 -0.841 8 -0.305 9 0.854 10 0.662

CONSTRUCT 40 WITH ELEMENT

1 -0.019 2 0.303 3 0.390 4 -0.082 5 -0.471 6 -0.419 7 -0.909 8 -0.607 9 0.857 10 0.955

INTER-ELEMENT RELATIONS  
EXPRESSED AS COSINES

ELEMENT 1 WITH ELEMENT

2 -0.728 3 -0.156 4 -0.401 5 0.582 6 -0.032 7 0.292 8 -0.189 9 -0.435 10 -0.001

ELEMENT 2 WITH ELEMENT

3 -0.069 4 0.003 5 -0.626 6 -0.039 7 -0.538 8 -0.101 9 0.601 10 0.261

ELEMENT 3 WITH ELEMENT

4 0.399 5 -0.444 6 -0.296 7 -0.411 8 -0.530 9 0.509 10 0.405

ELEMENT 4 WITH ELEMENT

5 -0.352 6 -0.385 7 -0.087 8 -0.050 9 0.214 10 0.010

ELEMENT 5 WITH ELEMENT

6 0.334 7 0.524 8 0.156 9 -0.788 10 -0.382

ELEMENT 6 WITH ELEMENT

7 0.280 8 0.232 9 -0.430 10 -0.524

ELEMENT 7 WITH ELEMENT

8 0.622 9 -0.855 10 -0.883

ELEMENT 8 WITH ELEMENT

9 -0.555 10 -0.683

ELEMENT 9 WITH ELEMENT

10 0.802

RELATIONS BETWEEN CONSTRUCTS AND ELEMENTS  
EXPRESSED IN DEGREES

|                           |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
|---------------------------|-------|---|-------|---|------|---|-------|---|-------|---|-------|---|-------|---|-------|---|------|
| CONSTRUCT 1 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 134.1 | 2 | 42.8  | 3 | 73.7 | 4 | 71.5  | 5 | 157.5 | 6 | 112.4 | 7 | 120.5 | 8 | 97.1  | 9 | 31.5 |
| CONSTRUCT 2 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 113.8 | 2 | 54.6  | 3 | 61.0 | 4 | 72.1  | 5 | 132.9 | 6 | 123.2 | 7 | 150.5 | 8 | 128.5 | 9 | 25.0 |
| CONSTRUCT 3 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 101.4 | 2 | 63.2  | 3 | 57.4 | 4 | 91.3  | 5 | 116.7 | 6 | 112.2 | 7 | 158.4 | 8 | 135.1 | 9 | 33.5 |
| CONSTRUCT 4 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 101.9 | 2 | 70.6  | 3 | 45.2 | 4 | 65.9  | 5 | 126.2 | 6 | 126.6 | 7 | 138.1 | 8 | 143.3 | 9 | 31.9 |
| CONSTRUCT 5 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 40.3  | 2 | 112.8 | 3 | 82.4 | 4 | 110.7 | 5 | 67.2  | 6 | 91.2  | 7 | 104.0 | 8 | 137.5 | 9 | 87.9 |
| CONSTRUCT 6 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 141.9 | 2 | 42.8  | 3 | 64.5 | 4 | 58.1  | 5 | 135.2 | 6 | 115.9 | 7 | 123.7 | 8 | 106.5 | 9 | 38.5 |
| CONSTRUCT 7 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 75.8  | 2 | 106.4 | 3 | 81.1 | 4 | 93.6  | 5 | 106.9 | 6 | 112.8 | 7 | 102.9 | 8 | 86.7  | 9 | 69.9 |
| CONSTRUCT 8 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 94.9  | 2 | 72.4  | 3 | 60.7 | 4 | 86.5  | 5 | 139.3 | 6 | 129.2 | 7 | 126.1 | 8 | 117.1 | 9 | 36.2 |
| CONSTRUCT 9 WITH ELEMENT  |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 115.5 | 2 | 51.1  | 3 | 66.8 | 4 | 80.6  | 5 | 136.6 | 6 | 125.9 | 7 | 150.2 | 8 | 111.9 | 9 | 23.1 |
| CONSTRUCT 10 WITH ELEMENT |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 42.7  | 2 | 132.6 | 3 | 77.0 | 4 | 78.4  | 5 | 81.1  | 6 | 101.1 | 7 | 76.9  | 8 | 110.6 | 9 | 99.8 |
| CONSTRUCT 11 WITH ELEMENT |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 138.6 | 2 | 38.9  | 3 | 56.3 | 4 | 84.3  | 5 | 104.9 | 6 | 74.3  | 7 | 122.9 | 8 | 95.1  | 9 | 64.7 |
| CONSTRUCT 12 WITH ELEMENT |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 125.3 | 2 | 50.3  | 3 | 52.9 | 4 | 63.1  | 5 | 147.4 | 6 | 120.1 | 7 | 143.4 | 8 | 119.3 | 9 | 20.3 |
| CONSTRUCT 13 WITH ELEMENT |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 73.0  | 2 | 109.2 | 3 | 46.0 | 4 | 86.1  | 5 | 95.8  | 6 | 98.7  | 7 | 124.8 | 8 | 131.4 | 9 | 62.5 |
| CONSTRUCT 14 WITH ELEMENT |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 114.5 | 2 | 40.6  | 3 | 72.7 | 4 | 92.3  | 5 | 127.2 | 6 | 101.8 | 7 | 148.6 | 8 | 131.6 | 9 | 27.9 |
| CONSTRUCT 15 WITH ELEMENT |       |   |       |   |      |   |       |   |       |   |       |   |       |   |       |   |      |
| 1                         | 111.7 | 2 | 53.1  | 3 | 60.9 | 4 | 93.7  | 5 | 123.6 | 6 | 105.9 | 7 | 155.6 | 8 | 131.6 | 9 | 25.8 |



|                           |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
|---------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|----|-------|
| CONSTRUCT 16 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 94.4  | 2 | 57.5  | 3 | 75.9  | 4 | 106.8 | 5 | 114.6 | 6 | 56.3  | 7 | 153.3 | 8 | 128.2 | 9 | 37.5  | 10 | 30.0  |
| CONSTRUCT 17 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 113.5 | 2 | 53.1  | 3 | 73.3  | 4 | 74.8  | 5 | 130.1 | 6 | 121.8 | 7 | 152.5 | 8 | 109.0 | 9 | 32.2  | 10 | 37.7  |
| CONSTRUCT 18 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 114.8 | 2 | 68.1  | 3 | 46.4  | 4 | 62.7  | 5 | 134.0 | 6 | 125.6 | 7 | 146.1 | 8 | 118.9 | 9 | 25.3  | 10 | 37.6  |
| CONSTRUCT 19 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 101.6 | 2 | 43.8  | 3 | 91.9  | 4 | 104.8 | 5 | 126.7 | 6 | 107.8 | 7 | 137.9 | 8 | 106.9 | 9 | 43.0  | 10 | 46.1  |
| CONSTRUCT 20 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 101.8 | 2 | 69.6  | 3 | 51.6  | 4 | 67.9  | 5 | 133.5 | 6 | 142.9 | 7 | 136.5 | 8 | 123.6 | 9 | 31.9  | 10 | 37.6  |
| CONSTRUCT 21 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 112.4 | 2 | 53.8  | 3 | 68.6  | 4 | 80.6  | 5 | 123.0 | 6 | 108.1 | 7 | 169.9 | 8 | 127.6 | 9 | 23.9  | 10 | 30.1  |
| CONSTRUCT 22 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 90.9  | 2 | 67.6  | 3 | 60.8  | 4 | 95.3  | 5 | 113.8 | 6 | 98.7  | 7 | 152.2 | 8 | 150.3 | 9 | 37.8  | 10 | 33.8  |
| CONSTRUCT 23 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 103.0 | 2 | 46.3  | 3 | 84.1  | 4 | 107.9 | 5 | 119.2 | 6 | 101.0 | 7 | 151.0 | 8 | 116.8 | 9 | 30.2  | 10 | 39.5  |
| CONSTRUCT 24 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 40.6  | 2 | 111.9 | 3 | 85.3  | 4 | 106.2 | 5 | 67.9  | 6 | 90.4  | 7 | 105.5 | 8 | 135.6 | 9 | 87.9  | 10 | 64.0  |
| CONSTRUCT 25 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 139.9 | 2 | 61.1  | 3 | 69.2  | 4 | 67.3  | 5 | 136.2 | 6 | 80.5  | 7 | 91.3  | 8 | 70.8  | 9 | 71.9  | 10 | 104.4 |
| CONSTRUCT 26 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 102.0 | 2 | 66.0  | 3 | 60.3  | 4 | 79.8  | 5 | 119.3 | 6 | 107.8 | 7 | 167.6 | 8 | 130.4 | 9 | 32.7  | 10 | 27.0  |
| CONSTRUCT 27 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 113.7 | 2 | 38.9  | 3 | 75.9  | 4 | 95.9  | 5 | 126.5 | 6 | 102.9 | 7 | 155.1 | 8 | 124.7 | 9 | 27.6  | 10 | 40.2  |
| CONSTRUCT 28 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 40.0  | 2 | 135.5 | 3 | 90.7  | 4 | 96.7  | 5 | 52.9  | 6 | 112.9 | 7 | 84.2  | 8 | 105.9 | 9 | 105.0 | 10 | 73.0  |
| CONSTRUCT 29 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 107.3 | 2 | 58.0  | 3 | 67.7  | 4 | 86.1  | 5 | 120.9 | 6 | 100.4 | 7 | 169.3 | 8 | 126.2 | 9 | 32.1  | 10 | 30.4  |
| CONSTRUCT 30 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 113.2 | 2 | 63.4  | 3 | 57.3  | 4 | 74.6  | 5 | 125.6 | 6 | 105.4 | 7 | 163.7 | 8 | 122.2 | 9 | 26.8  | 10 | 35.1  |
| CONSTRUCT 31 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 133.3 | 2 | 31.8  | 3 | 111.3 | 4 | 104.1 | 5 | 116.5 | 6 | 71.9  | 7 | 100.0 | 8 | 72.5  | 9 | 75.5  | 10 | 95.4  |
| CONSTRUCT 32 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 134.9 | 2 | 47.0  | 3 | 66.4  | 4 | 56.3  | 5 | 146.3 | 6 | 118.9 | 7 | 136.0 | 8 | 106.0 | 9 | 29.0  | 10 | 56.1  |

CONSTRUCT 33 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 129.5 | 2 | 59.2 | 3 | 50.7 | 4 | 56.2 | 5 | 142.2 | 6 | 109.4 | 7 | 107.0 | 8 | 106.8 | 9 | 53.5 | 10 | 81.0 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 34 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 112.9 | 2 | 64.2 | 3 | 56.0 | 4 | 62.4 | 5 | 133.0 | 6 | 123.6 | 7 | 152.7 | 8 | 122.0 | 9 | 24.7 | 10 | 32.6 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 35 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 131.2 | 2 | 39.5 | 3 | 64.5 | 4 | 68.7 | 5 | 149.4 | 6 | 109.0 | 7 | 144.8 | 8 | 114.6 | 9 | 20.3 | 10 | 52.2 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 36 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 104.3 | 2 | 67.3 | 3 | 64.5 | 4 | 61.9 | 5 | 143.9 | 6 | 131.2 | 7 | 132.7 | 8 | 116.6 | 9 | 31.6 | 10 | 45.3 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 37 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 131.0 | 2 | 52.0 | 3 | 59.3 | 4 | 60.2 | 5 | 135.6 | 6 | 113.4 | 7 | 147.0 | 8 | 117.1 | 9 | 25.8 | 10 | 45.9 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 38 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 116.6 | 2 | 40.8 | 3 | 74.8 | 4 | 79.7 | 5 | 136.9 | 6 | 113.4 | 7 | 151.9 | 8 | 123.1 | 9 | 21.5 | 10 | 35.2 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 39 WITH ELEMENT

|   |       |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 123.1 | 2 | 30.7 | 3 | 66.2 | 4 | 89.4 | 5 | 131.5 | 6 | 105.8 | 7 | 147.2 | 8 | 107.8 | 9 | 31.3 | 10 | 46.6 |
|---|-------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

CONSTRUCT 40 WITH ELEMENT

|   |      |   |      |   |      |   |      |   |       |   |       |   |       |   |       |   |      |    |      |
|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|
| 1 | 91.1 | 2 | 72.4 | 3 | 67.0 | 4 | 94.7 | 5 | 118.1 | 6 | 114.8 | 7 | 155.3 | 8 | 127.4 | 9 | 31.1 | 10 | 17.2 |
|---|------|---|------|---|------|---|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|

INTER-ELEMENT RELATIONS  
EXPRESSED IN DEGREES

|                        |       |   |      |   |       |   |      |   |      |   |      |   |       |   |       |    |      |  |  |
|------------------------|-------|---|------|---|-------|---|------|---|------|---|------|---|-------|---|-------|----|------|--|--|
| ELEMENT 1 WITH ELEMENT |       |   |      |   |       |   |      |   |      |   |      |   |       |   |       |    |      |  |  |
| 2                      | 136.7 | 3 | 99.0 | 4 | 113.6 | 5 | 54.4 | 6 | 91.9 | 7 | 73.0 | 8 | 100.9 | 9 | 115.8 | 10 | 90.1 |  |  |

|                        |      |   |      |   |       |   |      |   |       |   |      |   |      |    |      |  |  |  |  |  |
|------------------------|------|---|------|---|-------|---|------|---|-------|---|------|---|------|----|------|--|--|--|--|--|
| ELEMENT 2 WITH ELEMENT |      |   |      |   |       |   |      |   |       |   |      |   |      |    |      |  |  |  |  |  |
| 3                      | 93.9 | 4 | 89.8 | 5 | 128.7 | 6 | 92.2 | 7 | 122.5 | 8 | 95.8 | 9 | 53.0 | 10 | 74.8 |  |  |  |  |  |

|                        |      |   |       |   |       |   |       |   |       |   |      |    |      |  |  |  |  |  |  |
|------------------------|------|---|-------|---|-------|---|-------|---|-------|---|------|----|------|--|--|--|--|--|--|
| ELEMENT 3 WITH ELEMENT |      |   |       |   |       |   |       |   |       |   |      |    |      |  |  |  |  |  |  |
| 4                      | 66.5 | 5 | 116.4 | 6 | 107.2 | 7 | 114.2 | 8 | 122.0 | 9 | 59.4 | 10 | 66.1 |  |  |  |  |  |  |

|                        |       |   |       |   |      |   |      |   |      |    |      |  |  |  |  |  |  |  |  |
|------------------------|-------|---|-------|---|------|---|------|---|------|----|------|--|--|--|--|--|--|--|--|
| ELEMENT 4 WITH ELEMENT |       |   |       |   |      |   |      |   |      |    |      |  |  |  |  |  |  |  |  |
| 5                      | 110.6 | 6 | 112.6 | 7 | 95.0 | 8 | 92.9 | 9 | 77.6 | 10 | 89.4 |  |  |  |  |  |  |  |  |

|                        |      |   |      |   |      |   |       |    |       |  |  |  |  |  |  |  |  |  |  |
|------------------------|------|---|------|---|------|---|-------|----|-------|--|--|--|--|--|--|--|--|--|--|
| ELEMENT 5 WITH ELEMENT |      |   |      |   |      |   |       |    |       |  |  |  |  |  |  |  |  |  |  |
| 6                      | 70.5 | 7 | 58.4 | 8 | 81.1 | 9 | 142.0 | 10 | 112.5 |  |  |  |  |  |  |  |  |  |  |

|                        |      |   |      |   |       |    |       |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|------|---|------|---|-------|----|-------|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT 6 WITH ELEMENT |      |   |      |   |       |    |       |  |  |  |  |  |  |  |  |  |  |  |  |
| 7                      | 73.7 | 8 | 76.6 | 9 | 115.5 | 10 | 121.6 |  |  |  |  |  |  |  |  |  |  |  |  |

|                        |      |   |       |    |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|------|---|-------|----|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT 7 WITH ELEMENT |      |   |       |    |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8                      | 51.5 | 9 | 153.5 | 10 | 152.0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|                        |       |    |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|-------|----|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT 8 WITH ELEMENT |       |    |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9                      | 124.0 | 10 | 133.1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|                        |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ELEMENT 9 WITH ELEMENT |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10                     | 36.7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

APPENDIX 8  
CONSENSUS GRID FOR  
90 MANAGERS

[illegible]

PROGRAM GRIDAY

PRODUCING A CONSENSUS GRID  
FOR INPUT TO INGRID72

PARAMETER SPECIFICATIONS

NUMBER OF GRIDS SPECIFIED = 20  
NUMBER OF CONSTRUCTS SPECIFIED = 10  
NUMBER OF ELEMENTS SPECIFIED = 10  
VALUE OF HIGHEST RATING = 7  
VALUE OF LOWEST RATING = 1  
PROGRAM TO DECIDE WHETHER NORMALIZATION NECESSARY  
NUMBER OF COMPONENTS TO BE EXTRACTED TO BE DETERMINED BY  
USER SPECIFICATION = 5 COMPONENTS

CONSENSUS GRID

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 1     |       |       |       |       |       |       |       |       |       |
|               | 4.611 | 5.556 | 5.333 | 5.556 | 3.667 | 4.867 | 4.567 | 4.978 | 6.000 | 5.789 |
| CONSTRUCT NO. | 2     |       |       |       |       |       |       |       |       |       |
|               | 5.278 | 5.278 | 5.500 | 5.033 | 4.533 | 4.567 | 3.989 | 4.511 | 5.578 | 6.422 |
| CONSTRUCT NO. | 3     |       |       |       |       |       |       |       |       |       |
|               | 5.909 | 5.500 | 6.044 | 5.422 | 5.244 | 5.456 | 5.211 | 5.533 | 6.044 | 6.567 |
| CONSTRUCT NO. | 4     |       |       |       |       |       |       |       |       |       |
|               | 4.456 | 5.178 | 5.344 | 4.411 | 3.433 | 3.589 | 3.500 | 3.311 | 6.211 | 5.689 |
| CONSTRUCT NO. | 5     |       |       |       |       |       |       |       |       |       |
|               | 5.644 | 4.278 | 3.933 | 3.533 | 5.089 | 4.600 | 3.522 | 2.711 | 3.844 | 5.289 |
| CONSTRUCT NO. | 6     |       |       |       |       |       |       |       |       |       |
|               | 4.267 | 5.144 | 5.389 | 5.256 | 4.267 | 4.567 | 4.533 | 5.311 | 5.011 | 5.333 |
| CONSTRUCT NO. | 7     |       |       |       |       |       |       |       |       |       |
|               | 5.378 | 4.522 | 5.433 | 4.611 | 4.456 | 4.544 | 5.078 | 4.911 | 5.500 | 5.478 |
| CONSTRUCT NO. | 8     |       |       |       |       |       |       |       |       |       |
|               | 5.156 | 4.956 | 5.567 | 4.744 | 3.978 | 4.433 | 4.756 | 4.856 | 5.522 | 6.289 |
| CONSTRUCT NO. | 9     |       |       |       |       |       |       |       |       |       |
|               | 5.300 | 5.700 | 5.578 | 5.267 | 4.911 | 4.867 | 4.856 | 5.600 | 6.078 | 6.467 |
| CONSTRUCT NO. | 10    |       |       |       |       |       |       |       |       |       |
|               | 4.278 | 3.256 | 3.744 | 4.289 | 4.100 | 3.744 | 3.856 | 3.344 | 3.067 | 2.789 |

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 11    |       |       |       |       |       |       |       |       |       |
|               | 2.833 | 4.589 | 3.300 | 4.211 | 3.522 | 4.667 | 2.711 | 4.522 | 4.867 | 3.878 |
| CONSTRUCT NO. | 12    |       |       |       |       |       |       |       |       |       |
|               | 4.511 | 5.411 | 5.456 | 5.567 | 3.111 | 3.967 | 3.311 | 4.111 | 6.433 | 5.911 |
| CONSTRUCT NO. | 13    |       |       |       |       |       |       |       |       |       |
|               | 3.456 | 3.833 | 4.933 | 4.233 | 4.522 | 5.044 | 3.422 | 4.222 | 5.078 | 6.256 |
| CONSTRUCT NO. | 14    |       |       |       |       |       |       |       |       |       |
|               | 4.389 | 5.689 | 4.489 | 4.267 | 4.267 | 4.867 | 3.411 | 4.467 | 5.844 | 5.711 |
| CONSTRUCT NO. | 15    |       |       |       |       |       |       |       |       |       |
|               | 4.889 | 5.200 | 5.278 | 4.100 | 4.511 | 4.900 | 3.556 | 4.289 | 5.644 | 6.689 |
| CONSTRUCT NO. | 16    |       |       |       |       |       |       |       |       |       |
|               | 4.744 | 5.200 | 4.056 | 3.600 | 4.500 | 4.922 | 3.600 | 4.422 | 5.200 | 5.456 |
| CONSTRUCT NO. | 17    |       |       |       |       |       |       |       |       |       |
|               | 5.211 | 5.489 | 5.322 | 5.622 | 4.933 | 5.222 | 4.836 | 5.789 | 5.811 | 6.111 |
| CONSTRUCT NO. | 18    |       |       |       |       |       |       |       |       |       |
|               | 5.456 | 5.378 | 6.000 | 5.389 | 4.689 | 4.700 | 4.800 | 5.156 | 5.922 | 6.433 |
| CONSTRUCT NO. | 19    |       |       |       |       |       |       |       |       |       |
|               | 5.739 | 5.889 | 4.789 | 4.900 | 4.600 | 5.522 | 4.367 | 5.589 | 6.144 | 6.244 |
| CONSTRUCT NO. | 20    |       |       |       |       |       |       |       |       |       |
|               | 5.600 | 5.578 | 6.156 | 5.356 | 4.744 | 4.456 | 4.778 | 4.667 | 6.056 | 6.044 |
| CONSTRUCT NO. | 21    |       |       |       |       |       |       |       |       |       |
|               | 5.939 | 5.900 | 4.809 | 4.922 | 4.667 | 5.244 | 4.100 | 4.711 | 5.611 | 6.156 |

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 22    |       |       |       |       |       |       |       |       |       |
|               | 5.411 | 5.322 | 5.309 | 4.233 | 4.356 | 5.133 | 3.539 | 4.344 | 5.644 | 6.133 |
| CONSTRUCT NO. | 23    |       |       |       |       |       |       |       |       |       |
|               | 5.211 | 5.389 | 4.944 | 4.844 | 4.600 | 5.356 | 4.022 | 5.444 | 6.333 | 6.267 |
| CONSTRUCT NO. | 24    |       |       |       |       |       |       |       |       |       |
|               | 5.144 | 4.256 | 3.733 | 3.744 | 5.011 | 4.344 | 3.678 | 3.144 | 3.767 | 5.144 |
| CONSTRUCT NO. | 25    |       |       |       |       |       |       |       |       |       |
|               | 3.300 | 5.500 | 3.979 | 5.278 | 2.922 | 5.167 | 5.389 | 5.189 | 5.589 | 4.167 |
| CONSTRUCT NO. | 26    |       |       |       |       |       |       |       |       |       |
|               | 5.900 | 4.889 | 5.344 | 5.356 | 4.667 | 5.222 | 4.376 | 4.044 | 5.956 | 6.222 |
| CONSTRUCT NO. | 27    |       |       |       |       |       |       |       |       |       |
|               | 4.189 | 5.544 | 4.444 | 3.078 | 4.100 | 4.656 | 3.344 | 4.433 | 5.689 | 5.622 |
| CONSTRUCT NO. | 28    |       |       |       |       |       |       |       |       |       |
|               | 5.700 | 2.489 | 3.509 | 4.144 | 5.678 | 2.933 | 4.267 | 3.922 | 3.311 | 5.533 |
| CONSTRUCT NO. | 29    |       |       |       |       |       |       |       |       |       |
|               | 4.678 | 4.944 | 5.256 | 4.989 | 4.322 | 5.167 | 3.689 | 5.056 | 5.833 | 6.244 |
| CONSTRUCT NO. | 30    |       |       |       |       |       |       |       |       |       |
|               | 5.022 | 4.689 | 5.722 | 5.378 | 4.856 | 4.809 | 3.844 | 5.500 | 5.578 | 6.144 |
| CONSTRUCT NO. | 31    |       |       |       |       |       |       |       |       |       |
|               | 3.578 | 5.300 | 4.411 | 5.000 | 3.678 | 4.856 | 4.189 | 5.078 | 4.989 | 4.267 |
| CONSTRUCT NO. | 32    |       |       |       |       |       |       |       |       |       |
|               | 4.178 | 5.211 | 5.344 | 5.800 | 3.756 | 4.378 | 3.967 | 4.767 | 6.056 | 5.600 |

CONSTRUCT NO. 33

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.433 | 5.489 | 5.189 | 5.711 | 3.944 | 4.022 | 5.611 | 4.967 | 5.522 | 5.000 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 34

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.122 | 5.167 | 5.511 | 5.478 | 4.822 | 4.989 | 4.522 | 5.000 | 5.511 | 6.311 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 35

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.133 | 5.322 | 5.311 | 5.667 | 3.656 | 4.722 | 4.044 | 5.067 | 6.278 | 5.878 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 36

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.467 | 5.000 | 3.489 | 5.633 | 4.644 | 4.711 | 4.800 | 5.533 | 5.667 | 6.200 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 37

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.411 | 5.444 | 5.655 | 5.744 | 4.189 | 4.922 | 4.033 | 5.056 | 5.989 | 6.167 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 38

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.200 | 5.844 | 5.311 | 5.711 | 4.644 | 5.044 | 4.267 | 4.956 | 6.211 | 6.067 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 39

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 4.200 | 5.700 | 4.667 | 4.722 | 4.322 | 4.856 | 3.000 | 5.122 | 6.089 | 5.700 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 40

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5.233 | 5.133 | 5.111 | 4.622 | 4.500 | 4.733 | 3.722 | 5.267 | 5.844 | 6.044 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|



MATRIX OF CELL STANDARD DEVIATIONS

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 1     |       |       |       |       |       |       |       |       |       |
|               | 1.534 | 1.470 | 1.227 | 1.431 | 1.565 | 1.359 | 1.272 | 1.476 | 1.374 | 1.044 |
| CONSTRUCT NO. | 2     |       |       |       |       |       |       |       |       |       |
|               | 1.544 | 1.236 | 1.369 | 1.480 | 1.134 | 1.341 | 1.632 | 1.574 | 1.628 | 1.016 |
| CONSTRUCT NO. | 3     |       |       |       |       |       |       |       |       |       |
|               | 1.299 | 1.351 | 1.121 | 1.199 | 1.154 | 0.876 | 1.156 | 1.334 | 1.189 | 1.102 |
| CONSTRUCT NO. | 4     |       |       |       |       |       |       |       |       |       |
|               | 1.349 | 1.450 | 1.405 | 1.841 | 1.382 | 1.491 | 1.501 | 1.906 | 1.378 | 1.338 |
| CONSTRUCT NO. | 5     |       |       |       |       |       |       |       |       |       |
|               | 1.310 | 1.761 | 1.421 | 1.743 | 1.138 | 1.847 | 1.730 | 1.440 | 1.476 | 1.256 |
| CONSTRUCT NO. | 6     |       |       |       |       |       |       |       |       |       |
|               | 1.675 | 1.481 | 1.168 | 1.518 | 1.372 | 1.181 | 1.304 | 1.056 | 2.149 | 1.786 |
| CONSTRUCT NO. | 7     |       |       |       |       |       |       |       |       |       |
|               | 1.555 | 1.756 | 1.423 | 1.667 | 1.455 | 1.201 | 1.602 | 1.304 | 1.292 | 0.951 |
| CONSTRUCT NO. | 8     |       |       |       |       |       |       |       |       |       |
|               | 1.453 | 1.381 | 1.307 | 1.660 | 1.422 | 1.399 | 1.230 | 1.303 | 1.794 | 1.064 |
| CONSTRUCT NO. | 9     |       |       |       |       |       |       |       |       |       |
|               | 1.285 | 1.490 | 1.091 | 1.520 | 1.273 | 1.493 | 1.434 | 1.047 | 1.440 | 1.030 |
| CONSTRUCT NO. | 10    |       |       |       |       |       |       |       |       |       |
|               | 1.622 | 1.411 | 1.450 | 1.384 | 1.544 | 1.411 | 1.259 | 1.616 | 1.661 | 1.833 |
| CONSTRUCT NO. | 11    |       |       |       |       |       |       |       |       |       |
|               | 1.831 | 1.405 | 1.304 | 1.390 | 1.523 | 1.254 | 1.463 | 1.463 | 1.463 | 1.463 |

CONSTRUCT NO. 12

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.563 | 1.365 | 1.375 | 1.407 | 1.258 | 1.510 | 1.379 | 1.460 | 1.190 | 0.882 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 13

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.334 | 1.007 | 1.975 | 1.603 | 1.581 | 1.262 | 1.735 | 1.620 | 1.545 | 0.680 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 14

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.591 | 1.260 | 1.319 | 1.405 | 1.296 | 1.051 | 1.323 | 1.493 | 1.070 | 0.915 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 15

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.426 | 1.493 | 1.446 | 1.710 | 1.103 | 1.264 | 1.703 | 1.359 | 1.801 | 0.681 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 16

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.370 | 1.595 | 1.645 | 1.688 | 1.384 | 1.274 | 1.680 | 1.649 | 1.376 | 0.914 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 17

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.185 | 1.309 | 1.179 | 1.362 | 1.296 | 0.980 | 1.232 | 0.993 | 1.217 | 1.022 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 18

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.219 | 1.223 | 0.899 | 1.527 | 1.186 | 1.258 | 1.153 | 1.332 | 1.368 | 0.542 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 19

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.096 | 1.311 | 1.827 | 1.551 | 1.331 | 1.201 | 1.465 | 1.208 | 0.894 | 0.676 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 20

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.322 | 1.038 | 0.993 | 1.637 | 1.147 | 1.391 | 1.482 | 1.302 | 0.976 | 0.935 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 21

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.186 | 1.374 | 1.737 | 2.095 | 1.081 | 1.063 | 1.836 | 1.880 | 1.363 | 1.121 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 22

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.059 | 1.520 | 1.156 | 1.642 | 1.183 | 1.163 | 1.620 | 1.455 | 1.135 | 0.851 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 23

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.232 | 1.765 | 1.751 | 1.913 | 1.512 | 1.062 | 1.621 | 1.162 | 0.983 | 1.026 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

CONSTRUCT NO. 24

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.831 | 1.405 | 1.304 | 1.390 | 1.523 | 1.245 | 1.180 | 1.079 | 1.071 | 0.946 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CONSTRUCT NO. | 25    |       |       |       |       |       |       |       |       |       |
|               | 1.378 | 0.915 | 0.912 | 1.307 | 1.173 | 1.164 | 1.396 | 1.090 | 1.297 | 1.508 |
| CONSTRUCT NO. | 26    |       |       |       |       |       |       |       |       |       |
|               | 1.290 | 1.487 | 1.256 | 1.425 | 1.298 | 0.871 | 1.214 | 1.262 | 1.389 | 1.025 |
| CONSTRUCT NO. | 27    |       |       |       |       |       |       |       |       |       |
|               | 1.579 | 1.359 | 1.544 | 1.823 | 1.237 | 0.973 | 1.595 | 1.255 | 1.024 | 0.854 |
| CONSTRUCT NO. | 28    |       |       |       |       |       |       |       |       |       |
|               | 1.033 | 1.448 | 1.405 | 1.277 | 0.910 | 1.322 | 0.884 | 1.312 | 1.260 | 1.274 |
| CONSTRUCT NO. | 29    |       |       |       |       |       |       |       |       |       |
|               | 1.542 | 1.401 | 1.232 | 1.590 | 1.120 | 0.986 | 1.746 | 1.327 | 1.368 | 0.765 |
| CONSTRUCT NO. | 30    |       |       |       |       |       |       |       |       |       |
|               | 1.307 | 1.504 | 1.438 | 1.526 | 1.034 | 1.285 | 1.805 | 1.019 | 1.438 | 0.829 |
| CONSTRUCT NO. | 31    |       |       |       |       |       |       |       |       |       |
|               | 1.614 | 1.911 | 1.829 | 1.579 | 1.467 | 1.419 | 1.841 | 1.440 | 1.532 | 1.314 |
| CONSTRUCT NO. | 32    |       |       |       |       |       |       |       |       |       |
|               | 1.427 | 1.518 | 1.485 | 1.326 | 1.310 | 1.137 | 1.267 | 1.200 | 1.393 | 0.845 |
| CONSTRUCT NO. | 33    |       |       |       |       |       |       |       |       |       |
|               | 1.245 | 1.211 | 0.898 | 1.183 | 1.151 | 1.518 | 1.355 | 1.470 | 1.030 | 1.091 |
| CONSTRUCT NO. | 34    |       |       |       |       |       |       |       |       |       |
|               | 1.179 | 1.351 | 1.084 | 1.440 | 0.931 | 1.095 | 1.424 | 1.254 | 1.300 | 0.681 |
| CONSTRUCT NO. | 35    |       |       |       |       |       |       |       |       |       |
|               | 1.831 | 1.405 | 1.304 | 1.390 | 1.523 | 1.245 | 1.180 | 1.079 | 1.071 | 0.946 |

|               |       |       |       |       |       |       |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | 1.400 | 1.341 | 1.094 | 1.402 | 0.878 | 1.134 | 1.392 | 0.997 | 1.236 | 0.737 |
| CONSTRUCT NO. | 37    |       |       |       |       |       |       |       |       |       |
|               | 1.648 | 1.423 | 1.113 | 1.345 | 1.235 | 1.030 | 1.441 | 1.105 | 1.473 | 0.903 |
| CONSTRUCT NO. | 38    |       |       |       |       |       |       |       |       |       |
|               | 1.220 | 1.217 | 1.233 | 1.455 | 1.417 | 1.090 | 1.270 | 1.395 | 0.930 | 0.884 |
| CONSTRUCT NO. | 39    |       |       |       |       |       |       |       |       |       |
|               | 1.144 | 1.532 | 1.767 | 1.787 | 1.270 | 1.147 | 1.124 | 1.140 | 0.802 | 0.559 |
| CONSTRUCT NO. | 40    |       |       |       |       |       |       |       |       |       |
|               | 1.961 | 1.447 | 1.258 | 1.481 | 1.293 | 1.089 | 1.398 | 1.305 | 1.280 | 1.131 |

MATRIX OF MEASURES OF SKEWNESS FOR INDIVIDUAL CELLS

|               |        |        |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| CONSTRUCT NO. | 1      |        |        |        |        |        |        |        |        |        |
|               | -0.596 | -0.979 | -0.962 | -1.203 | 0.363  | -0.744 | -0.390 | -0.149 | -1.748 | -1.453 |
| CONSTRUCT NO. | 2      |        |        |        |        |        |        |        |        |        |
|               | -1.352 | -1.166 | -0.938 | -0.694 | -0.630 | -0.237 | -0.044 | -0.439 | -1.103 | -2.552 |
| CONSTRUCT NO. | 3      |        |        |        |        |        |        |        |        |        |
|               | -1.765 | -1.216 | -2.548 | -1.230 | -0.632 | -0.213 | -0.627 | -1.334 | -2.186 | -3.728 |
| CONSTRUCT NO. | 4      |        |        |        |        |        |        |        |        |        |
|               | -0.421 | -1.160 | -1.328 | -0.383 | 0.313  | 0.152  | 0.108  | 0.102  | -2.263 | -1.227 |
| CONSTRUCT NO. | 5      |        |        |        |        |        |        |        |        |        |
|               | -1.767 | -0.531 | 0.046  | 0.272  | -0.714 | -0.226 | -0.243 | 0.976  | -0.087 | -0.750 |

CONSTRUCT NO. 6

-0.391 -0.903 -0.948 -1.155 -0.248 -0.178 -0.471 -0.522 -0.612 -1.157

CONSTRUCT NO. 7

-0.883 -0.157 -1.453 -0.660 -0.422 -1.008 -0.595 -0.529 -1.129 -0.829

CONSTRUCT NO. 8

-1.353 -0.984 -0.935 -0.966 -0.170 -0.303 -0.609 -0.609 -1.260 -3.203

CONSTRUCT NO. 9

-0.784 -1.149 -0.556 -1.171 -0.507 -0.375 -0.472 -1.017 -1.967 -2.414

CONSTRUCT NO. 10

-0.030 0.735 0.029 -0.394 0.107 0.666 0.336 0.562 1.088 1.076

CONSTRUCT NO. 11

0.482 -0.576 0.465 -0.029 0.259 -1.152 0.437 -0.748 -0.913 -0.168

CONSTRUCT NO. 12

-0.679 -1.100 -1.177 -0.937 0.262 -0.370 -0.028 -0.533 -2.532 -1.868

CONSTRUCT NO. 13

-1.179 0.009 -0.772 -0.421 -0.361 -0.778 -0.043 -0.959 -0.960 -1.204

CONSTRUCT NO. 14

-0.395 -1.108 -0.064 -0.041 -0.680 -1.170 0.406 -0.417 -1.817 -0.106

CONSTRUCT NO. 15

-0.865 -1.141 -0.570 -0.207 -0.893 -0.971 -0.229 -0.445 -1.340 -3.965

CONSTRUCT NO. 16

-0.498 -0.752 -0.298 0.231 -0.277 -0.308 0.051 -0.459 -1.331 -0.367

|                  |        |        |        |        |        |        |        |        |        |        |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| CONSTRUCT NO. 17 | -0.608 | -1.150 | -1.498 | -1.020 | -0.857 | -0.660 | -0.690 | -0.611 | -1.749 | -1.720 |
| CONSTRUCT NO. 18 | -1.056 | -0.666 | -1.649 | -1.057 | -0.308 | -0.635 | -0.306 | -1.129 | -1.660 | -0.158 |
| CONSTRUCT NO. 19 | -0.846 | -1.367 | -0.532 | -0.407 | -0.581 | -0.494 | -0.238 | -1.153 | -0.935 | -0.328 |
| CONSTRUCT NO. 20 | -0.905 | -0.295 | -1.466 | -1.075 | -1.131 | -0.417 | -0.214 | -0.584 | -1.976 | -1.799 |
| CONSTRUCT NO. 21 | -0.529 | -1.105 | -0.624 | -0.640 | -0.586 | -1.156 | -0.447 | -0.959 | -0.705 | -1.014 |
| CONSTRUCT NO. 22 | -0.864 | -0.414 | -1.111 | -0.296 | -0.221 | -0.723 | -0.381 | -0.279 | -1.290 | -0.361 |
| CONSTRUCT NO. 23 | -0.722 | -0.799 | -0.662 | -0.485 | -0.064 | -0.955 | -0.035 | -0.992 | -1.817 | -1.716 |
| CONSTRUCT NO. 24 | -0.905 | -0.406 | -0.016 | 0.066  | -0.817 | -0.398 | 0.103  | 0.643  | 0.132  | -0.476 |
| CONSTRUCT NO. 25 | 0.325  | -0.261 | -0.485 | -0.695 | 0.603  | -0.999 | -0.190 | -0.373 | -0.682 | -0.009 |
| CONSTRUCT NO. 26 | -1.150 | -0.987 | -1.031 | -1.302 | -0.806 | -0.941 | -0.481 | -0.406 | -1.910 | -2.983 |
| CONSTRUCT NO. 27 | -0.292 | -0.611 | -0.259 | -0.349 | -0.752 | -1.087 | 0.075  | -0.678 | -1.535 | -0.029 |
| CONSTRUCT NO. 28 | -1.202 | 1.056  | 0.526  | 0.341  | -0.484 | 0.582  | 0.311  | 0.414  | 0.108  | -0.003 |

CONSTRUCT NO. 29

-0.368 -0.702 -0.951 -0.994 -0.743 -0.889 -0.000 -0.871 -1.786 -0.731

CONSTRUCT NO. 30

-0.798 -0.488 -1.351 -0.906 -0.558 -0.801 -0.179 -0.912 -1.377 -1.674

CONSTRUCT NO. 31

0.297 -0.885 -0.099 -1.032 -0.347 -0.822 0.131 -0.782 -0.704 -0.581

CONSTRUCT NO. 32

-0.242 -0.889 -1.287 -1.266 -0.617 -0.176 -0.233 -0.400 -1.528 -0.366

CONSTRUCT NO. 33

-0.333 -1.101 -1.017 -0.846 -0.355 -0.769 -0.594 -0.171 -1.249 -0.359

CONSTRUCT NO. 34

-0.478 -1.327 -1.574 -1.017 -0.638 -0.585 -0.102 -0.338 -1.207 -0.677

CONSTRUCT NO. 35

-0.499 -0.913 -1.153 -1.037 -0.038 0.011 -0.160 -0.714 -1.755 -1.570

CONSTRUCT NO. 36

-0.832 -0.802 -1.361 -1.154 -0.636 -1.071 -0.362 -0.798 -1.298 -0.825

CONSTRUCT NO. 37

-0.136 -0.303 -0.896 -1.450 -0.322 -0.700 -0.325 -1.244 -1.756 -0.650

CONSTRUCT NO. 38

-0.564 -1.110 -0.312 -1.292 -0.865 -0.344 -0.047 -0.458 -1.251 -0.417

CONSTRUCT NO. 39

-0.546 -1.145 -0.605 -0.437 0.006 -0.603 -0.171 -0.552 -0.932 -0.585

CONSTRUCT NO. 40

MATRIX OF MEASURES OF KURTOSIS FOR INDIVIDUAL CELLS

|               |       |       |        |       |       |       |       |       |       |        |
|---------------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| CONSTRUCT NO. | 1     |       |        |       |       |       |       |       |       |        |
|               | 2.301 | 3.566 | 3.670  | 3.797 | 1.949 | 3.122 | 2.603 | 1.737 | 5.239 | 6.037  |
| CONSTRUCT NO. | 2     |       |        |       |       |       |       |       |       |        |
|               | 4.051 | 4.392 | 3.219  | 2.763 | 3.268 | 2.225 | 1.461 | 1.910 | 3.063 | 10.307 |
| CONSTRUCT NO. | 3     |       |        |       |       |       |       |       |       |        |
|               | 6.386 | 3.905 | 11.487 | 5.755 | 2.861 | 3.121 | 3.037 | 4.709 | 8.958 | 17.906 |
| CONSTRUCT NO. | 4     |       |        |       |       |       |       |       |       |        |
|               | 1.567 | 4.123 | 3.903  | 1.986 | 1.919 | 1.809 | 1.880 | 1.548 | 7.919 | 4.854  |
| CONSTRUCT NO. | 5     |       |        |       |       |       |       |       |       |        |
|               | 5.237 | 2.163 | 1.829  | 1.655 | 3.130 | 1.970 | 1.637 | 3.242 | 2.409 | 4.244  |
| CONSTRUCT NO. | 6     |       |        |       |       |       |       |       |       |        |
|               | 1.545 | 3.081 | 3.692  | 3.560 | 2.581 | 2.059 | 2.344 | 3.200 | 1.671 | 2.888  |
| CONSTRUCT NO. | 7     |       |        |       |       |       |       |       |       |        |
|               | 2.854 | 1.994 | 5.165  | 2.696 | 1.940 | 4.025 | 2.329 | 2.674 | 3.483 | 2.946  |
| CONSTRUCT NO. | 8     |       |        |       |       |       |       |       |       |        |
|               | 3.980 | 3.755 | 3.168  | 2.971 | 1.814 | 2.512 | 2.990 | 3.437 | 3.530 | 15.500 |
| CONSTRUCT NO. | 9     |       |        |       |       |       |       |       |       |        |
|               | 2.653 | 3.436 | 1.324  | 4.228 | 2.890 | 2.037 | 2.810 | 3.694 | 6.411 | 9.336  |



CONSTRUCT NO. 10

1.576 2.344 1.517 2.024 1.608 2.315 2.299 2.365 2.941 2.760

CONSTRUCT NO. 11

1.901 1.860 2.052 2.051 2.412 3.020 2.194 2.442 2.785 2.624

CONSTRUCT NO. 12

2.473 3.318 3.677 3.384 2.938 1.835 1.705 2.061 6.655 11.669

CONSTRUCT NO. 13

5.055 1.647 2.258 1.871 1.857 3.612 1.771 3.105 3.448 7.145

CONSTRUCT NO. 14

1.752 4.122 2.032 1.842 2.525 4.037 2.188 2.190 7.544 2.469

CONSTRUCT NO. 15

2.701 3.693 3.510 1.617 3.694 3.155 1.792 2.269 3.641 25.651

CONSTRUCT NO. 16

2.348 2.492 1.821 1.645 2.227 2.438 2.049 2.070 4.385 3.999

CONSTRUCT NO. 17

3.337 3.755 6.070 4.131 3.041 3.826 3.552 2.702 6.326 7.023

CONSTRUCT NO. 18

4.144 2.998 7.742 3.374 2.101 2.481 3.087 4.150 5.203 1.851

CONSTRUCT NO. 19

3.394 4.456 1.903 2.265 3.152 2.374 2.295 4.381 3.598 2.134

CONSTRUCT NO. 20

2.756 2.336 3.222 3.393 4.181 2.278 1.772 2.262 10.607 8.612

|                  |       |       |       |       |       |       |       |       |        |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| CONSTRUCT NO. 21 |       |       |       |       |       |       |       |       |        |
| 2.783            | 4.004 | 2.092 | 1.960 | 3.342 | 4.589 | 1.898 | 2.685 | 2.634 | 2.518  |
| CONSTRUCT NO. 22 |       |       |       |       |       |       |       |       |        |
| 3.775            | 1.953 | 4.230 | 1.796 | 1.717 | 4.272 | 1.871 | 2.901 | 5.709 | 1.735  |
| CONSTRUCT NO. 23 |       |       |       |       |       |       |       |       |        |
| 2.672            | 2.353 | 1.994 | 1.786 | 2.090 | 5.122 | 1.998 | 4.246 | 6.910 | 5.639  |
| CONSTRUCT NO. 24 |       |       |       |       |       |       |       |       |        |
| 3.733            | 2.177 | 1.655 | 1.835 | 3.725 | 2.167 | 1.852 | 2.204 | 2.708 | 2.246  |
| CONSTRUCT NO. 25 |       |       |       |       |       |       |       |       |        |
| 2.274            | 4.053 | 2.299 | 2.936 | 2.898 | 3.960 | 1.663 | 2.636 | 3.413 | 2.998  |
| CONSTRUCT NO. 26 |       |       |       |       |       |       |       |       |        |
| 4.307            | 3.282 | 3.339 | 4.131 | 3.205 | 8.207 | 3.024 | 2.493 | 6.845 | 15.476 |
| CONSTRUCT NO. 27 |       |       |       |       |       |       |       |       |        |
| 1.810            | 2.501 | 1.974 | 1.894 | 2.908 | 4.375 | 2.063 | 2.909 | 6.983 | 2.598  |
| CONSTRUCT NO. 28 |       |       |       |       |       |       |       |       |        |
| 5.199            | 3.513 | 2.390 | 2.942 | 2.821 | 2.414 | 3.704 | 2.457 | 2.782 | 4.653  |
| CONSTRUCT NO. 29 |       |       |       |       |       |       |       |       |        |
| 2.176            | 2.840 | 3.352 | 3.221 | 3.753 | 5.712 | 1.925 | 3.665 | 6.511 | 2.926  |
| CONSTRUCT NO. 30 |       |       |       |       |       |       |       |       |        |
| 2.415            | 2.507 | 4.093 | 2.999 | 2.850 | 3.121 | 1.835 | 3.033 | 4.470 | 8.690  |
| CONSTRUCT NO. 31 |       |       |       |       |       |       |       |       |        |
| 1.896            | 2.588 | 1.562 | 3.075 | 1.757 | 2.799 | 1.895 | 2.772 | 2.794 | 3.016  |
| CONSTRUCT NO. 32 |       |       |       |       |       |       |       |       |        |

CONSTRUCT NO. 33

2.494 3.493 3.716 3.586 2.666 2.603 2.135 1.691 4.669 3.366

CONSTRUCT NO. 34

2.235 4.554 5.825 3.481 2.962 3.935 1.931 1.922 4.477 3.156

CONSTRUCT NO. 35

2.000 2.899 4.004 3.058 1.820 2.100 2.657 4.057 5.583 7.370

CONSTRUCT NO. 36

3.047 3.232 4.737 3.926 3.951 4.496 2.358 3.103 4.054 3.759

CONSTRUCT NO. 37

1.650 2.772 3.267 4.863 2.153 4.480 1.862 5.782 5.705 2.366

CONSTRUCT NO. 38

2.519 3.660 3.785 4.010 3.051 2.860 2.669 2.340 4.525 2.018

CONSTRUCT NO. 39

2.632 3.450 2.037 1.878 2.052 3.445 2.504 3.702 4.470 3.577

CONSTRUCT NO. 40

3.827 2.184 3.790 2.505 2.377 2.526 1.869 3.309 3.160 9.842

\*\*\*WARNING - ASYMMETRICAL MATRIX\*\*\*

SEE LEDERMAN, W. ON THE RANK OF THE REDUCED CORRELATION MATRIX IN MULTIPLE FACTOR ANALYSIS.  
PSYCHOMETRIKA, 1937, 2, 85-93

OF THE 400 CELLS IN THE GRID 253 HAVE SKEWNESSES GREATER THAN +0.50 OR LESS THAN -0.50.  
AND 111 HAVE MEASURES OF KURTOSIS GREATER THAN 3.75 AND LESS THAN -2.25

NORMALIZATION OF DATA WILL BE PERFORMED BY PROGRAM INGRID

\*\*\* COMPANIES \*\*\*\*\*A-J\*\*\*\* GRID 1

HIGHEST GRADE ON CONSTRUCT SCALE 7.  
 LOWEST .. .. 1.

THE GRID

|                       |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
|-----------------------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|----|------|
| CONSTRUCT 1, ELEMENT  | 1 | 4.61 | 2 | 5.56 | 3 | 5.33 | 4 | 5.56 | 5 | 3.67 | 6 | 4.87 | 7 | 4.57 | 8 | 4.99 | 9 | 6.00 | 10 | 5.79 |
| CONSTRUCT 2, ELEMENT  | 1 | 5.28 | 2 | 5.20 | 3 | 5.50 | 4 | 5.03 | 5 | 4.53 | 6 | 4.57 | 7 | 3.99 | 8 | 4.51 | 9 | 5.58 | 10 | 6.42 |
| CONSTRUCT 3, ELEMENT  | 1 | 3.90 | 2 | 5.50 | 3 | 6.04 | 4 | 5.42 | 5 | 5.24 | 6 | 5.46 | 7 | 5.21 | 8 | 5.53 | 9 | 6.04 | 10 | 6.57 |
| CONSTRUCT 4, ELEMENT  | 1 | 4.46 | 2 | 5.18 | 3 | 5.34 | 4 | 4.41 | 5 | 3.43 | 6 | 3.59 | 7 | 3.50 | 8 | 3.31 | 9 | 6.21 | 10 | 5.69 |
| CONSTRUCT 5, ELEMENT  | 1 | 5.64 | 2 | 4.28 | 3 | 3.93 | 4 | 3.53 | 5 | 5.09 | 6 | 4.60 | 7 | 3.52 | 8 | 2.71 | 9 | 3.84 | 10 | 5.29 |
| CONSTRUCT 6, ELEMENT  | 1 | 4.27 | 2 | 5.14 | 3 | 5.39 | 4 | 5.26 | 5 | 4.27 | 6 | 4.57 | 7 | 4.53 | 8 | 5.31 | 9 | 5.01 | 10 | 5.33 |
| CONSTRUCT 7, ELEMENT  | 1 | 5.38 | 2 | 4.52 | 3 | 5.43 | 4 | 4.61 | 5 | 4.46 | 6 | 4.54 | 7 | 5.08 | 8 | 4.91 | 9 | 5.50 | 10 | 5.40 |
| CONSTRUCT 8, ELEMENT  | 1 | 5.16 | 2 | 4.96 | 3 | 5.57 | 4 | 4.74 | 5 | 3.98 | 6 | 4.43 | 7 | 4.76 | 8 | 4.86 | 9 | 5.52 | 10 | 6.29 |
| CONSTRUCT 9, ELEMENT  | 1 | 5.30 | 2 | 5.70 | 3 | 5.59 | 4 | 5.27 | 5 | 4.91 | 6 | 4.87 | 7 | 4.86 | 8 | 5.60 | 9 | 6.08 | 10 | 6.47 |
| CONSTRUCT 10, ELEMENT | 1 | 4.29 | 2 | 3.26 | 3 | 3.74 | 4 | 4.29 | 5 | 4.10 | 6 | 3.74 | 7 | 3.86 | 8 | 3.34 | 9 | 3.07 | 10 | 2.79 |
| CONSTRUCT 11, ELEMENT | 1 | 2.03 | 2 | 4.59 | 3 | 3.30 | 4 | 4.21 | 5 | 3.52 | 6 | 4.67 | 7 | 2.71 | 8 | 4.52 | 9 | 4.87 | 10 | 3.08 |
| CONSTRUCT 12, ELEMENT | 1 | 4.51 | 2 | 5.41 | 3 | 5.46 | 4 | 5.57 | 5 | 3.11 | 6 | 3.97 | 7 | 3.31 | 8 | 4.41 | 9 | 6.43 | 10 | 5.91 |
| CONSTRUCT 13, ELEMENT | 1 | 5.46 | 2 | 3.83 | 3 | 4.93 | 4 | 4.23 | 5 | 4.52 | 6 | 5.04 | 7 | 3.42 | 8 | 4.22 | 9 | 5.08 | 10 | 6.26 |
| CONSTRUCT 14, ELEMENT | 1 | 4.39 | 2 | 5.69 | 3 | 4.49 | 4 | 4.27 | 5 | 4.27 | 6 | 4.87 | 7 | 3.41 | 8 | 4.47 | 9 | 5.84 | 10 | 5.71 |
| CONSTRUCT 15, ELEMENT | 1 | 4.09 | 2 | 5.20 | 3 | 5.28 | 4 | 4.10 | 5 | 4.51 | 6 | 4.90 | 7 | 3.56 | 8 | 4.29 | 9 | 5.64 | 10 | 6.69 |
| CONSTRUCT 16, ELEMENT | 1 | 4.74 | 2 | 5.20 | 3 | 4.06 | 4 | 3.60 | 5 | 4.50 | 6 | 4.92 | 7 | 3.60 | 8 | 4.42 | 9 | 5.20 | 10 | 5.46 |
| CONSTRUCT 17, ELEMENT | 1 | 5.21 | 2 | 5.49 | 3 | 5.32 | 4 | 5.62 | 5 | 4.93 | 6 | 5.22 | 7 | 4.86 | 8 | 5.79 | 9 | 5.81 | 10 | 6.11 |
| CONSTRUCT 18, ELEMENT | 1 | 5.46 | 2 | 5.38 | 3 | 6.00 | 4 | 5.39 | 5 | 4.69 | 6 | 4.70 | 7 | 4.80 | 8 | 5.16 | 9 | 5.92 | 10 | 6.43 |
| CONSTRUCT 19, ELEMENT | 1 | 5.79 | 2 | 5.89 | 3 | 4.79 | 4 | 4.90 | 5 | 4.60 | 6 | 5.52 | 7 | 4.37 | 8 | 5.59 | 9 | 6.14 | 10 | 6.24 |

|                       |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
|-----------------------|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|----|------|
| CONSTRUCT 20, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.60 | 2 | 5.50 | 3 | 6.16 | 4 | 5.36 | 5 | 4.74 | 6 | 4.46 | 7 | 4.78 | 8 | 4.67 | 9 | 6.06 | 10 | 6.04 |
| CONSTRUCT 21, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.09 | 2 | 5.00 | 3 | 4.80 | 4 | 4.52 | 5 | 4.67 | 6 | 5.24 | 7 | 4.10 | 8 | 4.71 | 9 | 5.61 | 10 | 6.16 |
| CONSTRUCT 22, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.41 | 2 | 5.32 | 3 | 5.30 | 4 | 4.23 | 5 | 4.36 | 6 | 5.13 | 7 | 3.59 | 8 | 4.34 | 9 | 5.64 | 10 | 6.13 |
| CONSTRUCT 23, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.21 | 2 | 5.39 | 3 | 4.94 | 4 | 4.84 | 5 | 4.60 | 6 | 5.36 | 7 | 4.02 | 8 | 5.44 | 9 | 6.33 | 10 | 6.27 |
| CONSTRUCT 24, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.14 | 2 | 4.26 | 3 | 3.73 | 4 | 3.74 | 5 | 5.01 | 6 | 4.34 | 7 | 3.68 | 8 | 3.14 | 9 | 3.77 | 10 | 5.14 |
| CONSTRUCT 25, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 3.30 | 2 | 5.50 | 3 | 5.98 | 4 | 5.28 | 5 | 2.92 | 6 | 5.17 | 7 | 5.39 | 8 | 5.19 | 9 | 5.59 | 10 | 4.17 |
| CONSTRUCT 26, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.00 | 2 | 4.89 | 3 | 5.34 | 4 | 5.36 | 5 | 4.67 | 6 | 5.22 | 7 | 4.38 | 8 | 4.84 | 9 | 5.96 | 10 | 6.22 |
| CONSTRUCT 27, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.19 | 2 | 5.54 | 3 | 4.44 | 4 | 3.08 | 5 | 4.10 | 6 | 4.66 | 7 | 3.34 | 8 | 4.43 | 9 | 5.69 | 10 | 5.62 |
| CONSTRUCT 28, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.70 | 2 | 2.49 | 3 | 3.59 | 4 | 4.14 | 5 | 5.68 | 6 | 2.93 | 7 | 4.27 | 8 | 3.02 | 9 | 3.31 | 10 | 5.53 |
| CONSTRUCT 29, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.69 | 2 | 4.94 | 3 | 5.26 | 4 | 4.99 | 5 | 4.32 | 6 | 3.17 | 7 | 3.69 | 8 | 5.06 | 9 | 5.83 | 10 | 6.24 |
| CONSTRUCT 30, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.02 | 2 | 4.69 | 3 | 5.72 | 4 | 5.38 | 5 | 4.86 | 6 | 4.89 | 7 | 3.84 | 8 | 5.50 | 9 | 5.58 | 10 | 6.14 |
| CONSTRUCT 31, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 3.58 | 2 | 5.30 | 3 | 4.41 | 4 | 5.00 | 5 | 3.68 | 6 | 4.86 | 7 | 4.19 | 8 | 5.08 | 9 | 4.99 | 10 | 4.27 |
| CONSTRUCT 32, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.18 | 2 | 5.21 | 3 | 5.34 | 4 | 5.80 | 5 | 3.76 | 6 | 4.38 | 7 | 3.97 | 8 | 4.77 | 9 | 6.06 | 10 | 5.60 |
| CONSTRUCT 33, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.43 | 2 | 5.49 | 3 | 6.19 | 4 | 5.71 | 5 | 3.84 | 6 | 4.82 | 7 | 5.61 | 8 | 4.87 | 9 | 5.92 | 10 | 5.00 |
| CONSTRUCT 34, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.12 | 2 | 5.17 | 3 | 5.51 | 4 | 5.48 | 5 | 4.82 | 6 | 4.99 | 7 | 4.53 | 8 | 5.00 | 9 | 5.51 | 10 | 6.31 |
| CONSTRUCT 35, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.13 | 2 | 5.32 | 3 | 5.31 | 4 | 5.67 | 5 | 3.66 | 6 | 4.72 | 7 | 4.04 | 8 | 5.07 | 9 | 6.28 | 10 | 5.88 |
| CONSTRUCT 36, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.47 | 2 | 5.00 | 3 | 5.49 | 4 | 5.63 | 5 | 4.64 | 6 | 4.71 | 7 | 4.80 | 8 | 5.53 | 9 | 5.67 | 10 | 6.20 |
| CONSTRUCT 37, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.41 | 2 | 5.44 | 3 | 5.66 | 4 | 5.74 | 5 | 4.19 | 6 | 4.92 | 7 | 4.03 | 8 | 5.06 | 9 | 5.99 | 10 | 6.17 |
| CONSTRUCT 38, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.20 | 2 | 5.84 | 3 | 5.31 | 4 | 5.71 | 5 | 4.64 | 6 | 5.04 | 7 | 4.27 | 8 | 4.96 | 9 | 6.21 | 10 | 6.07 |
| CONSTRUCT 39, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 4.80 | 2 | 5.70 | 3 | 4.67 | 4 | 4.72 | 5 | 4.32 | 6 | 4.86 | 7 | 3.30 | 8 | 5.12 | 9 | 6.09 | 10 | 5.70 |
| CONSTRUCT 40, ELEMENT |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |    |      |
| 1                     | 5.23 | 2 | 5.13 | 3 | 5.11 | 4 | 4.52 | 5 | 4.50 | 6 | 4.73 | 7 | 3.72 | 8 | 5.27 | 9 | 5.84 | 10 | 6.04 |

| CONSTRUCT | MEAN  | VARIATION | AS PER CENT |
|-----------|-------|-----------|-------------|
| 1         | 5.092 | 4.4002    | 2.31        |
| 2         | 3.067 | 4.3012    | 2.30        |
| 3         | 5.592 | 1.6795    | 0.88        |
| 4         | 4.512 | 9.9039    | 5.21        |
| 5         | 4.244 | 7.5275    | 3.96        |
| 6         | 4.908 | 1.8405    | 0.97        |
| 7         | 4.991 | 1.7057    | 0.90        |
| 8         | 5.026 | 3.7869    | 1.99        |
| 9         | 5.462 | 2.5678    | 1.35        |
| 10        | 3.647 | 2.3953    | 1.26        |
| 11        | 1.910 | 5.5363    | 2.91        |
| 12        | 4.809 | 11.2907   | 5.94        |
| 13        | 4.700 | 6.1714    | 3.25        |
| 14        | 4.740 | 5.5528    | 2.92        |
| 15        | 4.906 | 6.9577    | 3.66        |
| 16        | 4.570 | 3.9058    | 2.05        |
| 17        | 5.437 | 1.4571    | 0.77        |
| 18        | 5.392 | 3.1178    | 1.64        |
| 19        | 5.383 | 4.0345    | 2.12        |
| 20        | 5.343 | 3.7039    | 1.95        |
| 21        | 4.990 | 3.0490    | 1.60        |
| 22        | 4.946 | 5.4744    | 2.88        |
| 23        | 5.241 | 4.4650    | 2.35        |
| 24        | 4.196 | 4.4649    | 2.35        |
| 25        | 4.848 | 9.5162    | 5.01        |
| 26        | 5.188 | 2.8833    | 1.52        |
| 27        | 4.590 | 5.6936    | 3.00        |
| 28        | 4.147 | 12.0298   | 6.33        |
| 29        | 5.018 | 4.6202    | 2.43        |
| 30        | 5.162 | 3.7605    | 1.98        |
| 31        | 4.535 | 3.2627    | 1.72        |
| 32        | 4.906 | 5.9205    | 3.11        |
| 33        | 5.189 | 4.7325    | 2.49        |
| 34        | 5.243 | 2.1806    | 1.15        |
| 35        | 5.008 | 6.6026    | 3.47        |
| 36        | 5.314 | 2.2087    | 1.20        |
| 37        | 5.161 | 5.2104    | 2.74        |
| 38        | 5.315 | 3.6509    | 1.92        |
| 39        | 4.978 | 4.3245    | 2.27        |
| 40        | 5.021 | 4.0509    | 2.13        |

TOTAL VARIATION ABOUT CONSTRUCT MEANS 190.0973

BIAS 0.3393  
VARIABILITY 0.2422

DEVIATIONS FROM CONSTRUCT MEANS  
(NORMALISED)

|                       |           |           |           |           |           |           |           |           |            |  |  |  |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|--|
| CONSTRUCT 1, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.2295             | 2 0.2210  | 3 0.1147  | 4 0.2210  | 5 -0.6795 | 6 -0.1075 | 7 -0.2505 | 8 -0.0545 | 9 0.4327  | 10 0.3321  |  |  |  |
| CONSTRUCT 2, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0999              | 2 0.0999  | 3 0.2060  | 4 -0.0171 | 5 -0.2560 | 6 -0.2398 | 7 -0.5159 | 8 -0.2665 | 9 0.2432  | 10 0.6465  |  |  |  |
| CONSTRUCT 3, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.1604              | 2 -0.1482 | 3 0.2715  | 4 -0.2084 | 5 -0.3458 | 6 -0.1822 | 7 -0.3712 | 8 -0.1228 | 9 0.2715  | 10 0.6751  |  |  |  |
| CONSTRUCT 4, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0179             | 2 0.2116  | 3 0.2643  | 4 -0.0322 | 5 -0.3429 | 6 -0.2934 | 7 -0.3216 | 8 -0.3917 | 9 0.5358  | 10 0.3739  |  |  |  |
| CONSTRUCT 5, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.5102              | 2 0.0123  | 3 -0.1135 | 4 -0.2593 | 5 0.3079  | 6 0.1296  | 7 -0.2633 | 8 -0.5589 | 9 -0.1459 | 10 0.3808  |  |  |  |
| CONSTRUCT 6, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.4723             | 2 0.1741  | 3 0.3547  | 4 0.2567  | 5 -0.4723 | 6 -0.2512 | 7 -0.2763 | 8 0.2972  | 9 0.0761  | 10 0.3134  |  |  |  |
| CONSTRUCT 7, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.2962              | 2 -0.3592 | 3 0.3384  | 4 -0.2910 | 5 -0.4097 | 6 -0.3423 | 7 0.0665  | 8 -0.0613 | 9 0.3897  | 10 0.3728  |  |  |  |
| CONSTRUCT 8, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0670              | 2 -0.0358 | 3 0.2782  | 4 -0.1448 | 5 -0.5384 | 6 -0.3046 | 7 -0.1386 | 8 -0.0872 | 9 0.2550  | 10 0.6492  |  |  |  |
| CONSTRUCT 9, ELEMENT  |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1013             | 2 0.1483  | 3 0.0721  | 4 -0.1219 | 5 -0.3441 | 6 -0.3716 | 7 -0.3784 | 8 0.0859  | 9 0.3842  | 10 0.6269  |  |  |  |
| CONSTRUCT 10, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.4079              | 2 -0.2524 | 3 0.0629  | 4 0.4150  | 5 0.2929  | 6 0.0629  | 7 0.1352  | 8 -0.1956 | 9 -0.3746 | 10 -0.5542 |  |  |  |
| CONSTRUCT 11, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.4577             | 2 0.2886  | 3 -0.2592 | 4 0.1279  | 5 -0.1649 | 6 0.3217  | 7 -0.5096 | 8 0.2601  | 9 0.4667  | 10 -0.0136 |  |  |  |
| CONSTRUCT 12, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0887             | 2 0.1792  | 3 0.1926  | 4 0.2256  | 5 -0.5053 | 6 -0.2506 | 7 -0.4458 | 8 -0.1184 | 9 0.4833  | 10 0.3280  |  |  |  |
| CONSTRUCT 13, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.3044              | 2 -0.3490 | 3 0.0938  | 4 -0.1879 | 5 -0.0716 | 6 0.1385  | 7 -0.5144 | 8 -0.1924 | 9 0.1522  | 10 0.6264  |  |  |  |
| CONSTRUCT 14, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1490             | 2 0.4027  | 3 -0.1066 | 4 -0.2008 | 5 -0.2008 | 6 0.0539  | 7 -0.5640 | 8 -0.1159 | 9 0.4685  | 10 0.4120  |  |  |  |
| CONSTRUCT 15, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0063             | 2 0.1116  | 3 0.1412  | 4 -0.3054 | 5 -0.1496 | 6 -0.0021 | 7 -0.5116 | 8 -0.2338 | 9 0.2799  | 10 0.6761  |  |  |  |
| CONSTRUCT 16, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0880              | 2 0.3198  | 3 -0.2601 | 4 -0.4908 | 5 -0.0354 | 6 0.1781  | 7 -0.4908 | 8 -0.0745 | 9 0.3188  | 10 0.4483  |  |  |  |
| CONSTRUCT 17, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1869             | 2 0.0434  | 3 -0.0949 | 4 0.1536  | 5 -0.4172 | 6 -0.1778 | 7 -0.4810 | 8 0.2919  | 9 0.3102  | 10 0.5587  |  |  |  |
| CONSTRUCT 18, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0361              | 2 -0.0081 | 3 0.3442  | 4 -0.0019 | 5 -0.3983 | 6 -0.3921 | 7 -0.3354 | 8 -0.1338 | 9 0.3000  | 10 0.5894  |  |  |  |
| CONSTRUCT 19, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.2020              | 2 0.2518  | 3 -0.2959 | 4 -0.2406 | 5 -0.3900 | 6 0.0691  | 7 -0.5060 | 8 0.1024  | 9 0.3787  | 10 0.4285  |  |  |  |
| CONSTRUCT 20, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.1333              | 2 0.1218  | 3 0.4222  | 4 0.0065  | 5 -0.3115 | 6 -0.4611 | 7 -0.2938 | 8 -0.3515 | 9 0.3702  | 10 0.3640  |  |  |  |

|                       |           |           |           |           |           |           |           |           |            |  |  |  |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|--|--|--|
| CONSTRUCT 21, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.0567              | 2 0.0057  | 3 -0.1008 | 4 -0.2680 | 5 -0.1850 | 6 0.1455  | 7 -0.5097 | 8 -0.1598 | 9 0.3556  | 10 0.6670  |  |  |  |
| CONSTRUCT 22, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.1985              | 2 0.1695  | 3 0.1511  | 4 -0.3049 | 5 -0.2524 | 6 0.0797  | 7 -0.5802 | 8 -0.2575 | 9 0.2981  | 10 0.5071  |  |  |  |
| CONSTRUCT 23, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0142             | 2 0.0700  | 3 -0.1406 | 4 -0.1879 | 5 -0.3033 | 6 0.0544  | 7 -0.5769 | 8 0.9961  | 9 0.5168  | 10 0.4856  |  |  |  |
| CONSTRUCT 24, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.4484              | 2 0.0292  | 3 -0.2194 | 4 -0.2141 | 5 0.3055  | 6 0.0698  | 7 -0.2454 | 8 -0.4981 | 9 -0.2033 | 10 0.4464  |  |  |  |
| CONSTRUCT 25, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.5018             | 2 0.2114  | 3 0.3663  | 4 0.1394  | 5 -0.6243 | 6 0.1034  | 7 0.1754  | 8 0.1106  | 9 0.2402  | 10 -0.2207 |  |  |  |
| CONSTRUCT 26, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1106             | 2 -0.1760 | 3 0.0920  | 4 0.0991  | 5 -0.3067 | 6 0.0201  | 7 -0.4769 | 8 -0.2025 | 9 0.4524  | 10 0.6091  |  |  |  |
| CONSTRUCT 27, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1680             | 2 0.3999  | 3 -0.0611 | 4 -0.2933 | 5 -0.2053 | 6 0.0277  | 7 -0.5221 | 8 -0.0658 | 9 0.4606  | 10 0.4325  |  |  |  |
| CONSTRUCT 28, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.4479              | 2 -0.4779 | 3 -0.1609 | 4 -0.0007 | 5 0.4415  | 6 -0.3499 | 7 0.0347  | 8 -0.0936 | 9 -0.2409 | 10 0.3997  |  |  |  |
| CONSTRUCT 29, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.1581             | 2 -0.0343 | 3 0.1109  | 4 -0.0134 | 5 -0.3237 | 6 0.0694  | 7 -0.6182 | 8 0.0178  | 9 0.3753  | 10 0.5705  |  |  |  |
| CONSTRUCT 30, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0723             | 2 -0.2440 | 3 0.2887  | 4 0.1113  | 5 -0.1579 | 6 -0.1405 | 7 -0.6798 | 8 0.1742  | 9 0.2144  | 10 0.5063  |  |  |  |
| CONSTRUCT 31, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.5296             | 2 0.4237  | 3 -0.0684 | 4 0.2577  | 5 -0.4742 | 6 0.1779  | 7 -0.1913 | 8 0.3008  | 9 0.2516  | 10 -0.1481 |  |  |  |
| CONSTRUCT 32, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.2991             | 2 0.1255  | 3 0.1801  | 4 0.3675  | 5 -0.4725 | 6 -0.2169 | 7 -0.3058 | 8 -0.0570 | 9 0.4728  | 10 0.2853  |  |  |  |
| CONSTRUCT 33, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.3474             | 2 0.1380  | 3 0.4598  | 4 0.2400  | 5 -0.6182 | 6 -0.1686 | 7 0.1941  | 8 -0.1479 | 9 0.3370  | 10 -0.0868 |  |  |  |
| CONSTRUCT 34, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0821             | 2 -0.0517 | 3 0.1813  | 4 0.1589  | 5 -0.2853 | 6 -0.1722 | 7 -0.4885 | 8 -0.1648 | 9 0.1813  | 10 0.7230  |  |  |  |
| CONSTRUCT 35, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.3404             | 2 0.1223  | 3 0.1180  | 4 0.2565  | 5 -0.5261 | 6 -0.1112 | 7 -0.3751 | 8 0.0230  | 9 0.4943  | 10 0.3387  |  |  |  |
| CONSTRUCT 36, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.1009              | 2 -0.2078 | 3 0.1154  | 4 0.2106  | 5 -0.4431 | 6 -0.3989 | 7 -0.3400 | 8 0.1445  | 9 0.2331  | 10 0.5854  |  |  |  |
| CONSTRUCT 37, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.3286             | 2 0.1239  | 3 0.2168  | 4 0.2554  | 5 -0.4259 | 6 -0.1047 | 7 -0.4942 | 8 -0.0460 | 9 0.3627  | 10 0.4407  |  |  |  |
| CONSTRUCT 38, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0604             | 2 0.2766  | 3 -0.0024 | 4 0.2070  | 5 -0.3914 | 6 -0.1421 | 7 -0.5487 | 8 -0.2405 | 9 0.4687  | 10 0.3933  |  |  |  |
| CONSTRUCT 39, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 -0.0855             | 2 0.3473  | 3 -0.1495 | 4 -0.1230 | 5 -0.3154 | 6 -0.0586 | 7 -0.5864 | 8 0.0693  | 9 0.5344  | 10 0.3473  |  |  |  |
| CONSTRUCT 40, ELEMENT |           |           |           |           |           |           |           |           |            |  |  |  |
| 1 0.1054              | 2 0.0557  | 3 0.0448  | 4 -0.1982 | 5 -0.2588 | 6 -0.1430 | 7 -0.6454 | 8 0.1223  | 9 0.4090  | 10 0.5083  |  |  |  |



# CORRELATIONS AND ANGULAR DISTANCES BETWEEN CONSTRUCTS

## CONSTRUCT 1

|    |       |       |    |        |        |    |        |        |    |        |        |    |       |       |
|----|-------|-------|----|--------|--------|----|--------|--------|----|--------|--------|----|-------|-------|
| 2  | 0.692 | 46.97 | 3  | 0.611  | 52.31  | 4  | 0.798  | 37.09  | 5  | -0.248 | 104.36 | 6  | 0.782 | 38.53 |
| 7  | 0.421 | 65.00 | 8  | 0.741  | 42.22  | 9  | 0.776  | 39.14  | 10 | -0.620 | 129.72 | 11 | 0.530 | 50.01 |
| 12 | 0.930 | 20.22 | 13 | 0.269  | 74.30  | 14 | 0.684  | 46.02  | 15 | 0.563  | 59.72  | 16 | 0.331 | 70.69 |
| 17 | 0.002 | 36.64 | 18 | 0.752  | 40.66  | 19 | 0.607  | 52.62  | 20 | 0.681  | 47.06  | 21 | 0.535 | 57.41 |
| 22 | 0.560 | 55.90 | 23 | 0.685  | 46.73  | 24 | -0.209 | 106.00 | 25 | 0.629  | 51.06  | 26 | 0.754 | 41.09 |
| 27 | 0.660 | 40.10 | 29 | -0.465 | 117.68 | 29 | 0.758  | 40.60  | 30 | 0.564  | 55.53  | 31 | 0.655 | 48.01 |
| 32 | 0.242 | 19.67 | 33 | 0.731  | 43.06  | 34 | 0.726  | 43.40  | 35 | 0.564  | 15.45  | 36 | 0.707 | 44.99 |
| 37 | 0.914 | 23.09 | 38 | 0.052  | 30.05  | 39 | 0.757  | 40.70  | 40 | 0.641  | 50.10  |    |       |       |

## CONSTRUCT 2

|    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |
|----|-------|-------|----|-------|-------|----|--------|--------|----|-------|-------|----|-------|-------|
| 3  | 0.920 | 23.13 | 4  | 0.873 | 22.17 | 5  | 0.419  | 65.24  | 6  | 0.504 | 59.70 | 7  | 0.573 | 55.03 |
| 9  | 0.050 | 31.77 | 9  | 0.879 | 22.55 | 10 | -0.536 | 122.19 | 11 | 0.170 | 79.35 | 12 | 0.625 | 24.37 |
| 13 | 0.762 | 40.37 | 14 | 0.740 | 41.62 | 15 | 0.915  | 23.78  | 16 | 0.602 | 52.96 | 17 | 0.720 | 43.96 |
| 18 | 0.932 | 21.19 | 19 | 0.675 | 47.57 | 20 | 0.073  | 29.16  | 21 | 0.825 | 34.45 | 22 | 0.886 | 27.62 |
| 23 | 0.756 | 40.00 | 24 | 0.390 | 67.02 | 25 | -0.025 | 51.44  | 26 | 0.866 | 29.99 | 27 | 0.740 | 42.25 |
| 29 | 0.142 | 01.06 | 29 | 0.945 | 32.30 | 30 | 0.704  | 38.38  | 31 | 0.634 | 00.07 | 32 | 0.700 | 45.56 |
| 33 | 0.234 | 76.30 | 34 | 0.943 | 19.44 | 35 | 0.686  | 46.69  | 36 | 0.791 | 37.76 | 37 | 0.794 | 37.41 |
| 39 | 0.057 | 31.01 | 39 | 0.720 | 43.91 | 40 | 0.058  | 30.94  |    |       |       |    |       |       |

## CONSTRUCT 3

|    |       |       |    |        |        |    |        |       |    |       |       |    |       |       |
|----|-------|-------|----|--------|--------|----|--------|-------|----|-------|-------|----|-------|-------|
| 4  | 0.702 | 30.60 | 5  | 0.357  | 69.09  | 6  | 0.449  | 63.34 | 7  | 0.790 | 37.09 | 8  | 0.933 | 21.00 |
| 9  | 0.051 | 31.69 | 10 | -0.501 | 125.54 | 11 | 0.044  | 07.50 | 12 | 0.713 | 44.15 | 13 | 0.044 | 32.49 |
| 14 | 0.610 | 51.04 | 15 | 0.000  | 27.42  | 16 | 0.559  | 56.02 | 17 | 0.607 | 46.64 | 18 | 0.530 | 21.52 |
| 19 | 0.653 | 49.12 | 20 | 0.007  | 35.22  | 21 | 0.020  | 34.08 | 22 | 0.056 | 31.17 | 23 | 0.754 | 41.08 |
| 24 | 0.307 | 72.15 | 25 | -0.007 | 90.39  | 26 | 0.051  | 31.68 | 27 | 0.644 | 49.89 | 28 | 0.213 | 77.68 |
| 29 | 0.027 | 34.18 | 30 | 0.791  | 37.72  | 31 | -0.006 | 94.94 | 32 | 0.580 | 54.56 | 33 | 0.222 | 77.17 |
| 34 | 0.000 | 20.42 | 35 | 0.607  | 52.61  | 36 | 0.027  | 34.18 | 37 | 0.686 | 46.69 | 38 | 0.679 | 47.24 |
| 39 | 0.621 | 51.62 | 40 | 0.056  | 31.00  |    |        |       |    |       |       |    |       |       |

## CONSTRUCT 4

|    |        |        |    |       |       |    |       |       |    |        |       |    |       |       |
|----|--------|--------|----|-------|-------|----|-------|-------|----|--------|-------|----|-------|-------|
| 5  | 0.190  | 79.06  | 6  | 0.500 | 59.99 | 7  | 0.610 | 52.40 | 8  | 0.802  | 36.71 | 9  | 0.814 | 35.52 |
| 10 | -0.555 | 123.68 | 11 | 0.230 | 76.24 | 12 | 0.902 | 25.57 | 13 | 0.491  | 60.61 | 14 | 0.752 | 41.25 |
| 15 | 0.701  | 30.69  | 16 | 0.499 | 60.07 | 17 | 0.597 | 53.32 | 18 | 0.682  | 20.17 | 19 | 0.501 | 54.48 |
| 20 | 0.942  | 19.69  | 21 | 0.667 | 40.13 | 22 | 0.779 | 30.05 | 23 | 0.681  | 47.04 | 24 | 0.121 | 63.04 |
| 25 | 0.270  | 73.04  | 26 | 0.780 | 30.02 | 27 | 0.747 | 41.65 | 28 | -0.150 | 99.90 | 29 | 0.726 | 42.45 |
| 30 | 0.575  | 54.89  | 31 | 0.210 | 77.86 | 32 | 0.001 | 36.77 | 33 | 0.554  | 56.35 | 34 | 0.770 | 39.65 |
| 35 | 0.773  | 39.35  | 36 | 0.646 | 49.77 | 37 | 0.795 | 37.34 | 38 | 0.003  | 29.01 | 39 | 0.735 | 42.37 |
| 40 | 0.731  | 43.07  |    |       |       |    |       |       |    |        |       |    |       |       |

## CONSTRUCT 5

|    |        |        |    |        |        |    |        |        |    |       |       |    |        |        |
|----|--------|--------|----|--------|--------|----|--------|--------|----|-------|-------|----|--------|--------|
| 6  | -0.509 | 120.58 | 7  | 0.115  | 93.39  | 8  | 0.130  | 02.55  | 9  | 0.054 | 96.92 | 10 | 0.106  | 63.92  |
| 11 | -0.319 | 108.57 | 12 | -0.074 | 94.22  | 13 | 0.644  | 49.09  | 14 | 0.240 | 76.11 | 15 | 0.497  | 60.20  |
| 16 | 0.513  | 59.13  | 17 | -0.144 | 99.30  | 18 | 0.150  | 81.37  | 19 | 0.275 | 74.05 | 20 | 0.223  | 77.14  |
| 21 | 0.199  | 60.09  | 22 | 0.544  | 37.04  | 23 | 0.100  | 79.65  | 24 | 0.901 | 11.30 | 25 | -0.737 | 137.47 |
| 26 | 0.210  | 77.40  | 27 | 0.216  | 77.55  | 28 | 0.562  | 35.00  | 29 | 0.134 | 82.31 | 30 | 0.075  | 85.71  |
| 31 | -0.653 | 131.13 | 32 | -0.267 | 195.50 | 33 | -0.533 | 123.56 | 34 | 0.255 | 75.22 | 35 | -0.286 | 106.60 |
| 36 | -0.009 | 90.53  | 37 | -0.131 | 97.52  | 38 | 0.153  | 81.21  | 39 | 0.069 | 86.02 | 40 | 0.238  | 76.23  |

## CONSTRUCT 6

|    |       |       |    |        |        |    |        |        |    |        |        |    |       |       |
|----|-------|-------|----|--------|--------|----|--------|--------|----|--------|--------|----|-------|-------|
| 7  | 0.232 | 76.57 | 8  | 0.590  | 53.06  | 9  | 0.600  | 47.18  | 10 | -0.560 | 124.03 | 11 | 0.449 | 63.31 |
| 12 | 0.720 | 43.24 | 13 | 0.072  | 05.05  | 14 | 0.419  | 65.25  | 15 | 0.370  | 69.26  | 16 | 0.046 | 87.30 |
| 17 | 0.762 | 40.39 | 19 | 0.650  | 49.44  | 19 | 0.202  | 73.63  | 20 | 0.492  | 60.55  | 21 | 0.247 | 75.68 |
| 22 | 0.274 | 74.09 | 23 | 0.430  | 64.54  | 24 | -0.494 | 119.63 | 25 | 0.642  | 50.06  | 26 | 0.516 | 58.91 |
| 27 | 0.436 | 64.15 | 28 | -0.403 | 113.77 | 29 | 0.624  | 51.41  | 30 | 0.647  | 49.67  | 31 | 0.660 | 46.70 |
| 32 | 0.014 | 35.51 | 33 | 0.640  | 49.61  | 34 | 0.639  | 50.26  | 35 | 0.020  | 34.07  | 36 | 0.655 | 48.79 |

## CONSTRUCT 7

|    |       |       |    |       |       |    |        |        |    |        |        |    |       |       |
|----|-------|-------|----|-------|-------|----|--------|--------|----|--------|--------|----|-------|-------|
| 1  | 0.831 | 33.77 | 9  | 0.598 | 53.29 | 10 | -0.361 | 111.17 | 11 | -0.303 | 107.55 | 12 | 0.490 | 60.67 |
| 13 | 0.554 | 56.34 | 14 | 0.203 | 78.20 | 15 | 0.498  | 60.12  | 16 | 0.183  | 79.44  | 17 | 0.363 | 66.70 |
| 18 | 0.751 | 41.37 | 19 | 0.343 | 69.95 | 20 | 0.704  | 45.24  | 21 | 0.445  | 63.56  | 22 | 0.500 | 60.03 |
| 23 | 0.422 | 65.07 | 24 | 0.031 | 88.21 | 25 | 0.095  | 84.53  | 26 | 0.536  | 57.62  | 27 | 0.257 | 75.00 |
| 28 | 0.252 | 75.35 | 29 | 0.434 | 64.28 | 30 | 0.461  | 62.56  | 31 | -0.262 | 105.20 | 32 | 0.357 | 65.11 |
| 33 | 0.365 | 68.58 | 34 | 0.503 | 59.90 | 35 | 0.367  | 68.46  | 36 | 0.678  | 47.32  | 37 | 0.343 | 69.94 |
| 38 | 0.322 | 71.23 | 39 | 0.280 | 73.73 | 40 | 0.537  | 57.49  |    |        |        |    |       |       |

## CONSTRUCT 8

|    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |
|----|-------|-------|----|--------|--------|----|-------|-------|----|-------|-------|----|-------|-------|
| 9  | 0.874 | 23.08 | 10 | -0.640 | 129.80 | 11 | 0.002 | 89.88 | 12 | 0.765 | 49.07 | 13 | 0.616 | 51.97 |
| 14 | 0.542 | 57.18 | 15 | 0.762  | 49.37  | 16 | 0.405 | 66.12 | 17 | 0.699 | 45.55 | 18 | 0.550 | 18.22 |
| 19 | 0.582 | 54.41 | 20 | 0.931  | 33.77  | 21 | 0.676 | 47.45 | 22 | 0.713 | 44.49 | 23 | 0.650 | 49.46 |
| 24 | 0.087 | 85.01 | 25 | 0.229  | 76.75  | 26 | 0.764 | 40.21 | 27 | 0.579 | 54.61 | 28 | 0.673 | 65.83 |
| 29 | 0.720 | 43.30 | 30 | 0.658  | 48.82  | 31 | 0.062 | 86.42 | 32 | 0.657 | 48.92 | 33 | 0.465 | 62.31 |
| 34 | 0.828 | 34.16 | 35 | 0.682  | 47.04  | 36 | 0.850 | 31.80 | 37 | 0.709 | 44.83 | 38 | 0.660 | 48.72 |
| 39 | 0.580 | 54.56 | 40 | 0.742  | 42.08  |    |       |       |    |       |       |    |       |       |

## CONSTRUCT 9

|    |        |        |    |       |       |    |       |       |    |        |       |    |       |       |
|----|--------|--------|----|-------|-------|----|-------|-------|----|--------|-------|----|-------|-------|
| 10 | -0.808 | 143.93 | 11 | 0.355 | 69.21 | 12 | 0.839 | 32.99 | 13 | 0.550  | 56.66 | 14 | 0.782 | 38.52 |
| 15 | 0.522  | 34.73  | 16 | 0.608 | 52.54 | 17 | 0.886 | 27.63 | 18 | 0.903  | 25.43 | 19 | 0.748 | 41.60 |
| 20 | 0.764  | 40.17  | 21 | 0.764 | 40.19 | 22 | 0.739 | 42.36 | 23 | 0.638  | 33.04 | 24 | 0.064 | 86.36 |
| 25 | 0.165  | 80.56  | 26 | 0.796 | 37.21 | 27 | 0.809 | 36.03 | 28 | -0.013 | 90.73 | 29 | 0.645 | 32.33 |
| 30 | 0.757  | 40.79  | 31 | 0.279 | 73.79 | 32 | 0.762 | 40.37 | 33 | 0.324  | 71.10 | 34 | 0.850 | 31.77 |
| 35 | 0.798  | 37.03  | 36 | 0.840 | 32.87 | 37 | 0.820 | 34.88 | 38 | 0.809  | 35.99 | 39 | 0.838 | 33.08 |
| 40 | 0.898  | 26.14  |    |       |       |    |       |       |    |        |       |    |       |       |

## CONSTRUCT 10

|    |        |        |    |        |        |    |        |        |    |        |        |    |        |        |
|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|
| 11 | -0.515 | 121.03 | 12 | -0.539 | 122.64 | 13 | -0.308 | 107.95 | 14 | -0.765 | 139.93 | 15 | -0.656 | 124.07 |
| 16 | -0.683 | 133.11 | 17 | -0.711 | 135.29 | 18 | -0.562 | 124.19 | 19 | -0.677 | 132.63 | 20 | -0.379 | 112.26 |
| 21 | -0.682 | 133.03 | 22 | -0.566 | 124.49 | 23 | -0.755 | 139.04 | 24 | 0.082  | 95.20  | 25 | -0.315 | 108.61 |
| 26 | -0.574 | 125.05 | 27 | -0.826 | 145.64 | 28 | 0.292  | 73.02  | 29 | -0.690 | 133.64 | 30 | -0.446 | 116.46 |
| 31 | -0.445 | 116.42 | 32 | -0.518 | 121.20 | 33 | -0.263 | 105.23 | 34 | -0.540 | 122.68 | 35 | -0.645 | 130.17 |
| 36 | -0.453 | 116.91 | 37 | -0.615 | 127.95 | 38 | -0.541 | 122.77 | 39 | -0.762 | 139.62 | 40 | -0.681 | 132.55 |

## CONSTRUCT 11

|    |       |       |    |        |        |    |        |        |    |        |       |    |       |       |
|----|-------|-------|----|--------|--------|----|--------|--------|----|--------|-------|----|-------|-------|
| 12 | 0.462 | 62.46 | 13 | 0.033  | 98.08  | 14 | 0.679  | 47.24  | 15 | 0.288  | 73.26 | 16 | 0.474 | 61.73 |
| 17 | 0.594 | 53.59 | 18 | 0.081  | 95.33  | 19 | 0.545  | 56.95  | 20 | -0.028 | 91.58 | 21 | 0.401 | 66.38 |
| 22 | 0.288 | 73.29 | 23 | 0.629  | 51.01  | 24 | -0.302 | 107.58 | 25 | 0.390  | 67.05 | 26 | 0.412 | 65.68 |
| 27 | 0.643 | 49.97 | 28 | -0.632 | 129.21 | 29 | 0.574  | 54.98  | 30 | 0.355  | 69.22 | 31 | 0.831 | 33.61 |
| 32 | 0.552 | 56.51 | 33 | 0.159  | 89.95  | 34 | 0.258  | 75.07  | 35 | 0.638  | 59.37 | 36 | 0.133 | 82.34 |
| 37 | 0.581 | 54.51 | 38 | 0.549  | 56.69  | 39 | 0.715  | 44.37  | 40 | 0.448  | 63.41 |    |       |       |

## CONSTRUCT 12

|    |        |        |    |        |       |    |       |       |    |       |       |    |       |       |
|----|--------|--------|----|--------|-------|----|-------|-------|----|-------|-------|----|-------|-------|
| 13 | 0.419  | 65.24  | 14 | 0.734  | 42.76 | 15 | 0.668 | 48.10 | 16 | 0.391 | 67.01 | 17 | 0.809 | 35.99 |
| 18 | 0.864  | 30.19  | 19 | 0.633  | 50.75 | 20 | 0.837 | 33.21 | 21 | 0.609 | 52.51 | 22 | 0.679 | 47.27 |
| 23 | 0.739  | 42.37  | 24 | -0.120 | 96.91 | 25 | 0.426 | 64.76 | 26 | 0.823 | 34.59 | 27 | 0.705 | 44.82 |
| 28 | -0.282 | 106.36 | 29 | 0.816  | 35.29 | 30 | 0.711 | 44.72 | 31 | 0.486 | 60.95 | 32 | 0.961 | 16.15 |
| 33 | 0.618  | 51.91  | 34 | 0.818  | 35.10 | 35 | 0.941 | 19.80 | 36 | 0.787 | 38.14 | 37 | 0.536 | 26.32 |
| 38 | 0.943  | 19.44  | 39 | 0.804  | 36.51 | 40 | 0.769 | 39.76 |    |       |       |    |       |       |

## CONSTRUCT 13

|    |       |       |    |        |        |    |        |        |    |       |       |    |        |        |
|----|-------|-------|----|--------|--------|----|--------|--------|----|-------|-------|----|--------|--------|
| 14 | 0.506 | 59.63 | 15 | 0.814  | 35.46  | 16 | 0.607  | 52.64  | 17 | 0.404 | 61.06 | 18 | 0.634  | 50.67  |
| 19 | 0.595 | 53.47 | 20 | 0.498  | 60.13  | 21 | 0.854  | 31.33  | 22 | 0.816 | 35.31 | 23 | 0.684  | 46.87  |
| 24 | 0.600 | 53.10 | 25 | -0.372 | 111.87 | 26 | 0.777  | 39.00  | 27 | 0.500 | 59.97 | 28 | 0.422  | 65.64  |
| 29 | 0.739 | 42.33 | 30 | 0.727  | 43.36  | 31 | -0.319 | 108.62 | 32 | 0.277 | 73.92 | 33 | -0.209 | 102.09 |
| 34 | 0.740 | 42.25 | 35 | 0.315  | 71.66  | 36 | 0.600  | 53.11  | 37 | 0.439 | 63.93 | 38 | 0.498  | 60.15  |
| 39 | 0.453 | 63.05 | 40 | 0.742  | 42.11  |    |        |        |    |       |       |    |        |        |

## CONSTRUCT 14

|    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |
|----|-------|-------|----|-------|-------|----|-------|-------|----|--------|--------|----|-------|-------|
| 15 | 0.847 | 32.06 | 16 | 0.878 | 28.63 | 17 | 0.712 | 44.62 | 18 | 0.602  | 52.99  | 19 | 0.861 | 30.61 |
| 20 | 0.550 | 56.60 | 21 | 0.852 | 31.57 | 22 | 0.841 | 32.77 | 23 | 0.903  | 25.41  | 24 | 0.223 | 77.12 |
| 25 | 0.134 | 82.32 | 26 | 0.734 | 42.78 | 27 | 0.991 | 7.57  | 28 | -0.306 | 107.94 | 29 | 0.625 | 34.04 |
| 30 | 0.556 | 56.23 | 31 | 0.440 | 63.91 | 32 | 0.649 | 49.57 | 33 | 0.159  | 81.08  | 34 | 0.666 | 48.27 |
| 35 | 0.716 | 44.31 | 36 | 0.440 | 63.92 | 37 | 0.740 | 42.28 | 38 | 0.861  | 30.57  | 39 | 0.958 | 16.63 |
| 40 | 0.837 | 33.15 |    |       |       |    |       |       |    |        |        |    |       |       |

|              |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
|--------------|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|-------|
| CONSTRUCT 15 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 16           | 0.814  | 35.50  | 17 | 0.651  | 49.39  | 18 | 0.794  | 37.46  | 19 | 0.747  | 41.63  | 20 | 0.700  | 45.56 |
| 21           | 0.943  | 19.39  | 22 | 0.952  | 17.81  | 23 | 0.836  | 33.24  | 24 | 0.465  | 62.20  | 25 | -0.065 | 53.93 |
| 26           | 0.839  | 32.92  | 27 | 0.863  | 39.37  | 28 | 0.063  | 86.39  | 29 | 0.669  | 29.63  | 30 | 0.713  | 44.49 |
| 31           | 0.031  | 08.24  | 32 | 0.536  | 57.58  | 33 | 0.073  | 05.82  | 34 | 0.843  | 32.55  | 35 | 0.587  | 54.06 |
| 36           | 0.597  | 53.38  | 37 | 0.696  | 45.93  | 38 | 0.755  | 41.00  | 39 | 0.761  | 40.44  | 40 | 0.871  | 25.40 |
| CONSTRUCT 16 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 17           | 0.493  | 60.44  | 18 | 0.391  | 67.00  | 19 | 0.873  | 29.23  | 20 | 0.318  | 71.44  | 21 | 0.674  | 29.07 |
| 22           | 0.829  | 34.05  | 23 | 0.829  | 34.04  | 24 | 0.503  | 59.78  | 25 | -0.217 | 102.52 | 26 | 0.543  | 57.14 |
| 27           | 0.889  | 27.23  | 28 | -0.056 | 93.23  | 29 | 0.655  | 49.05  | 30 | 0.383  | 57.91  | 31 | 0.113  | 83.49 |
| 32           | 0.237  | 76.30  | 33 | -0.248 | 104.35 | 34 | 0.465  | 62.32  | 35 | 0.343  | 69.94  | 36 | 0.247  | 75.72 |
| 37           | 0.384  | 67.39  | 38 | 0.582  | 54.40  | 39 | 0.002  | 36.68  | 40 | 0.762  | 40.34  |    |        |       |
| CONSTRUCT 17 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 18           | 0.740  | 42.23  | 19 | 0.745  | 41.85  | 20 | 0.510  | 59.33  | 21 | 0.692  | 46.21  | 22 | 0.579  | 54.59 |
| 23           | 0.844  | 32.42  | 24 | -0.108 | 96.19  | 25 | 0.231  | 76.66  | 26 | 0.795  | 37.37  | 27 | 0.706  | 45.09 |
| 28           | -0.107 | 96.13  | 29 | 0.877  | 29.71  | 30 | 0.811  | 35.83  | 31 | 0.505  | 59.68  | 32 | 0.811  | 35.77 |
| 33           | 0.272  | 74.24  | 34 | 0.817  | 35.22  | 35 | 0.866  | 30.00  | 36 | 0.854  | 31.31  | 37 | 0.865  | 30.15 |
| 38           | 0.786  | 38.18  | 39 | 0.821  | 34.84  | 40 | 0.038  | 33.03  |    |        |        |    |        |       |
| CONSTRUCT 19 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 19           | 0.554  | 56.34  | 20 | 0.925  | 22.31  | 21 | 0.674  | 47.60  | 22 | 0.745  | 41.93  | 23 | 0.672  | 47.76 |
| 24           | 0.112  | 83.56  | 25 | 0.182  | 79.49  | 26 | 0.325  | 34.42  | 27 | 0.618  | 51.82  | 28 | 0.090  | 84.82 |
| 29           | 0.789  | 37.37  | 30 | 0.784  | 38.36  | 31 | 0.085  | 85.15  | 32 | 0.770  | 39.57  | 33 | 0.461  | 62.54 |
| 34           | 0.907  | 24.95  | 35 | 0.751  | 41.35  | 36 | 0.887  | 27.48  | 37 | 0.812  | 35.66  | 38 | 0.775  | 28.86 |
| 39           | 0.637  | 50.42  | 40 | 0.801  | 36.80  |    |        |        |    |        |        |    |        |       |
| CONSTRUCT 19 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 20           | 0.430  | 64.56  | 21 | 0.854  | 31.34  | 22 | 0.810  | 35.86  | 23 | 0.929  | 21.70  | 24 | 0.257  | 75.11 |
| 25           | -0.020 | 91.17  | 26 | 0.656  | 48.99  | 27 | 0.856  | 31.15  | 28 | -0.126 | 97.21  | 29 | 0.764  | 40.22 |
| 30           | 0.524  | 58.43  | 31 | 0.315  | 71.66  | 32 | 0.489  | 60.70  | 33 | -0.023 | 91.30  | 34 | 0.587  | 54.08 |
| 35           | 0.587  | 54.03  | 36 | 0.554  | 56.33  | 37 | 0.570  | 55.28  | 38 | 0.735  | 42.73  | 39 | 0.908  | 24.80 |
| 40           | 0.873  | 29.24  |    |        |        |    |        |        |    |        |        |    |        |       |
| CONSTRUCT 20 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 21           | 0.532  | 57.88  | 22 | 0.706  | 45.12  | 23 | 0.519  | 58.72  | 24 | 0.152  | 81.25  | 25 | 0.179  | 79.66 |
| 26           | 0.690  | 46.37  | 27 | 0.554  | 56.34  | 28 | 0.036  | 87.91  | 29 | 0.614  | 52.14  | 30 | 0.600  | 53.16 |
| 31           | 0.009  | 89.47  | 32 | 0.713  | 44.49  | 33 | 0.525  | 58.36  | 34 | 0.760  | 40.51  | 35 | 0.645  | 49.87 |
| 36           | 0.709  | 44.37  | 37 | 0.702  | 45.45  | 38 | 0.763  | 40.23  | 39 | 0.559  | 56.04  | 40 | 0.668  | 48.08 |
| CONSTRUCT 21 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 22           | 0.917  | 23.47  | 23 | 0.916  | 23.65  | 24 | 0.477  | 61.48  | 25 | -0.143 | 98.22  | 26 | 0.859  | 30.81 |
| 27           | 0.351  | 31.71  | 28 | 0.086  | 85.05  | 29 | 0.880  | 20.31  | 30 | 0.675  | 47.55  | 31 | 0.064  | 86.31 |
| 32           | 0.486  | 60.93  | 33 | -0.057 | 93.26  | 34 | 0.783  | 38.46  | 35 | 0.570  | 55.22  | 36 | 0.583  | 54.30 |
| 37           | 0.636  | 50.50  | 38 | 0.735  | 42.72  | 39 | 0.796  | 37.28  | 40 | 0.876  | 28.95  |    |        |       |
| CONSTRUCT 22 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 23           | 0.935  | 33.32  | 24 | 0.471  | 61.87  | 25 | -0.058 | 93.30  | 26 | 0.785  | 38.27  | 27 | 0.843  | 32.53 |
| 28           | -0.016 | 90.94  | 29 | 0.828  | 34.15  | 30 | 0.655  | 49.08  | 31 | 0.041  | 87.64  | 32 | 0.502  | 69.87 |
| 33           | 0.074  | 85.76  | 34 | 0.759  | 40.61  | 35 | 0.546  | 56.88  | 36 | 0.546  | 56.98  | 37 | 0.639  | 50.29 |
| 38           | 0.766  | 40.03  | 39 | 0.775  | 39.22  | 40 | 0.974  | 29.12  |    |        |        |    |        |       |
| CONSTRUCT 23 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 24           | 0.160  | 80.80  | 25 | 0.066  | 96.23  | 26 | 0.837  | 33.17  | 27 | 0.902  | 25.61  | 28 | -0.130 | 97.44 |
| 29           | 0.920  | 23.06  | 30 | 0.728  | 43.26  | 31 | 0.349  | 69.56  | 32 | 0.650  | 49.45  | 33 | 0.085  | 84.89 |
| 34           | 0.730  | 43.11  | 35 | 0.741  | 42.21  | 36 | 0.656  | 49.03  | 37 | 0.740  | 42.23  | 38 | 0.807  | 26.18 |
| 39           | 0.940  | 19.90  | 40 | 0.946  | 18.97  |    |        |        |    |        |        |    |        |       |
| CONSTRUCT 24 |        |        |    |        |        |    |        |        |    |        |        |    |        |       |
| 25           | -0.309 | 143.96 | 26 | 0.186  | 79.26  | 27 | 0.197  | 78.63  | 28 | 0.635  | 50.59  | 29 | 0.108  | 83.78 |
| 30           | 0.066  | 86.20  | 31 | -0.657 | 131.04 | 32 | -0.291 | 106.93 | 33 | -0.636 | 129.46 | 34 | 0.255  | 75.21 |
| 35           | -0.309 | 107.98 | 36 | -0.003 | 90.18  | 37 | -0.149 | 98.60  | 38 | 0.127  | 82.70  | 39 | 0.056  | 66.76 |
| 40           | 0.214  | 77.65  |    |        |        |    |        |        |    |        |        |    |        |       |

|              |       |       |              |       |       |              |        |        |              |       |       |              |       |       |              |       |       |              |       |       |              |        |        |              |       |       |              |       |       |              |       |       |              |       |       |              |        |        |              |       |       |              |       |       |              |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       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| CONSTRUCT 25 |       |       | CONSTRUCT 26 |       |       | CONSTRUCT 27 |        |        | CONSTRUCT 28 |       |       | CONSTRUCT 29 |       |       | CONSTRUCT 30 |       |       | CONSTRUCT 31 |       |       | CONSTRUCT 32 |        |        | CONSTRUCT 33 |       |       | CONSTRUCT 34 |       |       | CONSTRUCT 35 |       |       | CONSTRUCT 36 |       |       | CONSTRUCT 37 |        |        | CONSTRUCT 38 |       |       | CONSTRUCT 39 |       |       | CONSTRUCT 40 |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |    |       |       |    |       |       |    |       |       |    |       |       |    |        |        |     |       |       |    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  |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |        |     |       |       |     |       |       |     |       |       |     |       |       |     |        |      |
| 25           | 0.128 | 92.67 | 27           | 0.152 | 91.25 | 29           | -0.047 | 147.88 | 31           | 0.179 | 79.70 | 33           | 0.030 | 68.29 | 35           | 0.128 | 92.67 | 37           | 0.152 | 91.25 | 39           | -0.047 | 147.88 | 41           | 0.179 | 79.70 | 43           | 0.030 | 68.29 | 45           | 0.128 | 92.67 | 47           | 0.152 | 91.25 | 49           | -0.047 | 147.88 | 51           | 0.179 | 79.70 | 53           | 0.030 | 68.29 | 55           | 0.128 | 92.67 | 57 | 0.152 | 91.25 | 59 | -0.047 | 147.88 | 61 | 0.179 | 79.70 | 63 | 0.030 | 68.29 | 65 | 0.128 | 92.67 | 67 | 0.152 | 91.25 | 69 | -0.047 | 147.88 | 71 | 0.179 | 79.70 | 73 | 0.030 | 68.29 | 75 | 0.128 | 92.67 | 77 | 0.152 | 91.25 | 79 | -0.047 | 147.88 | 81 | 0.179 | 79.70 | 83 | 0.030 | 68.29 | 85 | 0.128 | 92.67 | 87 | 0.152 | 91.25 | 89 | -0.047 | 147.88 | 91 | 0.179 | 79.70 | 93 | 0.030 | 68.29 | 95 | 0.128 | 92.67 | 97 | 0.152 | 91.25 | 99 | -0.047 | 147.88 | 101 | 0.179 | 79.70 | 103 | 0.030 | 68.29 | 105 | 0.128 | 92.67 | 107 | 0.152 | 91.25 | 109 | -0.047 | 147.88 | 111 | 0.179 | 79.70 | 113 | 0.030 | 68.29 | 115 | 0.128 | 92.67 | 117 | 0.152 | 91.25 | 119 | -0.047 | 147.88 | 121 | 0.179 | 79.70 | 123 | 0.030 | 68.29 | 125 | 0.128 | 92.67 | 127 | 0.152 | 91.25 | 129 | -0.047 | 147.88 | 131 | 0.179 | 79.70 | 133 | 0.030 | 68.29 | 135 | 0.128 | 92.67 | 137 | 0.152 | 91.25 | 139 | -0.047 | 147.88 | 141 | 0.179 | 79.70 | 143 | 0.030 | 68.29 | 145 | 0.128 | 92.67 | 147 | 0.152 | 91.25 | 149 | -0.047 | 147.88 | 151 | 0.179 | 79.70 | 153 | 0.030 | 68.29 | 155 | 0.128 | 92.67 | 157 | 0.152 | 91.25 | 159 | -0.047 | 147.88 | 161 | 0.179 | 79.70 | 163 | 0.030 | 68.29 | 165 | 0.128 | 92.67 | 167 | 0.152 | 91.25 | 169 | -0.047 | 147.88 | 171 | 0.179 | 79.70 | 173 | 0.030 | 68.29 | 175 | 0.128 | 92.67 | 177 | 0.152 | 91.25 | 179 | -0.047 | 147.88 | 181 | 0.179 | 79.70 | 183 | 0.030 | 68.29 | 185 | 0.128 | 92.67 | 187 | 0.152 | 91.25 | 189 | -0.047 | 147.88 | 191 | 0.179 | 79.70 | 193 | 0.030 | 68.29 | 195 | 0.128 | 92.67 | 197 | 0.152 | 91.25 | 199 | -0.047 | 147.88 | 201 | 0.179 | 79.70 | 203 | 0.030 | 68.29 | 205 | 0.128 | 92.67 | 207 | 0.152 | 91.25 | 209 | -0.047 | 147.88 | 211 | 0.179 | 79.70 | 213 | 0.030 | 68.29 | 215 | 0.128 | 92.67 | 217 | 0.152 | 91.25 | 219 | -0.047 | 147.88 | 221 | 0.179 | 79.70 | 223 | 0.030 | 68.29 | 225 | 0.128 | 92.67 | 227 | 0.152 | 91.25 | 229 | -0.047 | 147.88 | 231 | 0.179 | 79.70 | 233 | 0.030 | 68.29 | 235 | 0.128 | 92.67 | 237 | 0.152 | 91.25 | 239 | -0.047 | 147.88 | 241 | 0.179 | 79.70 | 243 | 0.030 | 68.29 | 245 | 0.128 | 92.67 | 247 | 0.152 | 91.25 | 249 | -0.047 | 147.88 | 251 | 0.179 | 79.70 | 253 | 0.030 | 68.29 | 255 | 0.128 | 92.67 | 257 | 0.152 | 91.25 | 259 | -0.047 | 147.88 | 261 | 0.179 | 79.70 | 263 | 0.030 | 68.29 | 265 | 0.128 | 92.67 | 267 | 0.152 | 91.25 | 269 | -0.047 | 147.88 | 271 | 0.179 | 79.70 | 273 | 0.030 | 68.29 | 275 | 0.128 | 92.67 | 277 | 0.152 | 91.25 | 279 | -0.047 | 147.88 | 281 | 0.179 | 79.70 | 283 | 0.030 | 68.29 | 285 | 0.128 | 92.67 | 287 | 0.152 | 91.25 | 289 | -0.047 | 147.88 | 291 | 0.179 | 79.70 | 293 | 0.030 | 68.29 | 295 | 0.128 | 92.67 | 297 | 0.152 | 91.25 | 299 | -0.047 | 147.88 | 301 | 0.179 | 79.70 | 303 | 0.030 | 68.29 | 305 | 0.128 | 92.67 | 307 | 0.152 | 91.25 | 309 | -0.047 | 147.88 | 311 | 0.179 | 79.70 | 313 | 0.030 | 68.29 | 315 | 0.128 | 92.67 | 317 | 0.152 | 91.25 | 319 | -0.047 | 147.88 | 321 | 0.179 | 79.70 | 323 | 0.030 | 68.29 | 325 | 0.128 | 92.67 | 327 | 0.152 | 91.25 | 329 | -0.047 | 147.88 | 331 | 0.179 | 79.70 | 333 | 0.030 | 68.29 | 335 | 0.128 | 92.67 | 337 | 0.152 | 91.25 | 339 | -0.047 | 147.88 | 341 | 0.179 | 79.70 | 343 | 0.030 | 68.29 | 345 | 0.128 | 92.67 | 347 | 0.152 | 91.25 | 349 | -0.047 | 147.88 | 351 | 0.179 | 79.70 | 353 | 0.030 | 68.29 | 355 | 0.128 | 92.67 | 357 | 0.152 | 91.25 | 359 | -0.047 | 147.88 | 361 | 0.179 | 79.70 | 363 | 0.030 | 68.29 | 365 | 0.128 | 92.67 | 367 | 0.152 | 91.25 | 369 | -0.047 | 147.88 | 371 | 0.179 | 79.70 | 373 | 0.030 | 68.29 | 375 | 0.128 | 92.67 | 377 | 0.152 | 91.25 | 379 | -0.047 | 147.88 | 381 | 0.179 | 79.70 | 383 | 0.030 | 68.29 | 385 | 0.128 | 92.67 | 387 | 0.152 | 91.25 | 389 | -0.047 | 147.88 | 391 | 0.179 | 79.70 | 393 | 0.030 | 68.29 | 395 | 0.128 | 92.67 | 397 | 0.152 | 91.25 | 399 | -0.047 | 147.88 | 401 | 0.179 | 79.70 | 403 | 0.030 | 68.29 | 405 | 0.128 | 92.67 | 407 | 0.152 | 91.25 | 409 | -0.047 | 147.88 | 411 | 0.179 | 79.70 | 413 | 0.030 | 68.29 | 415 | 0.128 | 92.67 | 417 | 0.152 | 91.25 | 419 | -0.047 | 147.88 | 421 | 0.179 | 79.70 | 423 | 0.030 | 68.29 | 425 | 0.128 | 92.67 | 427 | 0.152 | 91.25 | 429 | -0.047 | 147.88 | 431 | 0.179 | 79.70 | 433 | 0.030 | 68.29 | 435 | 0.128 | 92.67 | 437 | 0.152 | 91.25 | 439 | -0.047 | 147.88 | 441 | 0.179 | 79.70 | 443 | 0.030 | 68.29 | 445 | 0.128 | 92.67 | 447 | 0.152 | 91.25 | 449 | -0.047 | 147.88 | 451 | 0.179 | 79.70 | 453 | 0.030 | 68.29 | 455 | 0.128 | 92.67 | 457 | 0.152 | 91.25 | 459 | -0.047 | 147.88 | 461 | 0.179 | 79.70 | 463 | 0.030 | 68.29 | 465 | 0.128 | 92.67 | 467 | 0.152 | 91.25 | 469 | -0.047 | 147.88 | 471 | 0.179 | 79.70 | 473 | 0.030 | 68.29 | 475 | 0.128 | 92.67 | 477 | 0.152 | 91.25 | 479 | -0.047 | 147.88 | 481 | 0.179 | 79.70 | 483 | 0.030 | 68.29 | 485 | 0.128 | 92.67 | 487 | 0.152 | 91.25 | 489 | -0.047 | 147.88 | 491 | 0.179 | 79.70 | 493 | 0.030 | 68.29 | 495 | 0.128 | 92.67 | 497 | 0.152 | 91.25 | 499 | -0.047 | 147.88 | 501 | 0.179 | 79.70 | 503 | 0.030 | 68.29 | 505 | 0.128 | 92.67 | 507 | 0.152 | 91.25 | 509 | -0.047 | 147.88 | 511 | 0.179 | 79.70 | 513 | 0.030 | 68.29 | 515 | 0.128 | 92.67 | 517 | 0.152 | 91.25 | 519 | -0.047 | 147.88 | 521 | 0.179 | 79.70 | 523 | 0.030 | 68.29 | 525 | 0.128 | 92.67 | 527 | 0.152 | 91.25 | 529 | -0.047 | 147.88 | 531 | 0.179 | 79.70 | 533 | 0.030 | 68.29 | 535 | 0.128 | 92.67 | 537 | 0.152 | 91.25 | 539 | -0.047 | 147.88 | 541 | 0.179 | 79.70 | 543 | 0.030 | 68.29 | 545 | 0.128 | 92.67 | 547 | 0.152 | 91.25 | 549 | -0.047 | 147.88 | 551 | 0.179 | 79.70 | 553 | 0.030 | 68.29 | 555 | 0.128 | 92.67 | 557 | 0.152 | 91.25 | 559 | -0.047 | 147.88 | 561 | 0.179 | 79.70 | 563 | 0.030 | 68.29 | 565 | 0.128 | 92.67 | 567 | 0.152 | 91.25 | 569 | -0.047 | 147.88 | 571 | 0.179 | 79.70 | 573 | 0.030 | 68.29 | 575 | 0.128 | 92.67 | 577 | 0.152 | 91.25 | 579 | -0.047 | 147.88 | 581 | 0.179 | 79.70 | 583 | 0.030 | 68.29 | 585 | 0.128 | 92.67 | 587 | 0.152 | 91.25 | 589 | -0.047 | 147.88 | 591 | 0.179 | 79.70 | 593 | 0.030 | 68.29 | 595 | 0.128 | 92.67 | 597 | 0.152 | 91.25 | 599 | -0.047 | 147.88 | 601 | 0.179 | 79.70 | 603 | 0.030 | 68.29 | 605 | 0.128 | 92.67 | 607 | 0.152 | 91.25 | 609 | -0.047 | 147.88 | 611 | 0.179 | 79.70 | 613 | 0.030 | 68.29 | 615 | 0.128 | 92.67 | 617 | 0.152 | 91.25 | 619 | -0.047 | 147.88 | 621 | 0.179 | 79.70 | 623 | 0.030 | 68.29 | 625 | 0.128 | 92.67 | 627 | 0.152 | 91.25 | 629 | -0.047 | 147.88 | 631 | 0.179 | 79.70 | 633 | 0.030 | 68.29 | 635 | 0.128 | 92.67 | 637 | 0.152 | 91.25 | 639 | -0.047 | 147.88 | 641 | 0.179 | 79.70 | 643 | 0.030 | 68.29 | 645 | 0.128 | 92.67 | 647 | 0.152 | 91.25 | 649 | -0.047 | 147.88 | 651 | 0.179 | 79.70 | 653 | 0.030 | 68.29 | 655 | 0.128 | 92.67 | 657 | 0.152 | 91.25 | 659 | -0.047 | 147.88 | 661 | 0.179 | 79.70 | 663 | 0.030 | 68.29 | 665 | 0.128 | 92.67 | 667 | 0.152 | 91.25 | 669 | -0.047 | 147.88 | 671 | 0.179 | 79.70 | 673 | 0.030 | 68.29 | 675 | 0.128 | 92.67 | 677 | 0.152 | 91.25 | 679 | -0.047 | 147.88 | 681 | 0.179 | 79.70 | 683 | 0.030 | 68.29 | 685 | 0.128 | 92.67 | 687 | 0.152 | 91.25 | 689 | -0.047 | 147.88 | 691 | 0.179 | 79.70 | 693 | 0.030 | 68.29 | 695 | 0.128 | 92.67 | 697 | 0.152 | 91.25 | 699 | -0.047 | 147.88 | 701 | 0.179 | 79.70 | 703 | 0.030 | 68.29 | 705 | 0.128 | 92.67 | 707 | 0.152 | 91.25 | 709 | -0.047 | 147.88 | 711 | 0.179 | 79.70 | 713 | 0.030 | 68.29 | 715 | 0.128 | 92.67 | 717 | 0.152 | 91.25 | 719 | -0.047 | 147.88 | 721 | 0.179 | 79.70 | 723 | 0.030 | 68.29 | 725 | 0.128 | 92.67 | 727 | 0.152 | 91.25 | 729 | -0.047 | 147.88 | 731 | 0.179 | 79.70 | 733 | 0.030 | 68.29 | 735 | 0.128 | 92.67 | 737 | 0.152 | 91.25 | 739 | -0.047 | 147.88 | 741 | 0.179 | 79.70 | 743 | 0.030 | 68.29 | 745 | 0.128 | 92.67 | 747 | 0.152 | 91.25 | 749 | -0.047 | 147.88 | 751 | 0.179 | 79.70 | 753 | 0.030 | 68.29 | 755 | 0.128 | 92.67 | 757 | 0.152 | 91.25 | 759 | -0.047 | 147.88 | 761 | 0.179 | 79.70 | 763 | 0.030 | 68.29 | 765 | 0.128 | 92.67 | 767 | 0.152 | 91.25 | 769 | -0.047 | 147.88 | 771 | 0.179 | 79.70 | 773 | 0.030 | 68.29 | 775 | 0.128 | 92.67 | 777 | 0.152 | 91.25 | 779 | -0.047 | 147.88 | 781 | 0.179 | 79.70 | 783 | 0.030 | 68.29 | 785 | 0.128 | 92.67 | 787 | 0.152 | 91.25 | 789 | -0.047 | 147.88 | 791 | 0.179 | 79.70 | 793 | 0.030 | 68.29 | 795 | 0.128 | 92.67 | 797 | 0.152 | 91.25 | 799 | -0.047 | 147.88 | 801 | 0.179 | 79.70 | 803 | 0.030 | 68.29 | 805 | 0.128 | 92.67 | 807 | 0.152 | 91.25 | 809 | -0.047 | 147.88 | 811 | 0.179 | 79.70 | 813 | 0.030 | 68.29 | 815 | 0.128 | 92.67 | 817 | 0.152 | 91.25 | 819 | -0.047 | 147.88 | 821 | 0.179 | 79.70 | 823 | 0.030 | 68.29 | 825 | 0.128 | 92.67 | 827 | 0.152 | 91.25 | 829 | -0.047 | 147.88 | 831 | 0.179 | 79.70 | 833 | 0.030 | 68.29 | 835 | 0.128 | 92.67 | 837 | 0.152 | 91.25 | 839 | -0.047 | 147.88 | 841 | 0.179 | 79.70 | 843 | 0.030 | 68.29 | 845 | 0.128 | 92.67 | 847 | 0.152 | 91.25 | 849 | -0.047 | 147.88 | 851 | 0.179 | 79.70 | 853 | 0.030 | 68.29 | 855 | 0.128 | 92.67 | 857 | 0.152 | 91.25 | 859 | -0.047 | 147.88 | 861 | 0.179 | 79.70 | 863 | 0.030 | 68.29 | 865 | 0.128 | 92.67 | 867 | 0.152 | 91.25 | 869 | -0.047 | 147.88 | 871 | 0.179 | 79.70 | 873 | 0.030 | 68.29 | 875 | 0.128 | 92.67 | 877 | 0.152 | 91.25 | 879 | -0.047 | 147.88 | 881 | 0.179 | 79.70 | 883 | 0.030 | 68.29 | 885 | 0.128 | 92.67 | 887 | 0.152 | 91.25 | 889 | -0.047 | 147. |

| ELEMENT | TOTAL   | SUM OF SQUARES | AS PER CENT |
|---------|---------|----------------|-------------|
| 1       | -1.145  | 2.796          | 6.99        |
| 2       | 2.729   | 2.012          | 5.03        |
| 3       | 3.441   | 1.895          | 4.74        |
| 4       | -0.101  | 2.012          | 5.03        |
| 5       | -11.135 | 5.723          | 14.31       |
| 6       | -3.681  | 1.001          | 4.50        |
| 7       | -14.807 | 7.497          | 18.74       |
| 8       | -2.786  | 1.812          | 4.53        |
| 9       | 11.758  | 5.214          | 13.03       |
| 10      | 16.028  | 9.238          | 23.10       |

TOTAL VARIATION ABOUT CONSTRUCT MEANS 40.0000

TOTAL PER CONSTRUCT 1.0000

UNIT OF EXPECTED DISTANCE 2.9814

## DISTANCES BETWEEN ELEMENTS

|                       |          |          |          |          |          |          |          |          |
|-----------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| ELEMENT 1<br>2 0.919  | 3 0.807  | 4 0.900  | 5 0.679  | 6 0.733  | 7 1.014  | 8 0.833  | 9 1.114  | 10 1.133 |
| ELEMENT 2<br>3 0.691  | 4 0.686  | 5 1.105  | 6 0.612  | 7 1.187  | 8 0.643  | 9 0.653  | 10 1.062 |          |
| ELEMENT 3<br>4 0.555  | 5 1.142  | 6 0.831  | 7 1.098  | 8 0.711  | 9 0.732  | 10 0.576 |          |          |
| ELEMENT 4<br>5 1.011  | 6 0.716  | 7 0.951  | 8 0.551  | 9 0.931  | 10 1.252 |          |          |          |
| ELEMENT 5<br>6 0.699  | 7 0.742  | 8 0.939  | 9 1.521  | 10 1.641 |          |          |          |          |
| ELEMENT 6<br>7 0.907  | 8 0.579  | 9 1.030  | 10 1.305 |          |          |          |          |          |
| ELEMENT 7<br>8 0.926  | 9 1.615  | 10 1.884 |          |          |          |          |          |          |
| ELEMENT 8<br>9 0.935  | 10 1.256 |          |          |          |          |          |          |          |
| ELEMENT 9<br>10 0.663 |          |          |          |          |          |          |          |          |

## SUMS OF PRODUCTS

|                       |           |           |           |           |           |          |          |          |
|-----------------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|
| ELEMENT 1<br>2 -1.350 | 3 -0.547  | 4 -1.199  | 5 2.212   | 6 -0.080  | 7 0.577   | 8 -1.204 | 9 -1.510 | 10 0.313 |
| ELEMENT 2<br>3 -0.166 | 4 -0.082  | 5 -1.557  | 6 0.243   | 7 -1.509  | 8 0.077   | 9 1.715  | 10 0.617 |          |
| ELEMENT 3<br>4 0.585  | 5 -1.992  | 6 -1.225  | 7 -0.659  | 8 -0.396  | 9 1.173   | 10 1.332 |          |          |
| ELEMENT 4<br>5 -0.671 | 6 -0.372  | 7 0.737   | 8 0.564   | 9 -0.236  | 10 -1.339 |          |          |          |
| ELEMENT 5<br>6 1.590  | 7 4.161   | 8 -0.153  | 9 -4.818  | 10 -4.494 |           |          |          |          |
| ELEMENT 6<br>7 0.593  | 8 0.316   | 9 -1.205  | 10 -2.053 |           |           |          |          |          |
| ELEMENT 7<br>8 0.841  | 9 -5.238  | 10 -7.401 |           |           |           |          |          |          |
| ELEMENT 8<br>9 -0.368 | 10 -1.488 |           |           |           |           |          |          |          |
| ELEMENT 9<br>10 5.274 |           |           |           |           |           |          |          |          |

THE COMPONENT-SPACE IS LIMITED TO 9 DIMENSIONS

| COMPONENT | ROOT    | AS PER CENT |
|-----------|---------|-------------|
| 1         | 24.3081 | 60.77       |
| 2         | 7.0090  | 17.72       |
| 3         | 3.8208  | 9.55        |
| 4         | 1.6278  | 4.07        |
| 5         | 1.2271  | 3.07        |
| 6         | 0.6876  | 1.72        |
| 7         | 0.3033  | 1.46        |
| 8         | 0.3646  | 0.91        |
| 9         | 0.2915  | 0.73        |

DARTLETT TEST NOT APPLIED

| COMPONENT 1 |         |         |          | COMPONENT 2 |         |          |         | COMPONENT 3 |          |  |  |
|-------------|---------|---------|----------|-------------|---------|----------|---------|-------------|----------|--|--|
| ELEMENT     | VECTOR  | LOADING | RESIDUAL | VECTOR      | LOADING | RESIDUAL | VECTOR  | LOADING     | RESIDUAL |  |  |
| 1           | -0.0322 | -0.4054 | 2.6318   | 0.5612      | 1.4943  | 0.3990   | 0.1723  | 0.3367      | 0.2856   |  |  |
| 2           | 0.1152  | 0.5678  | 1.5901   | -0.2341     | -0.6234 | 1.3014   | -0.4273 | -0.6352     | 0.6040   |  |  |
| 3           | 0.1164  | 0.5738  | 1.5653   | -0.1514     | -0.4032 | 1.4027   | 0.5262  | -1.0285     | 0.3449   |  |  |
| 4           | -0.3353 | -0.1766 | 1.2927   | -0.3553     | -0.9461 | 1.0856   | 0.2562  | 0.5008      | 0.8348   |  |  |
| 5           | -0.4071 | -2.0071 | 1.6245   | 0.4250      | 1.1315  | 0.4142   | -0.1954 | -0.3819     | 0.2684   |  |  |
| 6           | -0.1317 | -0.6491 | 1.3793   | 0.0062      | 0.0166  | 1.3790   | -0.5038 | -0.5847     | 0.4051   |  |  |
| 7           | -0.5164 | -2.5461 | 1.0149   | -0.1712     | -0.4558 | 0.8070   | 0.3173  | 0.6203      | 0.4222   |  |  |
| 8           | -0.0612 | -0.3017 | 1.7210   | -0.2952     | -0.7860 | 1.1032   | -0.1535 | -0.3001     | 1.0132   |  |  |
| 9           | 0.4351  | 2.1453  | 0.6113   | -0.1761     | -0.4690 | 0.3914   | -0.1165 | -0.2277     | 0.3356   |  |  |
| 10          | 0.5677  | 2.7992  | 1.4031   | 0.3910      | 1.0411  | 0.3192   | 0.1244  | -0.2431     | 0.2601   |  |  |
| CONSTRUCT   |         |         |          |             |         |          |         |             |          |  |  |
| 1           | 0.1724  | 0.8500  | 0.2775   | -0.1702     | -0.4533 | 0.0720   | 0.0459  | 0.0857      | 0.0640   |  |  |
| 2           | 0.1365  | 0.9193  | 0.1550   | 0.1030      | 0.2742  | 0.0798   | 0.0914  | 0.1786      | 0.0479   |  |  |
| 3           | 0.1773  | 0.8742  | 0.2358   | -0.1223     | -0.3255 | 0.1298   | 0.1500  | -0.2932     | 0.0436   |  |  |
| 4           | 0.1770  | 0.8726  | 0.2385   | -0.0063     | -0.0168 | 0.2383   | 0.0984  | -0.1923     | 0.2013   |  |  |
| 5           | 0.0276  | 0.1360  | 0.9915   | 0.3414      | 0.9090  | 0.1552   | -0.0524 | -0.1023     | 0.1447   |  |  |
| 6           | 0.1322  | 0.6519  | 0.5751   | -0.2195     | -0.5843 | 0.2336   | 0.1096  | 0.2123      | 0.1685   |  |  |
| 7           | 0.1109  | 0.5465  | 0.7013   | 0.0709      | 0.2101  | 0.6571   | 0.3029  | 0.5920      | 0.3067   |  |  |
| 8           | 0.1711  | 0.8436  | 0.2893   | 0.0312      | 0.0930  | 0.2814   | -0.2124 | 0.4152      | 0.1050   |  |  |
| 9           | 0.1907  | 0.9404  | 0.1156   | 0.0034      | 0.0092  | 0.1155   | 0.0411  | 0.0803      | 0.1051   |  |  |
| 10          | -0.1487 | -0.7332 | 0.4625   | 0.0525      | -0.1398 | 0.4429   | 0.1413  | 0.2763      | 0.3666   |  |  |
| 11          | 0.0968  | 0.4774  | 0.7721   | -0.1747     | -0.4652 | 0.5557   | -0.3511 | -0.6864     | 0.0646   |  |  |
| 12          | 0.1956  | 0.9149  | 0.1629   | -0.0988     | -0.2630 | 0.0938   | 0.0795  | 0.1535      | 0.0702   |  |  |
| 13          | 0.1344  | 0.6626  | 0.5609   | 0.2398      | 0.6385  | 0.1532   | 0.0376  | -0.0734     | 0.1478   |  |  |
| 14          | 0.1753  | 0.8642  | 0.2532   | 0.0127      | 0.0339  | 0.2520   | -0.2341 | -0.4576     | 0.0426   |  |  |
| 15          | 0.1797  | 0.8861  | 0.2149   | 0.1373      | 0.3656  | 0.0812   | -0.0498 | -0.0974     | 0.0717   |  |  |
| 16          | 0.1337  | 0.6590  | 0.5657   | 0.1502      | 0.3999  | 0.4058   | -0.3029 | -0.5921     | 0.0552   |  |  |
| 17          | 0.1784  | 0.8797  | 0.2261   | -0.0652     | -0.1737 | 0.1959   | -0.0278 | -0.0544     | 0.1929   |  |  |
| 18          | 0.1813  | 0.8966  | 0.1962   | -0.0276     | 0.0735  | 0.1908   | -0.2139 | 0.4161      | 0.0160   |  |  |
| 19          | 0.1621  | 0.7993  | 0.3611   | -0.0663     | 0.1766  | 0.3299   | -0.2127 | -0.4158     | 0.1570   |  |  |
| 20          | 0.1583  | 0.7805  | 0.3909   | 0.0285      | 0.0760  | 0.3851   | 0.2306  | -0.4507     | 0.1819   |  |  |
| 21          | 0.1736  | 0.8559  | 0.2674   | 0.1492      | 0.3974  | 0.1095   | -0.1286 | -0.2513     | 0.0463   |  |  |
| 22          | 0.1736  | 0.8559  | 0.2674   | 0.1404      | 0.3737  | 0.1278   | -0.0717 | -0.1401     | 0.1082   |  |  |
| 23          | 0.1843  | 0.9085  | 0.1746   | 0.0392      | 0.1043  | 0.1637   | -0.1639 | -0.3202     | 0.0612   |  |  |
| 24          | 0.0214  | 0.1057  | 0.9388   | 0.3451      | -0.9188 | 0.1446   | -0.0703 | -0.1375     | 0.1257   |  |  |
| 25          | 0.0458  | 0.2256  | 0.9491   | -0.3351     | -0.8921 | 0.1533   | 0.0536  | -0.1048     | 0.1423   |  |  |
| 26          | 0.1965  | 0.9195  | 0.1545   | 0.0374      | 0.0997  | 0.1446   | -0.0422 | -0.0825     | 0.1378   |  |  |
| 27          | 0.1750  | 0.8630  | 0.2552   | 0.0139      | 0.0371  | 0.2538   | -0.2239 | -0.4377     | 0.0622   |  |  |
| 28          | -0.0272 | -0.1343 | 0.9820   | -0.2981     | -0.7937 | 0.3519   | 0.1994  | 0.3897      | 0.2000   |  |  |
| 29          | 0.1931  | 0.9521  | 0.0935   | 0.0101      | 0.0270  | 0.0927   | -0.0519 | -0.1015     | 0.0824   |  |  |
| 30          | 0.1646  | 0.8114  | 0.3416   | -0.0340     | 0.0905  | 0.3334   | 0.0868  | 0.1696      | 0.3047   |  |  |
| 31          | 0.0711  | 0.3505  | 0.3771   | -0.3141     | -0.8364 | 0.1776   | -0.2015 | -0.3939     | 0.0225   |  |  |
| 32          | 0.1700  | 0.8382  | 0.2975   | -0.1675     | -0.4461 | 0.0985   | 0.0778  | 0.1521      | 0.0754   |  |  |
| 33          | 0.0749  | 0.3694  | 0.3635   | -0.2737     | -0.7288 | 0.3323   | -0.2172 | 0.4246      | 0.1521   |  |  |
| 34          | 0.1839  | 0.9067  | 0.1778   | 0.0536      | -0.1428 | 0.1154   | 0.1154  | 0.2256      | 0.1065   |  |  |
| 35          | 0.1775  | 0.8751  | 0.2342   | -0.1691     | -0.4502 | 0.0315   | 0.0193  | 0.0377      | 0.0301   |  |  |
| 36          | 0.1637  | 0.8071  | 0.3486   | 0.0096      | 0.0256  | 0.3480   | 0.2169  | 0.4239      | 0.1662   |  |  |
| 37          | 0.1847  | 0.9106  | 0.1709   | -0.1172     | -0.3120 | 0.0735   | -0.0352 | 0.0687      | 0.0688   |  |  |
| 38          | 0.1358  | 0.9162  | 0.1605   | -0.0323     | -0.0859 | 0.1531   | -0.0106 | -0.0754     | 0.1468   |  |  |
| 39          | 0.1801  | 0.8880  | 0.2114   | -0.0297     | -0.0792 | 0.2051   | -0.2003 | -0.3916     | 0.0518   |  |  |
| 40          | 0.1879  | 0.9266  | 0.1415   | 0.0751      | 0.2000  | 0.1015   | -0.0605 | -0.1182     | 0.0875   |  |  |



## POLAR CO-ORDINATES

| CONSTRUCT | H       | V      | R    |
|-----------|---------|--------|------|
| 1         | 20.07   | -5.32  | 0.97 |
| 2         | -16.61  | -10.55 | 0.92 |
| 3         | -20.43  | -17.45 | 0.98 |
| 4         | 1.11    | -12.43 | 0.89 |
| 5         | -91.49  | 6.35   | 0.92 |
| 6         | 41.87   | -13.63 | 0.90 |
| 7         | -21.03  | -45.31 | 0.93 |
| 8         | -5.62   | -26.09 | 0.94 |
| 9         | -0.56   | -4.88  | 0.94 |
| 10        | -169.21 | -20.31 | 0.80 |
| 11        | 44.26   | 45.84  | 0.96 |
| 12        | 16.03   | -9.16  | 0.95 |
| 13        | -43.94  | -4.56  | 0.92 |
| 14        | -2.25   | 27.89  | 0.98 |
| 15        | -22.42  | 5.00   | 0.96 |
| 16        | -31.25  | 37.53  | 0.97 |
| 17        | 11.17   | 3.47   | 0.90 |
| 18        | -4.69   | -24.93 | 0.92 |
| 19        | -12.46  | 26.93  | 0.92 |
| 20        | -5.56   | -29.89 | 0.90 |
| 21        | -24.90  | 14.91  | 0.98 |
| 22        | -23.59  | 8.53   | 0.94 |
| 23        | -6.35   | 19.30  | 0.97 |
| 24        | -83.43  | 8.46   | 0.94 |
| 25        | 75.80   | -6.50  | 0.93 |
| 26        | -6.19   | -5.10  | 0.93 |
| 27        | -2.46   | 26.87  | 0.97 |
| 28        | -22.60  | -25.83 | 0.99 |
| 29        | -1.63   | 6.08   | 0.96 |
| 30        | -6.36   | -11.73 | 0.83 |
| 31        | 67.26   | 23.48  | 0.99 |
| 32        | 28.02   | -9.10  | 0.96 |
| 33        | 63.12   | -27.46 | 0.92 |
| 34        | -9.95   | -13.81 | 0.95 |
| 35        | 27.23   | -2.19  | 0.98 |
| 36        | -1.81   | -27.70 | 0.91 |
| 37        | 18.91   | -4.08  | 0.96 |
| 38        | 5.36    | 4.93   | 0.92 |
| 39        | 5.09    | 23.71  | 0.97 |
| 40        | -12.18  | 7.11   | 0.96 |

## PROJECTIONS FOR ELEMENTS

| ELEMENT | H       | V      | R    |
|---------|---------|--------|------|
| 1       | -105.18 | -12.27 | 0.95 |
| 2       | 47.67   | 44.72  | 0.84 |
| 3       | 35.09   | -55.71 | 0.90 |
| 4       | 100.57  | -27.49 | 0.76 |
| 5       | -150.59 | 9.41   | 0.98 |
| 6       | -178.54 | 56.60  | 0.90 |
| 7       | 159.85  | -13.49 | 0.97 |
| 8       | 111.00  | 19.62  | 0.66 |
| 9       | 12.33   | 5.92   | 0.97 |
| 10      | -20.40  | -4.65  | 0.99 |

| COMPONENT 4 |         |         |          | COMPONENT 5 |         |          |
|-------------|---------|---------|----------|-------------|---------|----------|
| ELEMENT     | VECTOR  | LOADING | RESIDUAL | VECTOR      | LOADING | RESIDUAL |
| 1           | 0.1277  | 0.1629  | 0.2591   | -0.0227     | -0.0252 | 0.2585   |
| 2           | 0.4654  | 0.5943  | 0.2508   | 0.1232      | 0.1365  | 0.2321   |
| 3           | 0.2197  | 0.2803  | 0.2664   | 0.0383      | 0.0424  | 0.2646   |
| 4           | -0.3577 | -0.4563 | 0.6265   | 0.6833      | 0.7563  | 0.0537   |
| 5           | -0.1559 | -0.1989 | 0.2298   | 0.2312      | 0.2561  | 0.1632   |
| 6           | 0.0263  | 0.0335  | 0.4092   | 0.0967      | 0.1072  | 0.3968   |
| 7           | 0.2931  | 0.3740  | 0.2821   | -0.3865     | -0.4281 | 0.0991   |
| 8           | -0.6204 | -0.7916 | 0.3966   | -0.5245     | -0.5810 | 0.0491   |
| 9           | 0.2184  | 0.2786  | 0.2620   | -0.1126     | -0.1248 | 0.2464   |
| 10          | -0.2169 | -0.2767 | 0.1935   | -0.1265     | -0.1402 | 0.1638   |
| CONSTRUCT   |         |         |          |             |         |          |
| 1           | 0.0929  | 0.1050  | 0.0529   | 0.0496      | 0.0550  | 0.0493   |
| 2           | 0.0559  | 0.0713  | 0.0429   | 0.1308      | 0.1538  | 0.0191   |
| 3           | 0.0117  | 0.0150  | 0.0436   | -0.1441     | -0.1596 | 0.0181   |
| 4           | 0.3064  | 0.3909  | 0.0485   | 0.1113      | 0.1233  | 0.0333   |
| 5           | 0.1953  | 0.2492  | 0.0926   | 0.2304      | 0.2553  | 0.0175   |
| 6           | -0.1943 | -0.2428 | 0.1296   | -0.0088     | -0.0097 | 0.1295   |
| 7           | 0.1290  | 0.1656  | 0.2793   | -0.4056     | -0.4493 | 0.0774   |
| 8           | 0.0855  | 0.1090  | 0.0971   | -0.2345     | -0.2597 | 0.0297   |
| 9           | -0.0445 | -0.0568 | 0.1058   | -0.1777     | -0.1969 | 0.0671   |
| 10          | -0.0351 | -0.0448 | 0.3646   | 0.4351      | 0.4820  | 0.1323   |
| 11          | -0.1658 | -0.2115 | 0.0399   | 0.1199      | 0.1326  | 0.0222   |
| 12          | 0.0652  | 0.0832  | 0.0633   | 0.1652      | 0.1830  | 0.0298   |
| 13          | -0.1216 | -0.1551 | 0.1239   | 0.0229      | 0.0254  | 0.1231   |
| 14          | 0.1326  | 0.1692  | 0.0140   | 0.0401      | 0.0444  | 0.0120   |
| 15          | 0.0974  | 0.1242  | 0.0563   | -0.0189     | -0.0209 | 0.0558   |
| 16          | 0.1230  | 0.1633  | 0.0296   | -0.1469     | -0.1627 | 0.0021   |
| 17          | -0.3093 | -0.3946 | 0.0372   | -0.0683     | -0.0756 | 0.0315   |
| 18          | 0.0402  | 0.0513  | 0.0133   | -0.0257     | -0.0285 | 0.0125   |
| 19          | 0.0936  | 0.0046  | 0.1579   | -0.1696     | -0.1878 | 0.1217   |
| 20          | 0.2622  | 0.3345  | 0.0700   | 0.1139      | 0.1261  | 0.0541   |
| 21          | -0.0023 | -0.0029 | 0.0463   | -0.0545     | -0.0604 | 0.0426   |
| 22          | 0.1792  | 0.2286  | 0.0559   | 0.0213      | 0.0236  | 0.0553   |
| 23          | -0.0925 | -0.1053 | 0.0501   | -0.1235     | -0.1368 | 0.0314   |
| 24          | 0.1066  | 0.1360  | 0.1772   | 0.2317      | 0.2567  | 0.0414   |
| 25          | 0.1946  | 0.2432  | 0.0807   | -0.1016     | -0.1125 | 0.0680   |
| 26          | -0.0866 | -0.1105 | 0.1256   | 0.1314      | 0.1455  | 0.1044   |
| 27          | 0.1453  | 0.1853  | 0.0279   | -0.0616     | -0.0682 | 0.0232   |
| 28          | -0.2740 | -0.3456 | 0.0778   | 0.0043      | 0.0047  | 0.0778   |
| 29          | -0.1473 | -0.1879 | 0.0471   | 0.0370      | 0.0410  | 0.0454   |
| 30          | -0.3517 | -0.4487 | 0.1934   | 0.0827      | 0.0917  | 0.0950   |
| 31          | -0.0427 | -0.0545 | 0.0195   | 0.0468      | 0.0518  | 0.0168   |
| 32          | -0.0314 | -0.0400 | 0.0738   | 0.2164      | 0.2297  | 0.0163   |
| 33          | 0.2885  | 0.3681  | 0.0166   | 0.0207      | 0.0229  | 0.0161   |
| 34          | -0.1331 | -0.1698 | 0.0777   | 0.1730      | 0.1917  | 0.0409   |
| 35          | -0.0494 | -0.0630 | 0.0261   | 0.0944      | 0.1046  | 0.0152   |
| 36          | -0.2670 | -0.3407 | 0.0522   | -0.0590     | -0.0653 | 0.0479   |
| 37          | -0.0760 | -0.0970 | 0.0594   | 0.1945      | 0.2155  | 0.0130   |
| 38          | 0.0807  | 0.1030  | 0.1362   | 0.2866      | 0.3174  | 0.0354   |
| 39          | 0.0329  | 0.0420  | 0.0500   | -0.0408     | -0.0452 | 0.0480   |
| 40          | -0.1013 | -0.1293 | 0.0708   | -0.1156     | -0.1280 | 0.0544   |

RELATIONS BETWEEN CONSTRUCTS AND ELEMENTS  
EXPRESSED AS COSINES

|                           |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
|---------------------------|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|----|--------|
| CONSTRUCT 1 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.556 | 2 | 0.534  | 3 | 0.518  | 4 | 0.254  | 5 | -0.975 | 6 | -0.439 | 7 | -0.673 | 8 | -0.044 | 9 | 0.891  | 10 | 0.630  |
| CONSTRUCT 2 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.052  | 2 | 0.229  | 3 | 0.465  | 4 | -0.191 | 5 | -0.653 | 6 | -0.588 | 7 | -0.876 | 8 | -0.504 | 9 | 0.765  | 10 | 0.949  |
| CONSTRUCT 3 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.135  | 2 | 0.001  | 3 | 0.524  | 4 | -0.325 | 5 | -0.653 | 6 | -0.590 | 7 | -0.779 | 8 | -0.396 | 9 | 0.726  | 10 | 0.946  |
| CONSTRUCT 4 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.151 | 2 | 0.423  | 3 | 0.575  | 4 | -0.095 | 5 | -0.769 | 6 | -0.601 | 7 | -0.731 | 8 | -0.507 | 9 | 0.873  | 10 | 0.764  |
| CONSTRUCT 5 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.775  | 2 | -0.151 | 3 | -0.225 | 4 | -0.601 | 5 | 0.324  | 6 | 0.078  | 7 | -0.302 | 8 | -0.801 | 9 | -0.054 | 10 | 0.404  |
| CONSTRUCT 6 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.714 | 2 | 0.372  | 3 | 0.617  | 4 | 0.425  | 5 | -0.818 | 6 | -0.515 | 7 | -0.499 | 8 | 0.311  | 9 | 0.612  | 10 | 0.465  |
| CONSTRUCT 7 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.242  | 2 | -0.270 | 3 | 0.616  | 4 | -0.282 | 5 | -0.530 | 6 | -0.685 | 7 | -0.324 | 8 | -0.294 | 9 | 0.508  | 10 | 0.600  |
| CONSTRUCT 8 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.030 | 2 | 0.097  | 3 | 0.636  | 4 | -0.178 | 5 | -0.787 | 6 | -0.715 | 7 | -0.638 | 8 | -0.290 | 9 | 0.734  | 10 | 0.857  |
| CONSTRUCT 9 WITH ELEMENT  |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.221 | 2 | 0.358  | 3 | 0.395  | 4 | -0.175 | 5 | -0.788 | 6 | -0.644 | 7 | -0.828 | 8 | -0.102 | 9 | 0.867  | 10 | 0.901  |
| CONSTRUCT 10 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.416  | 2 | -0.530 | 3 | -0.135 | 4 | 0.381  | 5 | 0.656  | 6 | 0.225  | 7 | 0.615  | 8 | -0.139 | 9 | -0.747 | 10 | -0.665 |
| CONSTRUCT 11 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.692 | 2 | 0.681  | 3 | -0.206 | 4 | 0.143  | 5 | -0.475 | 6 | 0.298  | 7 | -0.575 | 8 | 0.378  | 9 | 0.606  | 10 | 0.228  |
| CONSTRUCT 12 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.375 | 2 | 0.454  | 3 | 0.558  | 4 | 0.204  | 5 | -0.910 | 6 | -0.586 | 7 | -0.794 | 8 | -0.197 | 9 | 0.919  | 10 | 0.733  |
| CONSTRUCT 13 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.409  | 2 | -0.224 | 3 | 0.180  | 4 | -0.437 | 5 | -0.278 | 6 | -0.209 | 7 | -0.740 | 8 | -0.490 | 9 | 0.472  | 10 | 0.838  |
| CONSTRUCT 14 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.270 | 2 | 0.696  | 3 | 0.041  | 4 | -0.326 | 5 | -0.628 | 6 | -0.115 | 7 | -0.896 | 8 | -0.226 | 9 | 0.970  | 10 | 0.756  |
| CONSTRUCT 15 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.042  | 2 | 0.299  | 3 | 0.281  | 4 | -0.472 | 5 | -0.550 | 6 | -0.310 | 7 | -0.888 | 8 | -0.457 | 9 | 0.754  | 10 | 0.941  |

|                           |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
|---------------------------|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|---|--------|----|--------|
| CONSTRUCT 16 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.094  | 2 | 0.504  | 3 | -0.255 | 4 | -0.699 | 5 | -0.297 | 6 | 0.097  | 7 | -0.766 | 8 | -0.271 | 9 | 0.619  | 10 | 0.691  |
| CONSTRUCT 17 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.399 | 2 | 0.327  | 3 | 0.238  | 4 | 0.097  | 5 | -0.795 | 6 | -0.453 | 7 | -0.932 | 8 | 0.194  | 9 | 0.817  | 10 | 0.793  |
| CONSTRUCT 18 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.968 | 2 | 0.133  | 3 | 0.681  | 4 | -0.050 | 5 | -0.781 | 6 | -0.778 | 7 | -0.743 | 8 | -0.343 | 9 | 0.780  | 10 | 0.684  |
| CONSTRUCT 19 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.019 | 2 | 0.488  | 3 | -0.111 | 4 | -0.422 | 5 | -0.586 | 6 | -0.117 | 7 | -0.838 | 8 | -0.989 | 9 | 0.777  | 10 | 0.753  |
| CONSTRUCT 20 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.918  | 2 | 0.207  | 3 | 0.714  | 4 | -0.034 | 5 | -0.682 | 6 | -0.776 | 7 | -0.625 | 8 | -0.540 | 9 | 0.717  | 10 | 0.725  |
| CONSTRUCT 21 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.076  | 2 | 0.256  | 3 | 0.055  | 4 | -0.491 | 5 | -0.509 | 6 | -0.149 | 7 | -0.898 | 8 | -0.371 | 9 | 0.754  | 10 | 0.917  |
| CONSTRUCT 22 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.135  | 2 | 0.337  | 3 | 0.256  | 4 | -0.497 | 5 | -0.551 | 6 | -0.231 | 7 | -0.882 | 8 | -0.511 | 9 | 0.751  | 10 | 0.672  |
| CONSTRUCT 23 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.156 | 2 | 0.407  | 3 | 0.066  | 4 | -0.324 | 5 | -0.678 | 6 | -0.198 | 7 | -0.931 | 8 | -0.073 | 9 | 0.893  | 10 | 0.845  |
| CONSTRUCT 24 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.754  | 2 | -0.158 | 3 | -0.319 | 4 | -0.572 | 5 | 0.381  | 6 | 0.066  | 7 | -0.287 | 8 | -0.730 | 9 | -0.104 | 10 | 0.401  |
| CONSTRUCT 25 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.826 | 2 | 0.462  | 3 | 0.542  | 4 | 0.444  | 5 | -0.679 | 6 | -0.083 | 7 | 0.011  | 8 | 0.331  | 9 | 0.402  | 10 | -0.101 |
| CONSTRUCT 26 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.161 | 2 | 0.147  | 3 | 0.400  | 4 | -0.039 | 5 | -0.721 | 6 | -0.389 | 7 | -0.876 | 8 | -0.327 | 9 | 0.344  | 10 | 0.896  |
| CONSTRUCT 27 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.273 | 2 | 0.693  | 3 | 0.073  | 4 | -0.396 | 5 | -0.635 | 6 | -0.139 | 7 | -0.874 | 8 | -0.191 | 9 | 0.967  | 10 | 0.764  |
| CONSTRUCT 28 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | 0.782  | 2 | -0.737 | 3 | -0.150 | 4 | -0.234 | 5 | 0.474  | 6 | -0.321 | 7 | 0.051  | 8 | -0.321 | 9 | -0.352 | 10 | 0.220  |
| CONSTRUCT 29 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.270 | 2 | 0.298  | 3 | 0.333  | 4 | -0.112 | 5 | -0.754 | 6 | -0.296 | 7 | -0.950 | 8 | -0.139 | 9 | 0.973  | 10 | 0.893  |
| CONSTRUCT 30 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.142 | 2 | -0.024 | 3 | 0.456  | 4 | 0.047  | 5 | -0.600 | 6 | -0.476 | 7 | -0.837 | 8 | -0.031 | 9 | 0.667  | 10 | 0.810  |
| CONSTRUCT 31 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.904 | 2 | 0.737  | 3 | 0.078  | 4 | 0.428  | 5 | -0.634 | 6 | 0.122  | 7 | -0.289 | 8 | 0.519  | 9 | 0.513  | 10 | 0.612  |
| CONSTRUCT 32 WITH ELEMENT |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |   |        |    |        |
| 1                         | -0.571 | 2 | 0.443  | 3 | 0.559  | 4 | 0.400  | 5 | -0.904 | 6 | -0.533 | 7 | -0.708 | 8 | -0.945 | 9 | 0.969  | 10 | 0.620  |

CONSTRUCT 33 WITH ELEMENT

|   |        |   |       |   |       |   |       |   |        |   |        |   |        |   |       |   |       |    |       |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|-------|---|-------|----|-------|
| 1 | -0.631 | 2 | 0.339 | 3 | 0.768 | 4 | 0.492 | 5 | -0.758 | 6 | -0.436 | 7 | -0.074 | 8 | 0.904 | 9 | 0.503 | 10 | 0.053 |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|-------|---|-------|----|-------|

CONSTRUCT 34 WITH ELEMENT

|   |        |   |       |   |       |   |       |   |        |   |        |   |        |   |        |   |       |    |       |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 1 | -0.113 | 2 | 0.129 | 3 | 0.488 | 4 | 0.021 | 5 | -0.693 | 6 | -0.567 | 7 | -0.056 | 8 | -0.339 | 9 | 0.736 | 10 | 0.934 |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

CONSTRUCT 35 WITH ELEMENT

|   |        |   |       |   |       |   |       |   |        |   |        |   |        |   |       |   |       |    |       |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|-------|---|-------|----|-------|
| 1 | -0.615 | 2 | 0.486 | 3 | 0.487 | 4 | 0.292 | 5 | -0.940 | 6 | -0.440 | 7 | -0.745 | 8 | 0.035 | 9 | 0.915 | 10 | 0.657 |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|-------|---|-------|----|-------|

CONSTRUCT 36 WITH ELEMENT

|   |        |   |        |   |       |   |       |   |        |   |        |   |        |   |        |   |       |    |       |
|---|--------|---|--------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 1 | -0.067 | 2 | -0.059 | 3 | 0.508 | 4 | 0.139 | 5 | -0.731 | 6 | -0.761 | 7 | -0.690 | 8 | -0.949 | 9 | 0.679 | 10 | 0.614 |
|---|--------|---|--------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

CONSTRUCT 37 WITH ELEMENT

|   |        |   |       |   |       |   |       |   |        |   |        |   |        |   |        |   |       |    |       |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 1 | -0.531 | 2 | 0.438 | 3 | 0.534 | 4 | 0.253 | 5 | -0.884 | 6 | -0.458 | 7 | -0.823 | 8 | -0.003 | 9 | 0.076 | 10 | 0.747 |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

CONSTRUCT 38 WITH ELEMENT

|   |        |   |       |   |       |   |       |   |        |   |        |   |        |   |        |   |       |    |       |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 1 | -0.275 | 2 | 0.545 | 3 | 0.315 | 4 | 0.079 | 5 | -0.775 | 6 | -0.418 | 7 | -0.895 | 8 | -0.327 | 9 | 0.901 | 10 | 0.778 |
|---|--------|---|-------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

CONSTRUCT 39 WITH ELEMENT

|   |        |   |       |   |       |   |        |   |        |   |        |   |        |   |        |   |       |    |       |
|---|--------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 1 | -0.316 | 2 | 0.662 | 3 | 0.064 | 4 | -0.216 | 5 | -0.723 | 6 | -0.227 | 7 | -0.894 | 8 | -0.047 | 9 | 0.921 | 10 | 0.741 |
|---|--------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

CONSTRUCT 40 WITH ELEMENT

|   |        |   |       |   |       |   |        |   |        |   |        |   |        |   |        |   |       |    |       |
|---|--------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 1 | -0.037 | 2 | 0.295 | 3 | 0.230 | 4 | -0.324 | 5 | -0.663 | 6 | -0.408 | 7 | -0.943 | 8 | -0.133 | 9 | 0.848 | 10 | 0.903 |
|---|--------|---|-------|---|-------|---|--------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

INTER-ELEMENT RELATIONS  
EXPRESSED AS COSINES

ELEMENT 1 WITH ELEMENT

|   |        |   |        |   |        |   |       |   |        |   |       |   |        |   |        |    |       |
|---|--------|---|--------|---|--------|---|-------|---|--------|---|-------|---|--------|---|--------|----|-------|
| 2 | -0.569 | 3 | -0.238 | 4 | -0.505 | 5 | 0.553 | 6 | -0.039 | 7 | 0.126 | 8 | -0.535 | 9 | -0.395 | 10 | 0.062 |
|---|--------|---|--------|---|--------|---|-------|---|--------|---|-------|---|--------|---|--------|----|-------|

ELEMENT 2 WITH ELEMENT

|   |        |   |        |   |        |   |       |   |        |   |       |   |       |    |       |
|---|--------|---|--------|---|--------|---|-------|---|--------|---|-------|---|-------|----|-------|
| 3 | -0.085 | 4 | -0.041 | 5 | -0.459 | 6 | 0.128 | 7 | -0.388 | 8 | 0.040 | 9 | 0.529 | 10 | 0.143 |
|---|--------|---|--------|---|--------|---|-------|---|--------|---|-------|---|-------|----|-------|

ELEMENT 3 WITH ELEMENT

|   |       |   |        |   |        |   |        |   |        |   |       |    |       |
|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|
| 4 | 0.300 | 5 | -0.605 | 6 | -0.663 | 7 | -0.175 | 8 | -0.214 | 9 | 0.373 | 10 | 0.319 |
|---|-------|---|--------|---|--------|---|--------|---|--------|---|-------|----|-------|

ELEMENT 4 WITH ELEMENT

|   |        |   |        |   |       |   |       |   |        |    |        |
|---|--------|---|--------|---|-------|---|-------|---|--------|----|--------|
| 5 | -0.193 | 6 | -0.195 | 7 | 0.190 | 8 | 0.295 | 9 | -0.073 | 10 | -0.311 |
|---|--------|---|--------|---|-------|---|-------|---|--------|----|--------|

ELEMENT 5 WITH ELEMENT

|   |       |   |       |   |        |   |        |    |        |
|---|-------|---|-------|---|--------|---|--------|----|--------|
| 6 | 0.495 | 7 | 0.635 | 8 | -0.048 | 9 | -0.882 | 10 | -0.618 |
|---|-------|---|-------|---|--------|---|--------|----|--------|

ELEMENT 6 WITH ELEMENT

|   |       |   |       |   |        |    |        |
|---|-------|---|-------|---|--------|----|--------|
| 7 | 0.270 | 8 | 0.175 | 9 | -0.393 | 10 | -0.503 |
|---|-------|---|-------|---|--------|----|--------|

ELEMENT 7 WITH ELEMENT

|   |       |   |        |    |        |
|---|-------|---|--------|----|--------|
| 8 | 0.228 | 9 | -0.838 | 10 | -0.889 |
|---|-------|---|--------|----|--------|

ELEMENT 8 WITH ELEMENT

|   |        |    |        |
|---|--------|----|--------|
| 9 | -0.120 | 10 | -0.364 |
|---|--------|----|--------|

ELEMENT 9 WITH ELEMENT

|    |       |
|----|-------|
| 10 | 0.760 |
|----|-------|

RELATIONS BETWEEN CONSTRUCTS AND ELEMENTS  
EXPRESSED IN DEGREES

|                           |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
|---------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|----|-------|
| CONSTRUCT 1 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 123.0 | 2 | 57.7  | 3 | 59.0  | 4 | 75.3  | 5 | 167.1 | 6 | 117.3 | 7 | 132.3 | 8 | 92.5  | 9 | 27.0  | 10 | 51.0  |
| CONSTRUCT 2 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 87.0  | 2 | 76.9  | 3 | 62.3  | 4 | 100.4 | 5 | 130.8 | 6 | 126.0 | 7 | 151.2 | 8 | 120.3 | 9 | 40.1  | 10 | 18.3  |
| CONSTRUCT 3 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 82.2  | 2 | 89.9  | 3 | 58.4  | 4 | 109.0 | 5 | 130.8 | 6 | 126.1 | 7 | 141.2 | 8 | 113.3 | 9 | 43.5  | 10 | 18.9  |
| CONSTRUCT 4 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 98.7  | 2 | 64.9  | 3 | 54.9  | 4 | 95.0  | 5 | 140.3 | 6 | 126.9 | 7 | 137.0 | 8 | 120.4 | 9 | 29.2  | 10 | 40.2  |
| CONSTRUCT 5 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 39.2  | 2 | 98.7  | 3 | 103.0 | 4 | 127.0 | 5 | 71.1  | 6 | 85.5  | 7 | 107.6 | 8 | 143.3 | 9 | 93.1  | 10 | 66.2  |
| CONSTRUCT 6 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 135.6 | 2 | 68.1  | 3 | 51.9  | 4 | 64.9  | 5 | 144.9 | 6 | 121.0 | 7 | 119.9 | 8 | 71.9  | 9 | 52.3  | 10 | 62.3  |
| CONSTRUCT 7 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 76.0  | 2 | 105.7 | 3 | 51.9  | 4 | 106.4 | 5 | 122.0 | 6 | 133.2 | 7 | 100.9 | 8 | 106.5 | 9 | 59.5  | 10 | 53.1  |
| CONSTRUCT 8 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 92.2  | 2 | 84.4  | 3 | 50.5  | 4 | 100.3 | 5 | 141.9 | 6 | 135.6 | 7 | 129.6 | 8 | 106.9 | 9 | 42.7  | 10 | 31.0  |
| CONSTRUCT 9 WITH ELEMENT  |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 102.7 | 2 | 59.1  | 3 | 66.8  | 4 | 100.1 | 5 | 142.0 | 6 | 130.1 | 7 | 145.9 | 8 | 95.9  | 9 | 29.5  | 10 | 25.7  |
| CONSTRUCT 10 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 63.5  | 2 | 122.0 | 3 | 97.7  | 4 | 67.6  | 5 | 49.0  | 6 | 77.0  | 7 | 52.1  | 8 | 97.5  | 9 | 138.3 | 10 | 131.7 |
| CONSTRUCT 11 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 133.8 | 2 | 47.1  | 3 | 101.9 | 4 | 81.8  | 5 | 118.4 | 6 | 72.7  | 7 | 125.1 | 8 | 67.9  | 9 | 52.7  | 10 | 76.8  |
| CONSTRUCT 12 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 112.0 | 2 | 63.0  | 3 | 56.1  | 4 | 78.2  | 5 | 155.5 | 6 | 125.9 | 7 | 142.6 | 8 | 101.3 | 9 | 23.2  | 10 | 42.9  |
| CONSTRUCT 13 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 65.9  | 2 | 102.9 | 3 | 79.6  | 4 | 115.9 | 5 | 106.1 | 6 | 102.1 | 7 | 137.7 | 8 | 118.7 | 9 | 61.0  | 10 | 33.1  |
| CONSTRUCT 14 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 105.6 | 2 | 45.9  | 3 | 87.6  | 4 | 109.0 | 5 | 128.9 | 6 | 96.6  | 7 | 153.7 | 8 | 103.1 | 9 | 29.6  | 10 | 40.9  |
| CONSTRUCT 15 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |       |
| 1                         | 87.6  | 2 | 72.6  | 3 | 73.7  | 4 | 118.2 | 5 | 123.4 | 6 | 108.0 | 7 | 152.6 | 8 | 117.0 | 9 | 41.0  | 10 | 15.8  |

|                           |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
|---------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|----|------|
| CONSTRUCT 16 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 84.6  | 2 | 59.7  | 3 | 104.8 | 4 | 134.3 | 5 | 107.3 | 6 | 84.4  | 7 | 140.0 | 8 | 105.7 | 9 | 51.8  | 10 | 46.3 |
| CONSTRUCT 17 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 113.5 | 2 | 70.9  | 3 | 76.2  | 4 | 84.4  | 5 | 142.6 | 6 | 116.9 | 7 | 146.3 | 8 | 79.4  | 9 | 35.2  | 10 | 37.5 |
| CONSTRUCT 18 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 93.9  | 2 | 82.3  | 3 | 47.1  | 4 | 92.9  | 5 | 141.4 | 6 | 141.1 | 7 | 138.0 | 8 | 110.1 | 9 | 38.7  | 10 | 27.9 |
| CONSTRUCT 19 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 91.1  | 2 | 60.8  | 3 | 96.4  | 4 | 114.9 | 5 | 125.9 | 6 | 96.7  | 7 | 146.9 | 8 | 95.1  | 9 | 39.0  | 10 | 41.1 |
| CONSTRUCT 20 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 89.0  | 2 | 78.0  | 3 | 44.5  | 4 | 91.9  | 5 | 133.0 | 6 | 140.9 | 7 | 128.7 | 8 | 122.7 | 9 | 44.2  | 10 | 43.2 |
| CONSTRUCT 21 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 95.7  | 2 | 75.2  | 3 | 86.9  | 4 | 119.4 | 5 | 120.6 | 6 | 98.6  | 7 | 153.9 | 8 | 111.8 | 9 | 41.0  | 10 | 23.5 |
| CONSTRUCT 22 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 82.2  | 2 | 70.3  | 3 | 75.1  | 4 | 119.1 | 5 | 123.4 | 6 | 103.4 | 7 | 151.9 | 8 | 129.7 | 9 | 41.3  | 10 | 25.3 |
| CONSTRUCT 23 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 99.6  | 2 | 66.0  | 3 | 86.2  | 4 | 108.9 | 5 | 132.7 | 6 | 101.4 | 7 | 158.6 | 8 | 94.2  | 9 | 26.8  | 10 | 32.3 |
| CONSTRUCT 24 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 41.0  | 2 | 99.1  | 3 | 108.6 | 4 | 124.9 | 5 | 67.6  | 6 | 86.2  | 7 | 106.7 | 8 | 136.9 | 9 | 96.0  | 10 | 66.4 |
| CONSTRUCT 25 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 145.7 | 2 | 62.5  | 3 | 57.2  | 4 | 63.6  | 5 | 132.8 | 6 | 94.7  | 7 | 89.4  | 8 | 70.7  | 9 | 66.3  | 10 | 95.6 |
| CONSTRUCT 26 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 99.3  | 2 | 81.6  | 3 | 66.4  | 4 | 92.2  | 5 | 136.2 | 6 | 112.9 | 7 | 151.1 | 8 | 109.1 | 9 | 32.4  | 10 | 26.4 |
| CONSTRUCT 27 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 105.8 | 2 | 46.7  | 3 | 85.8  | 4 | 113.3 | 5 | 129.4 | 6 | 98.0  | 7 | 150.9 | 8 | 101.0 | 9 | 29.9  | 10 | 40.2 |
| CONSTRUCT 28 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 39.5  | 2 | 137.5 | 3 | 98.6  | 4 | 103.5 | 5 | 61.7  | 6 | 108.7 | 7 | 87.1  | 8 | 108.7 | 9 | 110.6 | 10 | 77.3 |
| CONSTRUCT 29 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 103.7 | 2 | 72.7  | 3 | 70.5  | 4 | 56.4  | 5 | 130.9 | 6 | 107.2 | 7 | 161.9 | 8 | 97.5  | 9 | 29.1  | 10 | 26.8 |
| CONSTRUCT 30 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 93.1  | 2 | 91.4  | 3 | 62.9  | 4 | 87.3  | 5 | 126.9 | 6 | 118.4 | 7 | 146.8 | 8 | 91.8  | 9 | 48.2  | 10 | 35.9 |
| CONSTRUCT 31 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 154.6 | 2 | 42.5  | 3 | 85.5  | 4 | 64.6  | 5 | 129.3 | 6 | 83.0  | 7 | 106.8 | 8 | 59.3  | 9 | 59.2  | 10 | 89.3 |
| CONSTRUCT 32 WITH ELEMENT |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |    |      |
| 1                         | 124.8 | 2 | 63.7  | 3 | 56.0  | 4 | 66.4  | 5 | 154.7 | 6 | 122.2 | 7 | 135.1 | 8 | 92.6  | 9 | 29.7  | 10 | 51.7 |

CONSTRUCT 33 WITH ELEMENT

1 129.1 2 70.3 3 39.9 4 61.2 5 139.3 6 115.9 7 94.3 8 89.3 9 59.8 10 84.7

CONSTRUCT 34 WITH ELEMENT

1 96.5 2 32.6 3 60.8 4 88.9 5 133.8 6 124.5 7 148.9 8 109.8 9 42.6 10 20.9

CONSTRUCT 35 WITH ELEMENT

1 129.0 2 60.9 3 60.8 4 73.0 5 160.1 6 116.1 7 128.2 8 88.0 9 23.8 10 48.9

CONSTRUCT 36 WITH ELEMENT

1 93.9 2 93.4 3 59.5 4 92.0 5 137.0 6 139.6 7 133.6 8 92.8 9 47.2 10 35.5

CONSTRUCT 37 WITH ELEMENT

1 122.1 2 64.0 3 57.7 4 75.4 5 152.1 6 117.3 7 145.4 8 94.8 9 28.8 10 41.7

CONSTRUCT 38 WITH ELEMENT

1 106.0 2 56.9 3 71.6 4 85.5 5 140.8 6 114.7 7 152.2 8 109.1 9 25.7 10 38.9

CONSTRUCT 39 WITH ELEMENT

1 109.4 2 48.8 3 86.3 4 102.5 5 136.3 6 103.1 7 153.4 8 92.7 9 22.9 10 42.2

CONSTRUCT 40 WITH ELEMENT

1 92.1 2 72.9 3 76.7 4 109.9 5 131.5 6 114.1 7 160.5 8 97.6 9 32.0 10 25.5

INTER-ELEMENT RELATIONS  
EXPRESSED IN DEGREES

ELEMENT 1 WITH ELEMENT  
2 124.7 3 103.8 4 120.4 5 56.4 6 92.3 7 82.8 8 122.3 9 113.3 10 86.9

ELEMENT 2 WITH ELEMENT  
3 94.9 4 92.3 5 117.3 6 92.7 7 112.9 8 87.7 9 58.6 10 81.8

ELEMENT 3 WITH ELEMENT  
4 72.6 5 127.2 6 131.5 7 100.1 8 102.3 9 68.1 10 71.4

ELEMENT 4 WITH ELEMENT  
5 101.4 6 101.3 7 79.1 8 72.8 9 94.2 10 108.1

ELEMENT 5 WITH ELEMENT  
6 60.3 7 50.6 8 92.7 9 151.9 10 128.2

ELEMENT 6 WITH ELEMENT  
7 74.3 8 79.9 9 113.2 10 120.2

ELEMENT 7 WITH ELEMENT  
8 76.8 9 146.9 10 152.8

ELEMENT 8 WITH ELEMENT  
9 95.9 10 111.3

ELEMENT 9 WITH ELEMENT  
10 40.3



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