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The effect of cultural variables on the Goodenough-Harris Drawing Test and the Standard Progressive Matrices

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a rural group in South Africa which is traditionally more exposed to representational art to score higher on the DAP than a rural group with little or no representational art. One would not expect to see a parallel difference on another IQ test. However, one would expect the DAP score differences to be much less marked when the groups fuse their environmental settings, as when both are urbanized.

In Southern African traditional population groups there is generally very little representational art. Though there is a fairly high level of decorative art on housing, clothing, and utensils, this does not take the form of representational art. Shaw says

> Almost the only instance of ritual art is the use by the Venda (and some Sotho), of carved wooden figures of people and animals, which are used as puppets in the enactment of moral plays and tales to teach correct ways of behaviour and conduct
> (1980, pg 105).

In verbal communication with an African art expert (Ms. A. Nettleton, Dept. of History of Art, Wits University) the Xhosa speaking people were identified as the group having no representational art in their traditional culture in South Africa. These two groups then, the Venda and the Xhosa, were chosen for this study.

5.3.3 Sex Differences

In traditional societies, and to a very large extent in urban communities, sex roles are clearly defined. Though the ability to do well in different aspects of 'intelligence' has been suggested to be inherent in sex genes , a strong argument must be made for these differences arising through the sex roles which are developed in the socialization process. If one accepts that consciousness develops through activity in ones environment, then it would hardly be surprising to see different aspects of 'intelligence' being developed in the sexes as they play out their roles.

Galton and Spencer both maintained that women were naturally less intelligent than men, and women were shown to perform worse on Galton's anthropomorphic tests. This notion continued into the period of the First World War when women were found to score a full ten points lower than men in the Army Alpha test (see Blum, 1975). Terman and his associates, however, deliberately changed their tests to show that there were no sex differences in average levels of intelligence. To balance the scores they chose equal numbers of items favouring each sex. (see Blum, 1975). So on the Stanford-Binet, and on subsequent IQ tests modelled after it, objective measures of ability

attested to the full equality of the sexes. Why this was done could have been for a number of reasons. It could have been that girls usually performed better than boys in elementary schools; pressure from womans' movements; that many of Terman's co-workers were women; or just plainly an enlightened belief in the equality of the sexes as far as general intelligence was concerned. The fact is that test items were chosen so as to make intelligence test scores equal between the sexes.

Two things still arise. Firstly not all aspects of intelligence are regarded as equal, Hutt (1982) says that " ... certain subjects are characterised by the performance of one sex more than the other - for instance, maths and science are subjects in which boys are better, languages and biology are those at which girls do better," (pg 90). And secondly, test items were chosen to be equal as far as particular white western sex role stereotypes were concerned. That a specific male role and female role would produce equality on one or other intelligence test, does not mean that the consciousness developed in different cultures with different roles for each sex would bring the same equality of score. In other words one's sex-role socialization within a particular culture could produce a greater or lesser amount of an ability to perform a particular cognitive task which is not

universal to gender. The sex-role stereotypes in a traditional society will now be outlined and then a brief reference will be made to urban sex-role stereotypes. (Venda and Xhosa gender roles are very similar and the following can be taken as representing both groups unless they are specifically separated.)

DIVISION OF LABOUR

Women	Men
Agriculture	
Till the soil, plant the seed, look after crops, reap and thresh	Clear new fields of bush and grass
Animals	
Look after fowls	Look after cattle, goats and sheep.
Gathering of wild fruit	Herding, milking and washing milking utensils. Slaughtering (Many of these tasks are carried out by young boys with men acting as supervisors)
Hut Building	
Plaster the floor	

and walls

Venda

Timber and thatch

Xhosa

Thatch	Timber

Housework

Prepare food and make beer	Occasionally cook meat if women are away
Wash utensils	
Clean the hut	
Fetch water	
Collect firewood	
Transport crops from the fields	

Marriage

1 husband	Many wives

Status

Serve husband	Head of household

From an early age children are being developed into their gender stereotypes through their activity. Girls imitate their mothers' activities in their play and are gradually drawn into active domestic work under the instruction of their mothers and older sisters. Similarly the boys make play replicas of their fathers weapons and at a young age are left to herd cattle and sheep. And then:

> at the initiation ceremonies making the transition from childhood to manhood, they are emphatically reminded that cattle herding and warfare are the two dominant spheres of masculine activities, while girls are similarly exhorted in regard to agriculture and housework (Shaw 1974, pg 124).

The sex-role stereotypes of urbanized black people is much more difficult to define. One is faced with the problem of what an 'urbanized' person is (see pg 150 - 152). It would appear that most urbanized blacks have a mixture of traditional and western values vis-a-vis sex roles. For example the man still usually dominates the household and the woman is subservient to him; and an urban man may still decide to take more than one wife. The woman still plays the dual role of housekeeper and 'worker.' (Though the substance of her work is different - largely work in a factory or as a domestic labourer). At work, the man's role has altered drastically. His proud position as head of the household and fields, now mostly becomes subservient labourer who often has to listen to the instruction of a white person, even if that person is a woman.

It would appear that the western notion of competition has made some inroads. Implicit in the educational system is the assumption that each individual will strive to fill his/her potential, but this, in general, does not happen equally for boys and girls.

If a girl is scoring higher than a boy then she may feel that she is undermining his position and therefore 'hold back.' Further, she will often not pursue her 'intellectual' activities because of the pressure on her to put most of her energy into domestic chores. Though all this is true of white women as well, it is possibly exacerbated by strong traditional male dominance which seem to be even less eroded than white male dominance.

In the traditional societies it is hypothesized that though the sex roles are so different, both the work of the man and the woman are so practically oriented, that this would override any of the other differences which would lead to differences between the sexes on intelligence tests designed for more abstract thinking (Ravens). Sex differences on the DAP could arise due to the scoring of the test. (see pg 164) In the urban areas, though one may expect males to perform higher, for reasons mentioned in the above paragraph, it must be remembered that most IQ tests have been standardized so that boys and girls fall into the normal curve's stipulations (even if this means different standardizations for boys and girls) in a white western population. As the sex role stereotypes are not <u>that</u> different between black and white urbanized populations a null hypothesis will again be

proposed.

5.3.4 Age

IQs are devised to discriminate between children at different ages, and is thus a basic feature of the test. In Binet's intelligence test items were chosen so that the 'average child' at a certain age would achieve an 'average score' with the proviso that the average child one year younger would not as a rule be able to correctly answer such items. The result was a progressively more difficult test with scores identified with average performances for each age group. Binet used the concept of 'mental age' and could thus say from the answers given to his test that a six year old had an 'intelligence' of an eight year old, or as being two years above the average child of his chronological age.

Terman extended the idea of 'mental age' with the concept of an 'Intelligence Quotient' or IQ. Instead of subtracting the chronological age of the child from the 'mental age' in order to obtain an idea of her/his level of intellectual functioning, he divided the latter by the former and multiplied this by one hundred, in order to get an IQ score. Terman also added that the IQs in a population at a certain age should always yield a Gaussian or a 'normal' curve.

This then became a requirement at any particular age group in a population for choosing test items (see pg 30). A further requirement was that the test would be proportionately represented by the whole population. Terman then proceeded to select a standardization sample from white, native-born Americans and excluded non-white Americans and the foreign born. This obviously unrepresentative sample was then seen as a 'true-American' intelligence which would be the standard against which other people would be measured. In South Africa, standardization of tests has taken a similar path, using only white South Africans. In both the U.S.A. and South Africa blacks have achieved mean IQ scores well below the white mean. (Biesheuvel, 1952, Grant, 1969) However, it cannot be presumed that differences between groups, say between black and white, or between urban and rural, will be the same at all ages. Jensen (1974) and (1977) for example found that there is an "increasing decrement in intelligence test scores with age" (Sattler 1982, pg 366), in black population groups in the U.S.A.

Various explanations have been proposed for this finding. Jensen's hypothesis is that the progressive IQ decrement is a result of the cumulative effects of a poor environment, while Kamin (1978) suggests that the measured intelligence of recently born black children has been improved by changed social

conditions. Therefore younger black children have higher IQs than older ones. A longitudinal study is necessary to test Kamin's hypothesis.

An alternative hypothesis is to consider the relationship between intelligence and a Vygotskiian theory of cognitive development. On Piagetian tasks there is often a 'developmental lag' in some cultural groups, as compared to others, and in some cases there is no movement beyond a particular Piagetian 'stage.' (Dasen 1972, Moll 1984). It is not difficult to see the relationship between 'lags in cognition' as a child gets older and decreasing IQ with age.

IQ tests, as has been mentioned (pg 130) are constructed in terms of items which yield a normal curve at a particular age, in a particular population. Thus if the cognitions <u>needed</u> to do well on more difficult test items are not developed, or are developed more slowly in some socio-historical circumstances, then this would explain the IQ age decrement finding. For example, if the attainment of 'formal operations' is necessary for IQ test items requiring advanced abstracting abilities, and if such abilities are not developed because they are not needed in a particular culture, then people from this culture will score comparatively lower than in cultures where abstracting abilities <u>are</u> developed.

Moll (1984) found a significant difference between rural and urban black twelve year olds in South Africa in the attainment of 'formal operations.' He states that his evidence indicates

> that communities whose everyday activity is concrete in form, tend to be those communities in which children's cognitive development has not gone beyond concrete operations by age 12, while communities characterized by abstract activity tend to be those which produce children with abstract formal operations at his age (1984, pg 112).

One would thus expect the mean IQ between urban and rural children at age eight to be more similar than between these two groups at age twelve when formal operations have developed in the one group but not in the other.

5.4 Hypotheses (including null hypotheses)

(1) Urban children will score higher than rural children on the SPM.

(2) Urban children will score higher than rural children on the DAP.

(3) Rural Venda children will score higher than rural Xhosa children on the DAP.

(4) There will be no differences between rural Venda and rural Xhosa on the SPM.

(5) There will be no differences between urban Venda and urban Xhosa on the DAP.

(6) There will be no differences between urban Venda and urban Xhosa on the SPM.

(7) There will be no differences between males and females on the DAP.

(8) There will be no differences between males and females on the SPM.

(9) The above hypotheses will not vary whether the subjects are eight years old or twelve years old.

(10) The percentile *8 rank of rural eight year olds will be higher than the percentile rank of rural twelve year olds on the DAP.

(11) The percentile rank of rural eight year olds will be higher than the percentile rank of rural twelve year olds on the SPM.

(12) The percentile rank of urban eight year olds will be higher than the percentile rank of urban twelve year olds on the DAP.

(13) The percentile rank of urban eight year olds will be higher than the percentile rank of urban twelve year olds on the SPM.

(14) The differences between eight year olds and twelve year olds, relative to the standardized sample, will be greater in the urban areas than in the rural areas on the SPM.

(15) The differences between eight year olds and twelve year olds, relative to the standardization sample, will be greater in the urban

areas than in the rural areas on the DAP.

(16) Subgroups other than rural Venda and rural Xhosa (see hypotheses 3 and 4) will fall into the same 'range' of intellectual functioning (i.e. average, below average etc.) on the SPM as they will on the DAP.

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CHAPTER VI

METHOD AND RESULTS

METHOD

6.1 Subjects

Two hundred and forty black primary school children served as subjects. Of these, half (one hundred and twenty) were drawn from an urban area while the other half came from rural areas. The subjects were subdivided into Venda speaking people (traditionally exposed to representational art) and Xhosa speaking people (not traditionally exposed to representational art) in both the rural and urban areas. The subjects thus consisted of sixty rural Venda, sixty urban Venda, sixty rural Xhosa and sixty urban Xhosa children. Further subdivisions were made in terms of equal numbers of boys and girls in each subgroup, as well as divisions into two age groups - eight year olds and twelve year olds.

Thus there were sixteen categories each consisting of fifteen subjects.

The subjects were all school-going children so as to eliminate the effects of schooling per se. In order

to qualify as 'urban,' the subjects had to be born in the chosen urban area and to have lived there all their lives. Soweto, adjoining the most industrialized centre of South Africa (i.e. Johannesburg) and itself probably the most urbanized 'black' area of South Africa was chosen as the area from which 'urbanized' children were drawn. The two urban schools used for this study (a Venda school and a Xhosa school) were in close proximity and drew children from the same surrounding physical area. The Pimville/Diepkloof area is representative of an 'average' socio-economic area of Soweto. It is characterized by 'matchbox-housing', overcrowding, dusty roads, outside sanitation and a generally low level of affluence.

As the selection of area alone was not a completely satisfactory way of controlling socio-economic status, and as the exact incomes of the families were not available, parents' occupations were controlled. All parents were unskilled or semi-skilled labourers. Children whose parents were teachers or traders, for example, were not included in the sample.

The rural samples were drawn from two 'homeland' areas of South Africa. The Xhosa speaking samples were tested at the "Lusikisiki Village School" in the Transkei, while the Venda sample were tested at the

Nthabatala School in Vendaland (Vuwrani district). An attempt was made for the rural samples to be as close to their traditional economies and worldviews as is possible in the late twentieth Century. Lusikisiki is a fairly isolated 'town' in the 'Pondo' region of the Transkei. Its access is limited by extremely bad roads. The school, though situated in the village, draws the majority of its pupils from the surrounding area (rather than from the village itself). Many of the pupils walk over five kilometers from their 'kraals' to and from school every day.

The Nthabatala school in Vendaland is similarly 'isolated.' Access by car is also difficult. The school differs from the Lusikisiki school in that it is not situated in or near a 'village' and thus the children have perhaps even less contact with industrialization than those from the Lusikisiki school. However this may be counterbalanced by the fact that the nearest major town to Nthabatala (Louis Trichardt) is nearer than the nearest major town to Lusikisiki (Umtata). In both rural samples the vast majority of the fathers of the children work as migrants in the 'white' cities, and all children for this study were taken from children of migrant workers.

6.2 Apparatus

The Raven's Standard Progressive Matrices and the Goodenough-Harris Draw-A-Person Test were administered.

6.2.1 The Raven's Standard Progressive Matrices

This test is designed to assess "a person's 'capacity' (at the time of the test) to apprehend meaningless figures presented for observation, see the relations between them, conceive the nature of the figure completing each system of relations, and, by so doing, develop a systematic method of reasoning" (Raven, 1977, pg 2).

The scale consists of sixty problems divided into five sets of twelve. The first problem in each set is as near as possible to being self-evident. The problems which follow become progressively more difficult and as the difficulty increases it provides training in the method of working. Further "the five sets provide five opportunities for grasping the method and five progressive assessments of a person's capacity for intellectual activity" (Raven, 1977, pg 2).

The majority of studies yield internal consistency correlations of approximately .90 while test-retest

reliability has been found to be around .90 in the short term reducing to .80 with larger intervals between testing (Raven 1977). The Raven's manual describes correlations with concurrent intelligence measures for English speaking children and adolescents as ranging from .54 to .86, while predictive validity has been found to range up to .70 vis-a-vis scholastic achievement.

Raven et al (1977) reports Sheppard et al (1968) as showing a mean biserial correlation of .52 between SPM items and the combined results of three IQ tests, and as having "good to excellent discrimination power for most items" (Raven, 1977, pg 9). The Raven's manual claims a Factorial Construct Validity of up to .83 on "g". According to Sattler (1982) tests with high 'g' loadings "require conscious and complex mental effort, such as is found in reasoning, comprehension, or hypothesis testing tasks" (1982, pg 48). According to Jensen (1979) 'g' is an index of general mental ability or intelligence.

Correlations between the 1966, 1973 and 1979 norms have been found to be significantly high in economically disadvantaged samples so that any of the norms may be used (Karnes et at 1982). In this study the 1966 norms are used (Raven's manual, 1977).

In terms of cultural effects on the test, Raven (1938) asserted the SPM assesses a person's "present capacity for intellectual activity irrespective of acquired knowledge" (1938, pg 62). Burke supported Raven and stated that the SPM is probably "as nearly culture free as any available test is or can be" (1958, pg 218). Macarther and Elley (1963) laud the SPM as the best culture reduced test as it shows:-

- a high 'g' loading
- a low correlation with socio-economic status
- reasonably good prediction of school marks
- respectable reliability
- no change with socio-economic status over the years
- little indication of variation in their discrimination across socio-economic levels.

As the SPM was designed as a culture-fair test there is little wonder that it has been extensively evaluated for its use as such. Valencia (1979) in a

in-depth review of the literature found that the majority of researchers have found the SPM to be useful as a cross-cultural measure of non-verbal intelligence. However, Irvine (1969), having examined the use of the SPM in Africa, concluded that the Matrices should, at most be looked at as culture-reduced and not culture-fair or free. Irvine argued that there are major sources of variance accounting for performance on the Matrices in African studies. These included amount and quality of schooling, individual behaviour (cognitive strategies) and the role of cultural value systems. Klingehofer (1967) cautioned against the use of the Matrices if one did not pay special attention to the degree of industrialization characterizing a particular culture. And Willshire and Gray (1969) concluded that the lower Raven's scores found in a group of Canadian Cree Indians could not be evaluated in terms of the test's published norms.

6.2.2 Goodenough-Harris Draw-A-Person Test

This test is a revision of the Goodenough Draw-A-Man Test (1926) and is based on the assumption that the intelligence of children can be estimated from their drawings of a human figure. The DAP lays claim to measuring conceptualization in terms of perception, abstraction and generalization.

In the U.S.A. the DAP is the second most frequently used instrument for measuring childrens' intelligence (Goh et al 1981) and it is extensively used in South Africa. It has obtained a mean validity coefficient of .49 when compared with 14 criterion measures of intelligence in a white western population. The relationship of the DAP to the WISC-R and the Stanford-Binet was approximately the same (.63). Relations to academic success has been found to be .58. (Scott, 1981)

In nineteen studies of interscorer reliability (collated by Scott, 1981) a medium of .90 on the Man scale and .94 on the Woman scale was found. Interscorer and interim reliabilities have been found to fall in the .80's and .90's while test-retest reliability only reaches the low .70's (Scott, 1981).

The DAP has been used cross-culturally because of its non-verbal character, because it has little relation to academic subject matter and because the human figure is equally familiar to members of all cultures. Many studies questioning its cross-cultural validity have decried its use. However, there is still research which supports the test as being 'culture-fair.' The devisors of the test, Goodenough and Harris, themselves recognized that the test was

not free from cultural influence, and concluded that "the search for a culture-free test, whether of intelligence, artistic ability, personal-social characteristics, or any other measurable trait, is illusory" (Anastasi 1968, pg 250). However, in 1980, for example, Weis concluded her study analyzing the effects of culture on DAP by stating "The Goodenough-Harris scores of these Peruvians approach the mean for the norm group, suggesting that the technique is probably an adequate measure of intellectual ability when used cross-culturally " (1980, pg 148). It seems incredible that this conclusion should be reached because one cultural group obtained the same mean as the standardization group, however this reflects the fact that even into the 1980's the issue is not resolved.

6.3 Procedure

Though both the SPM and the DAP are non-verbal tests of intelligence, instructions are verbal. Therefore a professional translator translated the instructions from the English originals into Xhosa and Venda. Ratusnik and Koenigsknecht (1977) showed that the administration of the DAP by an examiner of a different race resulted in lower scores for whites and blacks. (see also pg 48) Teachers (of the same race as the pupils) in all four schools were therefore

trained in detail on test administration of the two tests. Further, by using teachers who were familiar with the children as administrators, it was hoped that the anxiety of the testees would be reduced. (see pg 48).

The tests were administered in groups of thirty children at a time. Harris (1963) found that the DAP could be administered in groups as effectively as individually (Harris 1963, pg 239) (except in preschool children and clinical populations) and Raven et al (1977) says that the SPM "can be given to a group of any size" (pg 18).

Both tests were untimed. Harris (1969) found that untimed DAP tests yielded higher scores than the timed test on 14 and 16 year olds, but no significant differences were found for 12 year olds and younger. Raven et al (1977) says of the SPM that "for anthropological, genetic and clinical studies an untimed 'capacity' test is more useful than a test in which a person is working against time" (1977, pg 4).

At each of the four schools the same teacher administered the tests firstly to the eight year olds (15 boys and 15 girls) and then to the twelve year olds (15 boys and 15 girls). The DAP was administered first as it is known to put children at ease (Harris

1963, Anastasi 1982). A blank sheet of paper, a pencil and an eraser were distributed to each person. When everyone was finished the drawings were taken in and SPM answer sheets were handed out together with test booklets. The instructions were read out in the vernacular according to each test manual.

The tester spent approximately ninety minutes with each group.

The SPM were scored by the researcher. The DAP sheets were mixed between all groups tested and given to two independent skilled scorers (clinical psychology interns) in order to attain inter-scorer reliability.

6.4 Statistical Analysis

(i) - Inter-scorer reliability of the DAP was assessed by using the Pearson Product-Moment Coefficient.

(ii) - As this study aimed to assess the independent and interactive effect of four independent variables on two dependent variables 2 x 2 x 2 x 2 ANOVA'S were computed on both the SPM and the DAP (Kerlinger 1973).

(iii)- Differences between subgroups were assessed

by means of t-tests. (Connolly and Stuckin, 1971). This was done by firstly comparing each independent variable as a whole e.g. urban and rural or Venda and Xhosa. Then two independent variables were combined and comparisons made e.g. urban Xhosa and rural Xhosa, or urban boys and urban girls. This was followed by a combination of three independent variables e.g. urban Venda boys, and rural Venda boys, or urban Xhosa girls and urban Xhosa boys. And finally all four independent variables were combined and t-tests computed e.g. urban Venda 12 year old boys and rural Venda 12 year old boys, or urban Xhosa 12 year old boys and urban Venda 12 year old boys. One hundred and fourteen t-tests were computed.

(iv) - This study aimed to compare performance on the SPM relative to performance on the DAP. As standard scores of the DAP and the SPM are not comparable *9, only approximate comparisons could be made. This was done by converting mean scores of subgroups into percentile ranks gained from the standardization sample of each test. It was taken into consideration that when using this method differences between percentiles are smaller near the mean than on the extremes, and that

percentile distributions do thus not represent equal units (Sattler, 1982). It was also realized that the standardization samples used in the two tests were not the same and thus percentile comparisons are not fully accurate.

(The SPM norms are 1966 Irish norms while the DAP was standardized in the U.S.A. in 1950). Nonetheless the assumption of random sampling, and more importantly, that South African subjects are being characterized in terms of the norms on both these tests, made this analysis feasible and important.
(see conclusion)

(v) - In order to assess the performance of each age group relative to the age norm of the standardization sample, so that the 'IQ decrement with increased age hypothesis' could be tested, percentile ranks were calculated and compared between the two ages tested, on both tests. (Though the ANOVA and the t-tests assessed variance and differences between eight year olds and twelve year olds, on the SPM this was essentially meaningless as these were raw scores. {see footnote 11})

RESULTS

(i) - The median interscorer reliability on the DAP using the Pearson Product-Moment coefficient was found to be .90. This compares favourably with other recorded interscorer reliabilities (Scott, 1981, see pg 134).

(ii) - *Using a 2 x 2 x 2 x 2* ANOVA the following results were obtained.

A) *On the Standard Progressive Matrices *10*

1. A significant variance was found between rural *and urban populations* ($\underline{F}$ = 6, 39, $\underline{P}$ < .01).

2. A significant variance *was found* between ethnic groups ($\underline{F}$ = 7,27 $\underline{P}$ < .01).

3. A significant variance was found between ages ($\underline{F}$ = 37, 42, $\underline{P}$ < .01).

4. No sex variances were found.

5. With regard to interaction effects on

this test, there was no significant differences between any two or more subgroups.

B. On the Draw-A-Person Test

1. A significant variance was found between ethnic groups (F = 6, 99, P < .Ø1).

2. A significant variance was found between ages (F = 18, 77 P < .Ø1).

3. A significant variance was found between sexes (F = 33, 93 P < .Ø1).

4. There was no variance found between rural and urban populations.

5. A significant variance was found in the interaction of ethnic group, rural/ urban and age (F = 5, 54, P < .Ø1).

6. Other than 5 (above) there were no further interaction effects.

(iii)- Differences between mean scores of each sub-group were calculated using t-tests (see [iii] pg 137). Of the one hundred and fourteen t-tests computed, the tables below (Table I and Table II) indicate where significant differences were found.

Table I

A Significant T-Test Differences Found on the SPM

Between:-			
(i)	V and X	t = 2,32	P < .05
(ii)	R and U	t = 2,49	P < .05
(iii)	R,V and R,X	t = 2,20	P < .05
(iv)	R,V and U,V	t = 2,08	P < .05
(v)	R,V,8 and R,X,8	t = 3,10	P < .05
(vi)	R,V,B and R,X,B	t = 2,02	P < .05
(vii)	U,V,G and U,X,G	t = 2,40	P < .05
(viii)	R,V,B and U,V,B	t = 2,41	P < .05
(ix)	R,V,B,8 and R,X,B,8	t = 2,60	P < .05
(x)	U,V,G,12 and U,X,G,12	t = 2,46	P < .05
(xi)	R,V,B,12 and U,V,B,12	t = 2,34	P < .05

Key V = Venda, X = Xhosa, R = Rural, U = Urban

B = Boy,G = Girl,8 = 8 year old,12 = 12 year old

Although the SPM ANOVA produced significant variances between urban and rural and Xhosa and Venda populations, no significant interaction effects were found between the two variables (pg 140). The SPM t-tests similarly produced significant differences between urban and rural (ii) and between Venda and Xhosa (i). However, what the t-tests reveal which the ANOVA did not was that (other than [vii] U,V,G and U X G) significant differences between Venda and Xhosa occur in the rural areas and <u>not</u> in the urban areas (iii, v, vi, ix, x). In other words (other than U V G and U X G) <u>differences between Venda and Xhosa are significant in the rural areas but not in the urban areas.</u>