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Self-Awareness in Traumatically Brain Injured (TBI) Persons regarding their Post-Accident Abilities

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A research report submitted to the Faculty of Education, University of the Witwatersrand, in partial fulfilment of the requirements for the Degree of Master of Education (Educational Psychology)

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ABSTRACT:

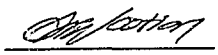
South Africa has the highest global fatality rate per 100 000 which annually leaves thousands dead and even greater numbers severely impaired following motor vehicle accidents. A large percentage of these persons sustain a Traumatic Brain Injury (TBI). Regardless of whether decreased insight following TBI has neurological or psychological aetiology, TBI is believed to hinder rehabilitation efforts in that TBI individuals are unaware of their deficits and the need for rehabilitation. The aims of this study were to determine if self-awareness in severely TBI persons differed markedly from their significant others' perception of their abilities. Furthermore a control group established awareness levels in the general population. Degree of insight was appraised by examining the disagreement between participant and significant other on both the Patient Competency Rating Scale (PCRS) Questionnaire and a modified Draw-A-Person Test. Statistical discordance was found to exist between participant and significant other for only two PCRS items, pointing to sound self-awareness amongst the experimental group. Although TBI persons were more likely to generally over-estimate their abilities, similar relationships were found to exist between participants and significant others in both groups. Few differences were found to exist between the way participants and their significant other visually portrayed them, although statistically significant intergroup differences were found to exist in this mode. These suggested a high level of visual self-awareness in the experimental group, and a tendency for both TBI participants and their significant others to portray participants in markedly different ways from control participants. The unexpectedly high concordance suggests the effectiveness of therapy in improving the self-awareness of TBI persons.

KEY WORDS:

Traumatic Brain Injury; Self-Awareness; Heteromodal Cortex

Declaration

I declare that this is my own unaided work. It is being submitted for the degree of Master of Education (Educational Psychology) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.



M.F. Wootton (Miss)

1st day of December 1998

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CHAPTER 1 BACKGROUND TO THE STUDY

1.1. Introduction

International comparisons reflect that South Africa has the highest global fatality rate per 100 000 (1994 Traffic Safety Audit). In 1997 over 850 000 vehicles were involved in collisions which resulted in more than 9 500 deaths (CSS, 1998, p.7161.2). Trends in traffic collisions highlight that technological advances continue to save numerous victims of such accidents, including a sizable proportion who have sustained severe head injuries, resulting in a "relatively new and usually tragic phenomena of physically fit young people whose brains have been significantly damaged" (Lezak, 1983, p.165).

Brain damage is a common result of such injury: "Traumatic head injuries are among the most common forms of brain damage, leading all others in childhood and the younger (to age 42) adult years". (Lezak, 1983, p.165). In South Africa, there is a "general consensus that the victims of such trauma incidents often receive less than optimal healthcare resulting in an unacceptable number of 'preventable' deaths or residual disability for the individuals, their families, the RAF and the country as a whole" (The White Paper on the Road Accident Fund, Government Gazette, 1998 Vol. 392, No 18658, p.54).

The sheer magnitude of survivors in South Africa with post-injury residual disabilities highlights the need for high quality rehabilitation services for accident victims. In 1997, 39 302 persons sustained serious impairments and 91 760 slight impairments as a result of road traffic collisions (CSS, 1998, p.7161.2). In this context, impairment is any "deviation from normal in a body part or organ system and its functioning that interferes with an individual's activities of daily living". Impairment is understood as encompassing areas of "selfcare and personal hygiene; eating and preparing food; communication, speaking and writing; maintaining one's posture, standing and sitting; caring for home and personal finances; walking, travelling and moving about; recreational and social activities; and work activities" (White Paper, 1998, p.39). In addition, it is recognised that some impairments become permanent in that they stabilise during the time period when tissue repair optimally occurs and are then unlikely to improve despite further medical or surgical interventions.

The consequences of traumatic brain injury (TBI) are often severe and disabling. However, findings by McGlynn and Schacter (1989) highlight that "in view of the debilitating and frequently dramatic nature of the disorders which result from brain damage, it is perhaps surprising to discover that a significant proportion of patients are entirely unaware of their deficits... Yet these same deficits are all too apparent to others and have a profound effect on afflicted patients' daily lives" (p.144).

In light of the outlined need for rehabilitation in South Africa and the reality of limited state financial resources, it is essential that available rehabilitative interventions are utilised as thoroughly and extensively as possible. To date, studies have unanimously found that awareness or insight is a major factor in successful rehabilitation after TBI. Exploratory research to evaluate the universality of this finding needs to be undertaken and the results examined in light of rehabilitation readiness in a South African context.

1.2. Literature Survey

1.2.1. Overview of Traumatic Brain Injury

Literature on traumatic brain injury (TBI) recognises that a variety of biochemical effects and degenerative and regenerative neural changes occur in response to the damage the brain sustains. Most studies on changes following brain damage, however, have focused on only one variable at a time and there is agreement that: "a multivariate approach to events following brain damage has been virtually nonexistent in the recovery literature" (Finger, LeVere, Almli and Stein 1988, p.357). This brings into question the truth behind some of the cause and effect relationships drawn.

Literature on TBI predominantly differentiates it from other types of brain damage in that it is unanticipated; has immediate effects and is usually acquired during the course of normal development. Open and closed head injuries are differentiated, with the brain itself not being externally penetrated in the latter. Damage acquired from closed head injuries may range from focal to diffuse, resulting in specific or multiple impairments (Lezak, 1983). The situation of persons who incurred head injuries in moving vehicle accidents "is greatly aggravated by the additional impact of the brain bouncing around inside the skull upon sudden deceleration" (Lezak, 1983 p.169).

Loss of consciousness is understood to occur at the time of the injury when the head accelerates freely and rapidly. The severity of TBI, as measured by total coma length, has long been recognised as a predictor of ultimate outcome. "The degree and duration of altered consciousness usually overshadowed all other clinical features in importance" (Teasedale and Jennett, 1974, p.81). In this regard it has been seen to be useful to perceive a severity continuum ranging from mild injuries with loss of consciousness of less than 60 minutes, to catastrophic injuries where patients may remain in a persistent vegetative state. Prigatano and Leathem (1993) outline parameters for loss of consciousness of between one and six hours as indicative of a moderate head injury, while a period of more than 24 hours as signifying a severe head injury. While the literature does not specifically mention a loss of consciousness of between seven and 23 hours, it is assumed that this can be regarded as moderately severe.

Lezak and Kay (1990), have identified physical, cognitive, executive and psychosocial sequelae following closed TBI. The sequelae are seen as continual and needing to be coped with by "the patient, as well as the patient's family and extended social system, ... over the long term" (Moore, Stambrook and Peters 1989, p.171). The persistence of such long term sequelae are similarly emphasised by Tyerman and Humphrey, who stress the complex and multifaceted consequences of severe head injury: "Having weathered the immediate crisis of survival, the unfortunate victim faces a seemingly endless struggle to regain the physical and psychological skills which have always been entirely taken for granted" (1984, p.12).

Recent studies show that persons who have sustained a TBI have a greater degree of awareness of their residual physical than their residual psycho-social or cognitive disabilities. Maslow's theory of need hierarchies is regarded as useful in understanding this phenomenon, whereby: "unless the individual realizes his/her potential in the lower-order skills (or else reaches a level of acceptance of residual dependence or difficulty), he or she may be unwilling or unable to fully participate in addressing the higher order issues" (Hillier and Metzer, 1997, p.534). Depending on the severity of the injuries, the survivor may attend to higher order impairments at a later time.

There is consensus in the literature regarding imp[illegible]areness and its repercussions in that "until the person becomes aware of these chang[illegible]d accepts their new self with new limitations, requiring new goals, successful rehabilitation of any kind will flounder" (Lezak and Kay, 1990 p.39). This has been re-iterated by Ben-Yishay, Silver, Piasetsky and Rattock, 1987; Ford, 1976, (in McGlynn and Schacter 1989); Lezak and O'Brien, 1988 and Prigatano and Schacter, 1991 who associate poor rehabilitation outcome and long-term problems with psychosocial adjustment for those persons who lack insight or awareness regarding the meaningful alterations in their higher cerebral functioning. The bulk of research maintains that persons with traumatic brain injury "may not understand the level of damage and may lack insight into mental, physical or emotional abilities". (Healthsouth, 1993, p.18). Unawareness of deficits is thus seen as responsible for a lack of realism regarding post-injury abilities. Whilst unrealistic expectations may initially serve a protective and motivating function, Tyerman and Humphrey (1984) concur that the lack of insight certainly curbs both rehabilitation efforts and long-term adaptation.

Unawareness of such post-injury sequelae raises important clinical and theoretical issues. Clinically, the survivor's unawareness of his/ her post-injury deficits "has major implications" for his/ her rehabilitation: "Patients who are unaware of their deficits are unlikely to seek or accept treatment" (Schacter and Prigatano 1991, p.259). In conjunction, persons who are unaware of their deficits "fail to implement compensating strategies (Brooks and Lincoln 1984; Cicerone and Tupper, 1986), maintain unrealistic goals for rehabilitation (Ben-Yishay et al., 1985, Diller and Weinberg, 1981), and fail to benefit from therapy (Ford, 1976)" (In McGlynn and Schacter 1989, p.172). Successfully rehabilitated persons with TBI are described in the literature as persons "who were helped to become realistically aware of their residual neuropsychological deficits, and who were willing to learn methods to compensate for handicaps in their social environment" (Prigatano in Crisp, 1992, p.15). Rehabilitation professionals suggest utilising objective outside perspectives to increase awareness. This strategy is espoused by TBI survivors who suggest: "put aside your pride and ask someone you trust to discuss with you their perception of your problem areas" (DeBoskey, Calub, Burton, and Morin, 1987, p.25).

On the theoretical side, the occurrence of impaired awareness following TBI raises questions regarding the nature of the processes and the mechanisms which under normal conditions allow persons to be aware of and monitor the state of their cognitive functions.

1.2.2. Impaired Self Awareness

Self awareness has been described as the highest of all integrated activities of the brain (Stuss and Benson, 1986) and is defined as "the capacity to consciously perceive the self in relatively objective terms while maintaining a sense of subjectivity" (Fleming, Strong and Ashton, 1996; Prigatano and Schacter, 1991, p.13). According to Prigatano: "Awareness is now being seen as emerging from an interconnection of feeling states and cognitive structures" (In Finger, 1988 p.341).

Many factors are felt to compromise awareness after TBI. A review of research (Jennett and Bond 1975) suggests a positive relationship between cognitive impairment and the severity of injury. Dissent surrounds the issue of whether severity compromises awareness, causing a decrease in accuracy of self-report (Allen and Ruff, 1990) or not (Prigatano and Altman, 1990). Thomsen's (1989) study found lack of insight to be more pronounced among younger than older severely TBI persons.

Regarding chronicity, persons recently injured display less insight than those who sustained their injury many years previously (Allen and Ruff, 1990). While earlier studies (Bond and Brooks 1976) maintain that the most rapid recovery and healing occurs in the first six months following TBI, more recent research (Oddy, Coughlan, Tyerman and Jenkins, 1985; Willer, Allen, Liss and Zicht, 1991) suggests that the process of personal adaptation and adjustment to post-injury status extends over a number of years.

From a neuropsychological perspective, no relationship between neuropsychological test scores and accurate self-estimates of behavioural limitations exists (Prigatano and Altman 1990), nor is there an association between denial of difficulties reported by relatives and cognitive ability as measured using psychometric tests (McKinlay and Brooks, 1984).

Higher rates of employment and job retention have been found among persons with TBI who attended intensive cognitive rehabilitation programmes (Burke, Wesolowski and Guth, 1988; Rao, Rosenthal, Cronin-Stubbs, Lambert, Barnes and Swanson, 1990), received job coaching (Wehman, Kreutzer, West, Sherron, Zasler, Groath, Stonnington, Burns and Sale, 1990), and/ or support and long-term training, (Ben-Yishay et al., 1987).

Post injury employment has also found to be strongly correlated both with the TBI persons' ability to utilise interpersonal feedback and to adapt to environmental demands (Ainsley and Gliner, 1989) and with their awareness and acceptance of their cognitive deficits (Prigatano, Fordyce, Zeiner, Rouche, Pepping and Wood, 1984).

Impaired self-awareness results in inaccurate judgement of cognitive functioning. To increase evaluation accuracy when TBI persons are asked to rate their ability to complete a specified task, their ratings are most commonly compared to "actual test scores or ratings by staff, or family members" (Allen and Ruff, 1990, p.7). The literature is firm, however, in maintaining that "the patient's own perceptions are crucial to our understanding of the consequences of severe head injury" (Tyerman and Humphrey, 1984 p.21) and there is consensus that effective rehabilitation interventions demand a "balanced approach", requiring input from both significant others and the head-injured person.

Bias in the reports of estimates of a TBI person's level of functioning by different persons has been queried, including self-report and relative report (Fordyce and Rouche, 1986; McKinlay and Brooks, 1984) and staff report (Fordyce and Rouche, 1986). In particular, the validity attributed to ability self-reports whereby "the head-injured are able to reliably complete self-report scales as indicated by similarity between patient's and a close other's report" (Kinsella cited in Brooks, 1991, p.157) has been greatly contested (Newton and Johnson, 1985; Tate, Lulham, Broe, Strettles and Pfaff, 1989; Thomsen, 1989) with greater credibility conferred to significant other report.

Research on specific sequelae (Brooks and McKinlay 1983) indicates that consensus between self-report and relative report regarding post-injury ability is highest for sensory and motor impairments and lowest for emotional and behavioural changes.

This is corroborated by Hendryx (1989), who found that relatives rated emotional changes as more extreme than did persons with TBI. Research citing similar self-relative ratings does, however, exist (Kinsella, Moran, Ford and Ponsford, 1988) as do results indicating that relatives tend to rate persons with TBI as more impaired (Rappaport, Herrobacke, Rappaport and Winterfield 1989), that self-report may express cognitive and behavioural symptoms more frequently than relative report (Oddy et al., 1985) and that residual complaints by both parties are of a similar nature (Van Zomeran and Van Den Berg, 1985).

Without a control group, however, the use of a within group design implicitly assumes that identified features are specific to head injury (Brooks, 1991). This is reiterated by McKinlay and Brooks (1984) who emphasise that "caution in drawing causal connections is also required in attributing post-injury sequelae specifically to brain injury". The literature agrees that normal controls are required: "Normal control groups are seldom included in these studies, but without such controls a determination of the relative accuracy of head-injured patients is restricted". (Allen and Ruff, 1990, p.7)

There is contention in the literature on the issue of the aetiology of impaired self-awareness. There is agreement that further research is required to ascertain "the degree to which both neurologic and non-neurologic factors are contributing to different types of altered self-awareness after brain injury - rather than posing the question in either or terms?" (Prigatano and Altman, 1990, p.1062). Aetiology is further obscured by the existence of various degrees of unawareness. In this regard, Schacter and Prigatano (1991) warn against implying an aware/ unaware dichotomy which assumes that "unawareness of deficit is a monolithic or unitary entity" (p.259). They propose instead an awareness continuum, which does more justice to the subtleties of awareness disturbances, emphasising levels, specificity and neural bases of unawareness, as well as the existence of partial/ implicit knowledge of deficits and defensive denial. The degree and quality of unawareness has been found to fluctuate across individuals and diagnostic groups (McGlynn and Schacter 1989; Schacter and Prigatano 1991).

The literature contrasts persons who are implicitly aware of their deficits, but utilise defensive or motivated denial (Weinstein 1991), with those experiencing neurologically based unawareness, that is, persons who are not able to explicitly acknowledge deficits (McGlynn and Schacter 1989; Schacter, 1991). Current assessment methods do not, however, make this organic-psychological distinction possible and support exists for both beliefs/ conditions. More recently, (Prigatano and Klonoff, 1988 cited in Prigatano, Ogano, and Amakusa 1997) brain injured patients have been classified either as denying their disability "as a psychological method of coping" or as having primarily impaired self-awareness, "purportedly caused by neurological or neuropsychological impairments" (p.142). This distinction warrants further investigation.

1.2.2.1. Denial of Disability

As early as 1952, Goldstein (in Levine and Zigler, 1975) stressed that the protective mechanisms employed to avoid the catastrophic reaction that often accompanies brain damage commonly included denial. As a response, denial is either seen as reflecting a true lack of awareness or as strategic self-preservation. From a psychoanalytic viewpoint, denial is a defence mechanism employed to disavow anxiety "such as might be aroused by the neurological patient's awareness and acknowledgement of loss of function" (Kihlstrom and Tobias, in Prigatano and Schacter, 1991, p.199). The DSM-IV states that denial occurs at the disavowal level of defence, a level characterised by "keeping unpleasant or unacceptable stressors, impulses, ideas, affects or responsibility out of awareness with or without a misattribution of these to external causes" (A.P.A. 1994 p.752).

The notion of self-concept is agreed to be critical in understanding self-awareness. Rogers (1951) outlines one's *self-concept or self-structure* as an "organized configuration of perceptions of the self which are admissible to awareness. It is composed of such elements as the perceptions of one's character and abilities; the percepts and concepts of the self in relation to others and the environment, the value qualities which are perceived as associated with experiences and objects; and the goals and ideals which are perceives as having positive or negative valance" (p.503).

Self-concept is most certainly a fluid entity which changes through experience. There is overwhelming support (Burns, 1979; Brigs, 1970; Epstein 1973; Purkey, 1968 and Rogers, 1974) for the dynamic nature of self-concept. Yet it is also frequently noted that such revision can be both distressing and gradual: "Any value entering this system which is inconsistent with the individual's valuation of himself cannot be assimilated; it meets with resistance and is likely, unless a general reorganization occurs, to be rejected" (*Lecky, in Raath and Jacobs* 1993, p.20). Rejection through denial of post-traumatic disabilities was originally highlighted in Ford's (1976) observations of head injured-patients: "The patient is rarely aware of his reduced intellectual skill and will deny there is a change. At first he will identify with his own pre-morbid self-image, and only after many destructive failures come to see he is not the man he was" (In Tyerman and Humphrey, 1984, p.21).

Studies on denial and self-image in stroke, lung cancer and heart disease patients recognise that these patients utilise denial: "to defend oneself against facing the full meaning of impending death, impaired functioning, and disability is a universal phenomena that has been noted clinically in response to every form of disability and disease" (Levine and Zigler, 1975 p.751).

Rogers (1951) asserts that the inability to assimilate information of a changed self, and the subsequent phenomenon of repression or denial of experience occurs because "the adequate symbolization of the experience in question would be definitely and often deeply in contradiction to the self concept of the individual". Furthermore he maintains that bringing denied experiences into awareness can only occur once "the concept of self is sufficiently revised to accept them, ... the change in self precedes, rather than follows, the recovery of denied or repressed material" (p.148).

From this perspective, denial of disability is understood to be a defence mechanism which the TBI survivor unconsciously implements in order to lessen anxiety surrounding changed functioning, which is incongruous with his/ her pre-injury self-concept. Because these changes occurred after the individual's personality and sense of self had been formed, "one of the greatest struggles in the rehabilitation of persons with acquired brain damage is letting go of an old, established sense of self, and learning to recognise and accept an alien new self"

(Lezak and Kay, 1990, p.25).

Notwithstanding its role as a defence mechanism, consensus exists that it is helpful to understand denial as part of a grief sequence (Kubler Ross 1970). In this context, "grief is not a single reaction, but rather a complex progression of emotional and intellectual adjustments to separation from something or someone valued" (Tanner and Gerstenberger, 1988, p.80). Survivors of TBI specifically grieve once they perceive that they no longer possess some aspect of their pre-injury integrity. Tanner and Gerstenberger (1988) identified denial as the first stage in grief reaction, which may range from full expression to partial activation. In this regard, they state that once the denial has "run its course and the patient's attempts to reduce frustration have proved unsuccessful, realization of the loss and its implications occurs and results in depression. If the normal and necessary grieving process is permitted to run its course, the patient enters into an acceptance of the disorder" (p.83).

The 1985 findings of Oddy et al., fuelled the contention surrounding the aetiology of self-awareness and prompted a paradigm shift away from a psychological understanding of awareness. Their research in a seven year post-accident study found that 40% of the families studied continued to describe their brain-injured relative as being both childish and unwilling to admit to any residual difficulties. Due to the large time period since accident, possible neurological causes were highlighted: "This lack of awareness of self-recognition is not purely a function of psychiatric 'denial'. Rather it is a disorder of self-awareness that is organically mediated via disturbances in arousal and perception" (Prigatano in Finger et al., 1988, p.336).

1.2.2.2. Lack of Insight and the Hetramodal Cortex

Self-awareness is agreed to be a pre-requisite for maximum adaptation (Prigatano, 1988). The continued inability of some TBI persons to adapt to their environment long after injury is thought to be a result of damage to those parts of their "brain structures that allow for attention and perception and the capacity of the organism to interpret feeling states" (Prigatano, 1988 p.340).

From a neurological perspective, self-awareness may well depend on the integrity of multiple brain regions and involve areas considered by Mesulam (1985) as the "heteromodal cortex". Traditionally the cerebral mantle was divided into the primary motor and sensory cortex and the 'association' cortex. A different conceptualisation, suggested by Mesulam (1985), described the cerebral cortex according to the type of stimuli it responded to. Three broad types of cortical tissue were differentiated, with the first occurring in the primary sensory and motor projection regions. These regions are important for tactile, visual, and auditory perception, thus "providing relatively invariant information concerning external reality" (Prigatano, 1990, p.1062). Surrounding this area is the association cortex which can be further subdivided into 'unimodal' and 'heteromodal' regions.

The literature describes the unimodal cortex as responding "primarily to one type of stimulus although the stimuli it responds to are typically more complex in nature" (Prigatano, 1991, p.120). By contrast, the heteromodal cortex is understood as being able to simultaneously respond to a variety of stimuli: "The heteromodal cortex lies in close proximity to this paralimbic belt, and may serve the function of integrating perceptual information about external reality with perceptual information about the internal, homeostatic state of the organism" (p.1062). Thus, this region interfaces internal and external information. Damage to the heteromodal cortex would in effect impair this interface, rendering the cognitive and affective components involved in a variety of perceptions un-integrated. "The capacity for self-perception may rest in those cortical regions that Mesulam (1985) considered heteromodal" (Prigatano, 1991 p.121).

Mesulam delineated the heteromodal cortex as including a large section "of the frontal lobe and prefrontal cortex but also areas in the inferior parietal lobule, the superior marginal gyrus, and the angular gyrus. These areas seem to develop last from a phylogentic and ontogenetic point of view" (In Prigatano, 1991 p.121). While some research (Allen and Ruff, 1990) maintains only one awareness-specific region exists, Mesulam's model allows for different types of impaired awareness depending on the specific region damaged or the combination of regions involved, and may "help explain the varied types of 'unawareness' disturbances that can exist after brain injury" (Prigatano, 1990, p.1062).

It follows then that numerous brain regions are correlated with impaired awareness, and that injury to any of these may potentially upset the integration of cognitive and affective components of experience.

This view postulates that impaired awareness is a result of damage to the heteromodal cortex. Yet "if the phenomenon truly has a biological basis to it, you should be able to see this same phenomenon in different cultures where there are different value systems" (Prigatano, 1996, Paper delivered at International Neuropsychological Society's 24th Annual Meeting). To date, cross-cultural studies have not been conclusive in this respect, asserting that "brain damage may cause a dissociation between awareness of behavioural competence and actual behavioural skills, but cultural variables may influence the direction and extent of those misperceptions" (Prigatano and Leathem, 1993, p.133).

Damage to the heteromodal cortex results in an absence of information. Prigatano (1996) differentiates impaired self-awareness from denial of disability, in that the former has a true negative symptom, where the individual has no knowledge of what is actually going wrong versus the latter, where the individual has partial/ implicit knowledge and attempts to draw upon premorbid methods of coping. The literature states that impaired awareness and denial of disability should be considered to be "interacting variables that change with time" (Prigatano 1996, Paper delivered at International Neuropsychological Society's 24th Annual Meeting). In this regard a true impairment of awareness follows the brain injury yet, as the heteromodal cortex recovers and resumes a degree of normal functioning, the individual increasingly gains partial awareness and begins to utilise his / her premorbid methods of coping.

1.2.3. Self-Awareness as Projected in Drawings

The literature (Prigatano and Klonoff, 1988; Prigatano, 1989) encourages analysis of the artistic expressions of TBI persons as a reflection of their degree of insight. This medium is understood as enabling the head-injured population to "admit to some changes in themselves which they cannot easily identify" (Prigatano and Altman, 1990, p.1058).

Traditionally the literature (Rappaport et al., 1984, p.116) has found that through drawing the person is understood to actively and spontaneously structure unstructured material and, in doing so, "reveals the principles of his psychological structure". The drawing of a person is understood to represent expression of their self-image, their self and body in their environment. This image develops slowly and is believed to be "plastic and responsive to disease, trauma, emotional regression and treatment". While old, primitive and regressed persons, who have become rigid, consistently portray the same image, "young and growing persons, as well as persons who are responding to treatment, tend to give variations of drawing projections consistent with the variations in their personality" (Machover in Anderson, 1951 p.348). The dynamic nature of self-image is also supported by Koppitz (1968, p.4), who asserts that the drawing reflects the "current stage of mental development and concerns of the given moment, all of which change in time due to maturation and experience".

More specifically, the Draw-A-Person (DAP) Test (Goodenough, 1926) is regarded as a valuable instrument in that it offers "direct testimony of the subject's projection" (Machover in Anderson, 1951, p.342). This test enables the drawers to express their "subjective response to, and personal interaction with their perceived reality" (Rappaport 1984, p.116). These drawings do not reflect an objective reality. Instead they reflect a perceived reality which is intensely personal and subjective. It is precisely this insider perspective which the literature warrants as requiring further investigation.

1.2.4. Summary of Literature

South Africa's alarmingly high motor vehicle accident rate has resulted in a large population of injured persons, some of whom have sustained a variety of traumatic brain injuries.

In spite of the dramatic social, emotional and behavioural sequelae often following traumatic brain injury, many of these persons remain unaware of their post injury deficits. This lack of insight has subsequently led to the augmentation of self-report of deficits with a significant other report, whereby relatives are frequently engaged in providing a more objective, realistic perspective on the brain injured persons's post-accident abilities.

While consensus exists regarding the repercussions of impaired awareness for rehabilitation, there is contention surrounding the aetiology of impaired self-awareness. Support exists both for the psychological view which asserts that the person is in fact aware of their deficits, but utilises defensive or motivated denial to lessen their anxiety surrounding reduced functioning and ability, and for the neurological perspective, which states that unawareness is due to physiological damage to the heteromodal cortex which mediates this function. Furthermore it appears possible that neurologic and non-neurologic factors may simultaneously contribute to different types of altered self-awareness.

Although the perceptions of significant others are regarded as informative in accurately estimating the injured person's true abilities, the importance of involving the TBI person in his/ her own rehabilitation is also stressed. In this regard, insight into functioning and perception of disabilities through self- drawings may provide a valuable tool in examining the TBI person's perspective and understanding of their post-injury position.

CHAPTER 2 THE STUDY

2.1. Rationale of the Study

A traumatically brain injured person's lack of insight is "the most formidable barrier to their eventual adjustment and rehabilitation" (Prigatano and Weinstein, 1995, p.10). This statement is widely supported in the literature with 'aware' individuals understanding the need for, and thus being in a better position to benefit from, rehabilitation. Despite impaired awareness being a common neuropsychological sequela following injury, "few data exist concerning the measurement of this problem" (Prigatano and Altman, 1990, p.1058).

There is a vast number of young TBI persons in South Africa in need of rehabilitation following closed head injuries. One of the many instructional concerns regarding this brain injured population that demands the attention of psychologists and rehabilitation staff is that of post-injury impaired self-awareness.

South African research has not yet examined or established if decreased self-awareness is frequently a feature following TBI. Questionnaires in which competency among various cultural groups including Americans (Prigatano and Altman, 1990); Maoris (Prigatano and Leathem, 1992) and Japanese populations (Prigatano, Ogano and Amakusa 1997) is rated, both by the participant and his/ her significant other, have been found to be useful in gauging the ability of the patient to complete a number of tasks.

In establishing the kind of rehabilitation the patient is ready to utilise, it is important to determine their level of insight. However, because "the patient's perceptions are likely to be distorted or unreliable" (Fleming et al, 1996, p.2), relatives are frequently asked for input on the survivor's post-accident functioning, and their report contrasted with the patient's self-report. Disparity which arises due to lack of concordance between these reports have to date been used to establish level of insight on the part of the patient.

By using a questionnaire which taps competency in specific areas and contrasting self and significant other reports, this research is designed to ascertain if decreased insight is, in fact, a universal feature and whether such a questionnaire is useful in South Africa.

Areas where discordance exists between the participant and his/ her significant other in the control group may either highlight confusion regarding the context the question examines or point to broader differences in perception of ability which fall outside the realms of head injury.

There has also been a call for more qualitative research on the subject of self awareness - it is after all "the subjective impairment which represents a distressing reality for these patients" (Fleming et al, 1996, p.10). South Africa's culturally and linguistically diverse brain injured population raises the need to explore a variety of modes in which these persons feel able and comfortable to express themselves. Agreement exists that through drawings persons are able to express themselves: "his picture of a person becomes therefore a portrait of his inner self, of his attitude" (Koppitz, 1968, p.5). Hence this medium enables them to "admit to some change in themselves which they cannot easily identify" (Prigatano and Altman, 1990, p.1058).

This study explores the use of the Draw-A-Person Test as a potential visual means of reflecting self-awareness. Previous studies have traditionally utilised this instrument as a projective technique. While the validity of using a nominated significant other to corroborate information using this medium has not been established, it was utilised in this study to augment information gained on the participant through the visual mode. Following analysis, incongruities in the way the participant and their significant other visually represented the participant were noted. Whether self-drawings reflect self-awareness of persons with TBI is examined and the validity and the usefulness of this instrument for assessing degree of insight explored.

2.2. Aims of the Study

This research aims to evaluate the extent to which TBI is followed by a decrease in self-awareness, and the extent to which a traumatically brain injured person's insight into his/ her post-injury capabilities differs from that of his / her significant other both in the written and visual mode. The usefulness of the Patient Competency Rating Scale (PCRS) and self-drawing for assessing self-awareness in the South African context are examined and typical features/ responses in both of these measures explored.

2.3. Hypotheses

The following hypotheses were tested:

1) The self-report of behavioural limitations by persons with traumatic brain injury will differ significantly from the report of these persons by their significant others.
2) The concordance between self-report and the report of these persons by their significant other will be considerably less in the experimental group than in the control group.
3) The degree of concordance between self-drawing and the drawing of these persons by their significant others will be significantly less for the experimental group than for their control counterparts.
4) The drawings of themselves by traumatically brain injured persons will differ significantly and in meaningful ways from drawings of them by their significant others.

2.4. Method

2.4.1. Sample

The sample used consisted of an experimental group consisting of 21 participants and a control group consisting of 28 participants (Biographical questionnaires for each sample are in Appendix B). Sample characteristics and biographical information are listed in Table 1 (Page 18). Drawing a control group from the same heterogenous population as the group under study occurred to ascertain an expected premorbid level of self-awareness in the general population. No significant differences were found to exist at the 0.05 level of significance (See Appendix C) regarding Gender, chi-square (1) = 0,007; Education, chi-square (2) = 1,05; Handedness: chi-square (2) = 2,844; Religion, chi-square (1) = 2,069; and Language, chi-square (2) = 0,844. While the groups are matched on household income, chi-square (2) = 3,787, this matching is almost not significant.

While the groups did not differ at the 0.05 level of significance in terms of age, t=0,735 and their means (The Wilcoxin Matched Pairs test) were found to be comparable, a difference in variance (Experimental group S.D. = 95,11 months; Control group S.D. = 64.77 months) was found to exist and is expected to impact on education level and household income.

Table 1:
Sample Characteristics:

	Experimental Group (n = 21)		Control Group (n = 28)	
Gender:	Male Female	61.9% 38.1%	Male Female	60.7% 39.3%
Age:	Mean	30.6 years	Mean	29.4 years
Education Level:	Std 8 - 10: Undergraduate/ or diploma: Post-Graduate:	33.3% 47.6% 19.0%	Std 8 - 10: Undergraduate/ or diploma: Post-Graduate:	28.6% 39.3% 32.1%
Handedness:	Right: Left: Ambidextrous:	71.4% 23.8% 4.8%	Right: Left: Ambidextrous:	89.3% 7.1% 3.6%
Income:	R0 - R1 400: R1 400 - R9 000: R9 000+:	9.5% 52.4% 38.1%	R0 - R1 400: R1 400 - R9 000: R9 000+:	0.0% 42.9% 57.1%
Employment Status:	Employed: Unemployed:	28.6% 71.4%	Employed: Unemployed:	92.9% 7.1%
Language:	English: Afrikaans: Other:	66.6% 28.6% 4.8%	English: Afrikaans: Other:	75.0% 17.9% 7.1%
Religious:	Yes: No:	85.7% 14.3%	Yes: No:	67.9% 32.1%
Significant Other:	Mother: Father: Sibling: Son/ Daughter: Therapist: Friend: Spouse: Boy/ Girlfriend:	61.9% 9.5% 0.0% 9.5% 9.5% 0.0% 9.5% 0.0%	Mother: Father: Sibling: Son/ Daughter: Therapist: Friend: Spouse: Boy/ Girlfriend:	7.1% 0.0% 10.7% 0.0% 0.0% 32.1% 46.4% 3.6%
Knowledge of Participant:	Very Well: Pretty Well: Fairly Well:	85.7% 4.8% 9.5%	Very Well: Pretty Well: Fairly Well:	82.1% 17.9% 0.0%
Chronicity:	Mean:	4.5 years	Not applicable	
Treatment Received:	Physiotherapy: Occupational Therapy: Speech Therapy: Psychotherapy:	100.0% 90.5% 85.7% 71.4%	Not ascertained	

Significant differences were found between the groups at the 0.05 level of significance on Employment status, chi-square (1) = 21,88 and nominated significant other, chi-square (7) = 34,8.

Following Hillier and Metzer, all participants were asked to nominate an informed significant other (SO), "perhaps a family member or friend who they considered knew them well" (1997, p.528), to complete a questionnaire and drawing. Participants unwilling or unable to nominate a significant other at this stage were eliminated. A total of 49 participants and their 49 significant others completed the questionnaire. All participants had a proficient understanding of English and had completed at least ten years of formal schooling.

2.4.1.1. Constituting the Experimental Group

Subjects for the experimental group were obtained by three means.

1. The research topic was broadly outlined at a Headway Gauteng meeting on the 09/05/98. Headway is a support group dedicated to assisting victims of brain injury and their families. It was explained that persons willing to participate in the study and a relative would be required to separately complete a questionnaire concerning post-accident functioning, and that the brain injured person and their nominated significant other would be required to draw a picture of the survivor for the researcher. Informed consent was gained from those persons willing to take part in the research.
2) The research topic was broadly outlined at a speech therapy group meeting, which caters for post-injury language-impaired persons, at the University of Pretoria on the 17/08/98. Permission to approach this group was obtained from Speech Therapist Glen Goldblum and after the study had been outlined her permission was granted to approach the two therapists running the group. It was explained that persons willing to participate in the study and a relative would be required to separately complete a questionnaire concerning post-accident functioning, and that the brain injured person and his/ her significant other would also be required to draw a picture for the researcher. Informed consent was gained from those persons willing to take part in the research. Persons in the group who had experienced a stroke were not excluded from the study.

3. After a research proposal had been presented, permission was obtained from Nell, Sugarman & Associates to view their client files. From this, a group of young adults, diagnosed as traumatically brain injured, who fitted the subject group parameters was constituted. The clients' respective lawyers were contacted and permission obtained from them to contact their clients.

   Once permission had been granted by the respective lawyers, the clients were telephonically contacted and the study outlined for them. Informed consent for participation was obtained.

Participants in the experimental group were a heterogeneous group of traumatically brain injured young adults, currently aged 19,5 - 43,3 who had sustained a closed head injury. The mean age of the group was 30,6 years. 48% of participants sustained the injury before age 23. Participants were all at least 10 months post-injury, with time since injury ranging from 10 months to 142 months. Mean chronicity for the group was 4,5 years. All participants had suffered a severe injury and had been unconscious for a minimum of 24 hours. While some of these persons have residual physical difficulties as a result of the accident and all had received physiotherapy treatment subsequent to their head injury, none had had limbs amputated.

All the participants understood and were able to speak English. Six of the participants mother tongue was Afrikaans and one participant's mother tongue was Zulu. Prior to injury almost 20% had achieved some post-graduate qualification and 48% had achieved some undergraduate or equivalent academic qualification. Post-injury 33% of participants resumed their studies, undertaking a variety of diplomas or courses in Travel, Education, Computers or Management. Six participants were employed, in that they earned and contributed to a household income. 52.4% of participants resided in households earning between R1 400 - R9 000 monthly. Two participants resided in households whose monthly income was below this figure, and six participants in households whose monthly income was above it.

2.4.1.2. Acknowledging the Potential of the Measures to raise concerns in the Experimental Group

Given the nature of head injury, the dictum of "do no harm" and the fact that the questionnaire is an intervention and may conceivably raise concerns regarding the injury in either the subject or their significant other, all participants had access to telephonic counselling.

Mrs Grace Mathlape at WITS Mental Health offered the services of her organisation in this regard and gave the researcher details regarding its branch offices closest to the suburbs where individual participants resided.

2.4.1.3. Constituting the Control Group

The control group consisted of young adults in a music/ religious group to which the researcher had access via a medical doctor. The researcher did not formally meet these participants. They were requested to participate in the study and informed that their function would be to form a control group and that their responses were totally confidential. The following pre-requisites for participation in the control group were outlined to control matching on age and internal validity: "Please decide on who will be the participant, and who will be the 'significant other', with the participant fulfilling the following criteria:

1. That the participant has at no time sustained a traumatic head injury.
2. That the participant had never been comatose.
3. That the participant has not been diagnosed as being epileptic or having a psychiatric condition.
4. That the participant is 18 - 45 in age, and has fulfilled this age requirement for the past 5 years, that is to be at least 23 years old at present.
5. That the participant fill in the biographical questionnaire".

Participants in the control group ranged in age from 19,3 - 41 years with a mean age of 29,4 years. 60% of participants were male. 89% were right handed and 7,1% left handed. One participant was ambidextrous.

All the participants understood and were able to speak English. Five of the participants' mother tongue was Afrikaans. 75% spoke English as their mother tongue and two participants' mother tongue was Zulu and Greek respectively. All participants had at least 10 years of formal schooling. 32,1% had achieved some post-graduate academic qualification and 39,38% had achieved some undergraduate or equivalent academic qualification. Two participants were unemployed and did not earn a salary or contribute to their household income. 42,9% of participants resided in households earning between R1 400 - R9 000 monthly. No participant's household income fell below this figure and the monthly household income of 16 participants was above R9 000.

2.4.2. Measures

Instruments used for the study included a Patient Competency Rating Scale (Patient and Relative versions) and a self-drawing (modified Draw-A-Person Test). In addition to this, some demographic information regarding age, sex, education and household income was also requested on different experimental and control group biographical information questionnaires (See Appendix D). All participants were assured of anonymity and confidentiality.

2.4.2.1. The Patient Competency Rating Scale (PCRS)

The most widely documented means of evaluating self-awareness in research on traumatic brain injury appears to be the Patient Competency Rating Scale (PCRS) questionnaire. The PCRS was developed at the Presbyterian Hospital's Neuropsychological Rehabilitation programme (Prigatano, in Prigatano and Schacter, 1991, p.114). Pilot data for the PCRS "suggest good overall test and retest reliability for patients (r= .97) and relatives (r=.92) (Prigatano and Altman, 1990 p.1060). No validity data appear to be available.

The questionnaire uses a five point Likert scale to rate the ease with which the TBI person is able to perform a variety of functional activities, from 1 = can't do, to 5 = can do with ease. The ratings correspond to perceived competence, not necessarily actual competence.

10 items on the PCRS questionnaire, (questions 6; 9; 16; 17; 20; 23; 24; 27; 28 and 29) reflect social and emotional abilities, whilst 8 items (numbers 1 - 5; 11; 19; and 30) reflect self-care activities (Prigatano, 1996).

In discerning the patient's insight into and ability to rate their limitations, the literature suggests obtaining an alternative view of their abilities. In this regard, separate patient and relative versions of the PCRS exist. "This practice allows some comparison of the patient's perception of his or her abilities versus an informed other's perception of the patient's abilities" (Prigatano in Prigatano and Schacter, 1991, p.117)

For the purpose of the study, each participant in both the experimental and control groups, along with his/her nominated significant other, completed a PCRS (patient or relative form respectively).

2.4.2.2. Self-Drawings, (Scored using the Goodenough-Harris Scoring System)

The Draw-A-Person Test was designed by Florence Goodenough in 1926, and revised in 1963. "When a person responds to the request to draw a person, he draws a picture of himself" (Kamano, 1960 p.429). The original Goodenough instructions requested the subject "to make three drawings: one of a man, one of a woman and one of yourself" (1984, p.116). Both in order to lessen ambiguity and decrease the time taken in participating and because gender identification was not regarded as pertinent to this study, participants in both the experimental and control groups were only requested to draw themselves.

All participants received an A4 sheet of paper - vertical format, with the header "Drawing of Self by Participant", a pencil and rubber. The same nominated significant other who rated the participant's ability to undertake the tasks examined in the questionnaire was similarly instructed to draw a picture of the participant, on an A4 sheet headed "Drawing of Participant by Significant Other". While the validity and reliability of significant other drawings has not been established, they were seen to be an important source of collateral information in this study. Following Semeonoff's criterion, drawings by significant others may be regarded as projective responses in that they "can be subsumed under the term 'apperception', i.e. the perception of qualities of an object and relating these to one's previous experience" (In Kline, 1973, p.92).

Drawings from all subjects in both the experimental and control groups were independently rated by two separate raters. In this regard, all the headers indicating who the drawing was by were removed and the drawings coded. The Raters received copies of the "Requirements for Scoring the Draw-a-Woman Scale" and "Requirements for Scoring the Draw-a-Man Scale". In addition, respective short scoring guides were stapled to each individual drawing, and then handed to the rater for assessment.

Raters were required to mark each point obtained on the short scoring guide, with a highest possible score of 73 for male participants (man scale) or 71 for female participants (woman scale). This study was not concerned with intellectual maturity and these raw scores were not converted into standard scores. Instead, they were converted into percentages for comparability between the raters. Inter-rater reliability was established before features noted in the projective analysis of the drawings were explored.

While research exists regarding 'normal' characteristics in adult drawings (Urban 1963), a control group was utilised to ascertain if significant others were helpful in providing additional information on participants and whether any distinct differences between the groups existed.

Drawings by the different samples underwent projective analysis and the frequency of atypical features/ traits was noted. Differences between the participant and their significant other's perception of these features were recorded. Furthermore the experimental group was compared to the control group and possible reasons for the occurrence of different traits were raised.

2.4.3. Procedures

2.4.3.1. Administering the Measures with Subjects in the Experimental Group

A time suitable to the participant and his/ her significant other to partake in the research was telephonically arranged.

The questionnaire and items to complete the drawings were hand- delivered in an envelope, to the participants in the experimental group, either at their homes or, in the case of those participants who were members of the speech group, at the University of Pretoria. The package contain a biographical questionnaire which was filled in by the significant other and a letter from the Division of Specialised Education outlining the study. In the case of geographical distance, the package was sent by registered post and a return registered envelope was enclosed.

2.4.3.3. Administering the Measures with Subjects in the Control Group

The researcher did not formally meet these subjects. The medical doctor who had contact with these persons was a co-member of the music/ religious group and liaised with the group on the researcher's behalf. All subjects were thanked in advance for their participation via a letter outlining the study. They were given an envelope containing a biographical questionnaire, the participant and significant other version of the Patient Competency Rating Scale questionnaire and two sheets of paper - one for "participant's drawing of self" and one for "significant other's drawing of participant" - with the relevant instructions for completion and a letter from the Division of Specialised Education outlining the study.

Group members took the envelopes home and had their significant other complete the questionnaire and drawing. Their responses were returned in sealed envelopes to the doctor at the following week's meeting. The doctor in turn returned the envelopes to the researcher. Those responses found to be incomplete when the envelopes were opened were discarded.

2.4.3.4. The Process of PCRS Administration

The PCRS participant form carried the following instruction: "The following is a questionnaire that asks you to judge your ability to do a variety of very practical skills. Some of the questions may not apply directly to things you often do, but you are asked to complete each question as if it were something you 'had to do'. On each question, you should judge how easy or difficult a particular activity is for you and mark the appropriate box". The PCRS significant other form qualified the nature of the relationship between the participant and significant other and their degree of acquaintance.

This questionnaire carried the following instruction: "The following is a questionnaire that asks you to judge this person's ability to do a variety of very practical skills. Some of the questions may not apply directly to things they often do, but you are asked to complete each question as if it were something they 'had to do'. On each question, you should judge how easy or difficult a particular activity is for them and mark the appropriate box".

2.4.3.5. The Process of Self-Drawing Administration

The standard Draw-A-Person instruction - "I want you to make a picture of yourself. You can draw yourself however you choose, except that your drawing cannot be a stick figure. Be sure to draw the whole person from top to toe. Make the very best picture you can" - was either given or written (in the cases where TBI participants lived outside Johannesburg) to all control participants. Significant others were given the same instruction, except that they were told to draw the participant.

2.4.3.6. Post-Measure Debriefing

Following the completion of the questionnaire, all TBI participants were given a standard debriefing and informed that their questionnaire responses and drawings were to be utilised to gauge if their perceptions of post-injury competency were congruent. It was explained that potential discordance may be the result of their holding different views regarding the abilities questioned, or being aware of them to a different extent.

The TBI participant and their significant other were thanked for their valuable participation. They were questioned as to whether the measures generally had raised any distress for them and whether they had struggled emotionally to complete the questionnaire and / or drawing. The availability of supportive counselling was made known in this regard, should they wish to make use of this.

TBI Participants were re-contacted telephonically approximately 10 days post-study. Again they were thanked and any need for counselling was explored.

2.5. Experimental Design

To undertake a correlational study between TBI and impaired self-awareness does not assume causality. Demonstrating a statistically positive correlation between these variables would still not establish a cause-effect relationship. According to Mouly (1970) "The obvious weakness of such an 'experiment' is that we have no control over situations that have already occurred and we can never be sure of how many other circumstances might have been involved" (In Leedy, 1980, p.175).

"Some life situations defy pretesting" (Leedy, 1980, p.179). Because pre-morbid self-awareness prior to injury cannot be ascertained, this study utilised a post-test only, control group design. Only through eliminating the existence of impaired self-awareness in a control group could an ex post facto study be avoided and the possibility of decreased insight being a sequelae of TBI be considered. Because the experimental group was derived from a predominantly white, middle-class population who sought support for linguistic or psychological difficulties, racial, cultural and socio-economic variables which may bias the randomness of the group were introduced.

According to Leedy (1980): "to minimise the differences that might exist between the experimental and control groups, the researcher might attempt to match as closely as possible and on as many variables as possible the two groups in a kind of quasi-randomization before beginning the experiment" (p.172). For this reason, parameters regarding control group characteristics were explicitly outlined for participation.

2.5.1. Data Analysis

The following initial procedures were employed to examine the data prior to qualitative and quantitative analysis:

2.5.1.1. Descriptive Statistics

The descriptive statistics obtained included the means, standard deviations and frequencies of each of the variables in the study. These were conducted in order to describe various aspects and characteristics of the demographic data obtained for the experimental and control groups.

2.5.1.2. Group Matching

Statistical analysis to establish if the control and experimental group samples were matched on bio-demographical features occurred using 't' tests and chi-squared statistical analysis.

2.5.1.3 Assumptions

It is assumed that:

1. All biographical details for both experimental and control groups are valid.
2. The control group population is normally distributed and random within the parameters outlined.
3. That the nominated significant others have a sufficient depth of knowledge of the participants in both groups to consider themselves noteworthy.
4. All participants completed the questionnaire independently as instructed and were honest in rating their perceived level of competency regarding the tasks queried.
5. There is external validity in that both the groups are representative within the parameters outlined.
6. That the quantitative parameters which provide the basis for matching the groups are sufficient and that the differences in other variables are a direct result of the TBI sustained by the experimental group.

2.5.2. Methods used to Analyse the PCRS Results

In the original research it was stated that "given the fact that patients and relatives may vary greatly in their perception on some items and not on others, the decision was made to restrict group classification on the basis of the number of items in which there was a difference in opinion" (Prigatano and Altman 1990, p.1060).

While this method was employed in this study, it was felt to be somewhat imprecise and analyses were not restricted to this approach. In conjunction with establishing an overall "group membership", the frequency results for the groups were analysed and item responses per question noted, with "group membership" also based on deducting the significant other's response from the participant's response. For both methods, the Likert scale was collapsed and three groups established.

To be classified in Group I, a participant's S > R score had to be higher than their S = R and S < R scores. To be in Group II, a participant's S = R score had to be the highest of the three possible category scores. To be in Group III, a participant's S < R had to be the highest score. Perception of competency therefore varied between groups, whereby "Group 1 overestimated their behavioural competency. Group 2 showed behaviour ratings similar to those made by relatives. Group 3 underestimated their behavioural competency" (Prigatano and Altman, 1990 p.1062). Differences in group membership numbers was discussed. Mean scores for each group were established and these analysed to ascertain if overall reported competency varied within and between experimental and control groups.

The Kolmogorov-Smirnov Test is a non-parametric method used "for testing whether there is a significant difference between an observed frequency distribution and a theoretical frequency distribution" (Levin and Rubin, 1991, p.628). The test is a measure of the goodness of fit of a theoretical frequency distribution. It was used in the study to test hypothesis one, that is to test if there was a significant difference between experimental and control group self-significant other concordance ratings and thus establish if participants rated themselves significantly differently to their significant others.

Hypothesis two was tested statistically and qualitatively. Discordance between participants' perceptions of their abilities and their significant others' perceptions of their ability per question on the PCRS was calculated. Spearman's Correlation Coefficient for Ranked Data (Spearman's rho) was ascertained for each groups and the significance of this difference established. There followed further discussion of which questions elicited an association in both the experimental and control groups, of which questions elicited no association in both the groups and which questions elicited differences in responses between the experimental and control group.

2.5.3. Methods used to Analyse the Self-Drawings

Hypothesis three was tested quantitatively. All drawings in both the experimental and control group were scored twice by independent senior psychology students, using either the Good-Enough Harris Man or Good-Enough Harris Woman score sheet.

Inter-rater reliability was established between raters using Spearman's correlation coefficient for the four sets of drawings. According to Howell, (1997) because there is no generally accepted method for calculating the standard error of Spearman's correlation coefficient for small samples, "computing confidence levels on rs is not practical. Numerous textbooks contain tables of critical values of rs, but for N >/= 28 these tables are themselves based on approximations. For N > 10, rs can be tested in the same manner as τ" (Kendall's Tau) (p.290). The standard error of Tau was obtained and the significance of the calculated z score established at either the 0.01 level of significance.

To test the difference between the means of the control and experimental group, the raw scores for all drawings were converted to percentages and a matched pairs 't'-test utilised to establish if participant perception and significant other perception differed significantly in the visual mode.

Hypothesis four was tested statistically using chi-squared tests and these results were qualitatively interpreted. Having established inter-rater reliability, the drawings underwent projective analysis. The frequency of conventional and atypical features chronicled by the raters was recorded and intra-group and inter-group differences were noted.

Using chi-square analysis, the experimental group was compared to the control group and the statistical significance of the presence of certain features established: "Chi-square tests also enable us to determine whether a group of data that we think could be described by the normal distribution actually does conform to that pattern" (Levin and Rubin, 1991, p.415). Likely reasons for the occurrence of different traits and their possible meaning as projective features were qualitatively discussed.

In summary, the hypotheses were tested as follows. After it was established that the groups had been matched, Hypothesis 1 was tested by classifying experimental and control participants according to whether they predominantly rated themselves more able, as able or less able than their significant other rated them. Inter-group differences were noted. Mean scores for the groups were verified. The Kolmogorov-Smirnov test was used to establish significant differences between how the groups responded on a per item basis.

Hypothesis 2 was tested by establishing the correlation between participant and significant other on the PCRS per item for both groups using Spearman's rho and then comparing and contrasting these relationships.

Inter-rater reliability having been established, Hypothesis 3 was tested by utilising a t-test to establish if participant perception and significant other perception of the participant differed significantly in the visual mode. Hypothesis 4 was tested by noting the frequency with which features arose in the drawings of one group and statistically comparing them, using a chi-square test to the frequency with which they arose in the other group. Qualitative analysis of the projective significance of these features was then discussed.

CHAPTER 3 RESULTS

The results are presented within the framework of the hypotheses outlined.

3.1. Hypothesis 1

The self-report of behavioural limitations by persons with traumatic brain injury will differ significantly from the report of these persons by their significant others.

The Kolmogorov-Smirnov Two-Sample Test was conducted to establish if any concordance ratings per item on the PCRS were statistically significant. It received some support at the 0.05 level of significance with 2 degrees of freedom, for questions 5 (value 8.06) and 6 (value 7.30), indicating significant discrepancies regarding adeptness in doing the laundry and controlling finances. The self-report of behavioural limitations by persons with traumatic brain injury was found to differ significantly from the report of these persons by their significant other in these domains (Table 9, Appendix A).

In general, however, the hypothesis was not confirmed. Using the classification outlined in the original study, three groups were established in which participants either overestimated, underestimated or equally estimated their behavioural abilities compared to their significant other.

This method demonstrated that while no control (C) participants overestimated their competency, 38.1% of participants in the experimental (E) group did and that while 85,7% of control participants rated their competency equal to their significant- others, only 47,6% of TBI participants did. An equal number of participants in the control and experimental groups underestimated their competency.

However, an examination of frequency results for the experimental and control group per question reflected the existence of a number of participants in the control group who did, in fact rate themselves more competently than their significant other (S > R). This category was not explored in the original study. To this effect, the original method was seen as imprecise. The Likert scale was again collapsed (S > R; S = R; S < R) using the frequency results. These results are documented in Table 2, page 33.

Table 2: Estimation of Competency by Participants in the Experimental and Control Groups.

	E.	C.
S > R	33,8% responses	16,4% responses
S = R	44,3% responses	56,3% responses
S < R	21,8% responses	27,1% responses

While this method certainly demonstrated the existence of a control group who over-estimated their competency, degree of over-estimation of ability remained almost double in the experimental group. Overall awareness of whether a task was perceived as either easy or difficult to do was established per question on the Likert scale. Marked differences in perception of participant competency between the experimental and control groups were apparent, with the significant others of TBI persons being three times more likely (34,76%) than the significant others of the control group (11,19%) to perceive the participant as experiencing some degree of difficulty with tasks. This is not unexpected in the light of the injuries sustained by the experimental group.

Mean scores analysis indicated a tendency for participants in the experimental group to over-estimate their ability compared to a tendency of control group participants to under-estimate their competency. Mean scores refuted Hypothesis 1, indicating that participant and significant other overall ratings fall within the same category for both groups, namely "can do with some difficulty" for the experimental group (participant's mean score = 118; significant others mean score = 113.5) and "fairly easy to do" for the control group (participant's mean score = 126; significant others mean score = 133.4).

3.2. Hypothesis 2

The concordance between self-report and report of the person by significant other will be considerably less in the experimental group than in the control group

The relationship between the participant and their significant other's perception of their ability per question on the PCRS was calculated. Spearman's Correlation Coefficient for Ranked Data (Spearman's rho) was ascertained for each of the groups and the significance of this relationship established. These results are presented in Table 3, page 34.

Table 3:
PCRS Questionnaire Inter-Group Correlation.

	Experimental Group n = 21	Control Group n = 28
Q. 1	0.692799 associated	0.531240 associated
Q. 2	0.274077 not associated	0.249101 not associated
Q. 3	0.543333 associated	0.145401 not associated
Q. 4	0.667237 associated	0.213337 not associated
Q. 5	0.303721 not associated	0.641444 associated
Q. 6	0.608065 associated	0.585321 associated
Q. 7	0.560099 associated	0.614488 associated
Q. 8	0.316635 not associated	0.417969 associated
Q. 9	0.364819 not associated	-0.067568 not associated
Q. 10	0.770296 associated	-0.062228 not associated
Q. 11	0.355847 not associated	0.550052 associated
Q. 12	0.398950 not associated	0.127778 not associated
Q. 13	0.309977 not associated	0.073296 not associated
Q. 14	0.879283 associated	0.265781 not associated
Q. 15	0.285977 not associated	0.390827 associated
Q. 16	-0.039833 not associated	0.253609 not associated
Q. 17	0.626639 associated	0.428525 associated
Q. 18	0.156322 not associated	0.556907 associated
Q. 19	0.309228 not associated	0.519234 associated
Q. 20	0.452890 associated	-.025807 not associated
Q. 21	0.376636 not associated	0.152101 not associated
Q. 22	0.053337 not associated	0.037398 not associated
Q. 23	-0.054618 not associated	0.200272 not associated
Q. 24	0.340854 not associated	0.269411 not associated
Q. 25	0.313385 not associated	0.538932 associated
Q. 26	0.531394 associated	0.110096 not associated
Q. 27	0.556510 associated	0.515529 associated
Q. 28	0.451823 associated	0.516642 associated
Q. 29	0.125407 not associated	0.252111 not associated
Q. 30	0.334159 not associated	0.387365 associated

As Table 3 shows, on six questions, that is 20% of the time, an intergroup association occurred. A discrepancy between self and significant other's perception of ability was therefore found to exist in both groups, apparently irrespective of the TBI. The specific domains these questions examine are discussed in Chapter 4.

The overall concordance between TBI self-report and report of the TBI participant by their significant other was established on 16 out of 30 items compared to 18 out of 30 items for the control group. Overall intergroup concordance was established for only ten items on the PCRS. That is to say that on 33,3% of the questions a correlation between participant and significant other was found to exist irrespective, of injury. However, as Leedy (1980) warns "correlations are merely statistical descriptions. They describe the strength of the bond of the relationship between one variable and the other" (p.22). The nature of these relationships will be explored in Chapter 4.

On 14 questions, that is 46,7% of the time, however, differences in responses between the experimental and control groups were found to exist. The existence of a correlation between participant and their significant other in the experimental group for six of these questions coexisted with a parallel, but converse, relationship in the control group on these same items. This was transposed in the remaining eight items, whereby the lack of relationship found to exist between participants and their significant others for these questions in the TBI group, was contrasted by marked a association for the same items in the control group.

The experimental group was not found to differ considerably from the control group, thus providing no support for Hypothesis 2. The similar association found between groups indicates the need to examine and discuss whether the preponderance of correlations was either over-estimation, similar estimation or underestimation of competence per item. (These correlations are reported in Table 7 and 8 in Appendix A.) Furthermore, the evidence of poor correlation within the control group raises the need to examine both the validity of the instrument and the value of using a non-injured control group. This is addressed in Chapter 4.

3.3. Hypothesis 3

The degree of concordance between self-drawing and the drawing of the participant by their significant other will be significantly less in the experimental group than in the control group.

Inter-rater reliability between the two independent raters was established per category (Table 10, Appendix B, yields individual ratings), that is for participants and significant others in both groups, for all the drawings. Inter-rater reliability was established to be 0,887 between raters regarding significant other's drawing of the participant in the experimental group (z value = 5,51); to be 0,884 between raters regarding the participant in the experimental group's drawing of him/ her self (z value = 5,59); to be 0,831 between raters regarding the participant in the control group's drawing of him/ her self (z value = 5,94) and 0,837 between raters regarding significant other's drawing of the participant in the control group (z value = 6,09). These correlations are not unexpected as "interscorer reliability has been shown to be quite high when scorers or judges are trained to use a specific scoring system" (Maloney and Ward, 1976, p.365).

Each drawing obtained the average of the raters scores. Mean scores for drawings in each category were established and are indicated below in Table 4.

Table 4: Average Goodenough-Harris raw scores obtained for Participants and their Significant others in TBI and Control Groups

	Experimental Group	Control Group
Participant Mean Score	34 out of 73	46 out of 73
Significant Other Mean Score	39 out of 73	46 out of 73

A Two Sample T-Test (t39), utilised to establish if self perception differed significantly between participant and their significant other in the experimental group at the 0.05 level of significance, yielded p = 0,5743 thus indicating no significant difference in their awareness.

A Two Sample T-Test (t52), utilised to establish if self perception differed significantly between participant and their significant other in the control group at the 0.05 level of significance, yielded p = 0,749, thus indicating no significant difference in their awareness. Statistically then, self-perception as visually noted by self and significant other was not found to differ between groups.

Scores for significant other drawings of participants in the control group tended to be higher than for significant other drawings of TBI participants (t45), but this was not significant at the 0.05 level (p=0.07). Similarly, the self-drawings of participants in the control group also tended to score higher than the self-drawings of TBI participants (t46), but this was also not significant at the 0.05 level (p=0.2776).

While control participants appeared to excel on the drawing task when compared to TBI participants, this provides no support for Hypothesis 3 as their inflated scores were viewed in light of the experimental participant's often compromised graphomotor ability, which resulted in a heterogenous range of participant self-drawings and thus a reduced mean score.

Furthermore, in spite of poor fine motor control, discordance between the way participants visually perceived themselves and the way in which their significant others perceived them was not found to be statistically less in the experimental group than it was in the control group. The fact that significant others scored similarly to their respective participants in the experimental group was unanticipated and provides no support for Hypothesis 3, as concordance appears to occur in spite of injury. This finding, however, strengthens the findings of Hypotheses 1 and 2, in that TBI persons appear to have comparably similar levels of insight with those of their significant others regarding their abilities as control participants. In the visual mode, it points to the possible value of analysing common features from a projective viewpoint. This is addressed further in relation to Hypothesis 4 in Chapter 4.

3.4. Hypothesis 4

The drawings of themselves by traumatically brain injured persons will differ significantly and in meaningful ways from the drawings of them by their significant others.

All drawings underwent projective analysis. The frequency of conventional and atypical features chronicled by the raters are presented for participants in both groups in Table 5 (Page 37) and for significant others in both groups in Table 6 (Page 38).

Analysis within the experimental group indicated that, at the 0,05 level of significance, TBI participants' drawings of themselves differed from drawings of them by their significant-others with respect to a greater frequency of significant others drawing figures with leg distortions, chi-square (1) = 8,107 and a greater frequency of participants drawing themselves with asymmetrical features, chi-square (1) = 4,221.

These differences are few and their support for Hypothesis 4 from a statistical viewpoint needs to be treated with caution. The possible significance of these traits with regard to projective analysis is discussed in Chapter 4.

However, the marked deviation between features portrayed by the experimental and control group (Table 5, page 39 and Table 6, page 40) was seen as requiring statistical investigation and attention.

In addition to the intra-group discordance between TBI participants and their significant others on the features noted above, significant differences in the frequency of features noted was found to exist between experimental and control participants. At the 0.05 level of significance, features drawn by the TBI participants in the experimental group were found to differ from those drawn by the control participants in terms of frequency of central placement, chi-square (1) = 13,605; frequency of large figures drawn, chi-square (1) = 11,516; frequency of ears included on the figure, chi-square (1) = 7,704; frequency of figures drawn with leg distortions, chi-square (1) = 12,467; frequency of figures noted with asymmetrical features, chi-square (1) = 5,6104; frequency of number of figures drawn slanted, chi-square (1) = 4,1143 and frequency of number of figures drawn fragmented, chi-square (1) = 4,1143.

Table 5:
Frequency of Features noted by Participants in both the Experimental and Control Groups

Feature noted in Drawing	Exp. Grp: n = 21	Control Grp: n = 27
Central placement Chi-square (1) = 13,605	6	22
Bottom placement Chi-square (1) = 0,1524	4	4
Large figure Chi-square (1) = 11.516	3	17
Small figure Chi-square (1) = 2,086	2	7
Neck distortions (short, thin necks) Chi-square (1) = 0,117	8	9
Neck distortions (short, thick necks) Chi-square (1) = 0,0022	4	5
Ears Chi-square (1) = 7,704	9	22
Hands Omitted Chi-square (1) = 2,3411	9	6
Petal/ Claw/ Scribbled fingers Chi-square (1) = 0,254	6	6
Feet Omitted (Legs present) Chi-square (1) = 3,4145	8	4
Leg Distortions Chi-square (1) = 12,467	2	16
Belts Chi-square (1) = 0,7648	6	11
Buttons Chi-square (1) = 1,5238	5	11
Asymmetry Chi-square (1) = 5,6104	4	0
Drawing Slanted Chi-square (1) = 4,1143	3	0
Fragmentation Chi-square (1) = 4,1143	3	0
Primitive Chi-square (1) = 2,683	2	0
Stick Figure Chi-square (1) = 1,131	1	0

Table 6:
Frequency of Features noted by Significant Others in both the Experimental and Control Groups

Feature noted in Drawing	Exp. Grp: n = 20	Control Grp: n = 27
Central placement Chi-square (1) = 2,2064	9	18
Bottom placement Chi-square (1) = 0,7622	2	1
Large figure Chi-square (1) = 4,995	6	17
Small figure Chi-square (1) = 0,2392	2	4
Neck distortions (short, thin necks) Chi-square (1) = 0,0052	5	7
Neck distortions (short, thick necks) Chi-square (1) = 1,0208	4	9
Ears Chi-square (1) = 2,7059	13	11
Hands Omitted Chi-square (1) = 0,812	7	13
Petal/ claw/ Scribbled fingers Chi-square (1) = 0,0003	3	4
Feet Omitted (legs present) Chi-square (1) = 1,8829	3	1
Leg Distortions Chi-square (1) = 0,7898	10	10
Belts Chi-square (1) = 3,439	5	14
Buttons Chi-square (1) = 2,7885	3	10
Drawing Slanted Chi-square (1) = 0,0149	2	3
Fragmentation Chi-square (1) = 0,7622	2	1
Primitive	0	0
Drawing Incomplete Chi-square (1) = 4,326	3	0
Stick Figure Chi-square (1) = 1,8829	3	1

Similarly, at the 0.05 level of significance, features drawn by the significant others of the TBI participants were found to differ from those drawn by the significant others of the control participants in terms of frequency of large figures drawn, chi-square (1) = 4,995 and those figures drawn incomplete, chi-square (1) = 4,326.

The drawings of themselves by TBI persons were found to be somewhat congruent with the drawings of them by their significant others, indicating poor endorsement of Hypothesis 4.

However, while participant and significant other visual presentations were again not found to differ greatly within the experimental group, they were found to differ both statistically and in meaningful ways from the control group's visual presentations. This points to important intergroup differences which may be TBI-related, and this issue is discussed in Chapter 4.

CHAPTER 4: DISCUSSION

4.1. Introduction

The characteristics which defined the TBI group studied are individually explored to consider the extent to which the sample of this study is representative of the greater TBI population. The findings of the hypotheses are individually discussed and their implications examined.

4.1.1. Issues of Representativeness

The experimental group of 21 TBI persons constitutes a very small sample if one considers that over 60 000 drivers and passengers aged 18 - 39 were injured in motor vehicle accidents in 1994 alone (1994 Annual Traffic Safety Audit). Most of the characteristics which define this experimental group were anticipated. Where they deviated from what was anticipated, this was noted and possible reasons for the difference considered.

The mean age of the experimental group (30.6 years) initially appears somewhat older than the TBI population: "Epidemiological studies reveal a bimodal peak incidence of closed head injuries in individuals aged 15 - 24 years and those > 70 years" (Goldstein, Levin, Presley, Searcy, Colohan, Eisenberg, Jann and Bertolino-Kusnerik, 1994, p.961). However, the mean chronicity prior to participation is 4,5 years, lowering this figure to a more representative age which is only slightly outside the typical mean age. Six participants who sustained head injuries in their 30's are felt to markedly skew the average of the group. With regard to gender, 61,9% of the participants in the experimental group were male. This preponderance of males was broadly consistent with research on the TBI population which indicates "males are two to three times more likely to be injured than females" (Vogenthaler, 1987, p.115). However, in this case it was somewhat less than 2 to 1.

All participants in the experimental group had sustained severe closed head injuries and had been unconscious for a minimum of 24 hours. The severity of injury was not typical as "the vast majority sustain mild injuries" (Vogenthaler, 1987, p.114). Consistent severity in the experimental group was similarly not anticipated and is possibly a result of the sample having been drawn from groups where intervention was (in the case of medico-legal reports) or continues to be sought by the injured person and his/ her family.

From this it may be inferred that the more severe the injury sustained, the greater the ongoing need both by the individual and his/ her family to seek support and assistance.

The experimental and control groups were found to be matched on all variables except employment status and choice of nominated significant other. A difference in these variables was, however, unavoidable. Of the experimental group, 71,4% were unemployed following the injury. Lezak (1986) maintains ".. many of them appear capable of earning a living or at least performing familiar household chores. Yet they are often unable to adapt what they know to everyday circumstances, to develop their own programs of adaptive behavior, or to learn new ones readily. What they can do, they often cannot carry out independently" (p.242). In fact, an almost 30% employment rate is higher than that which is usually reported, although the type and degree of employment were not explored.

Most control group participants (82,1%) nominated either their spouse or close friend as a significant other. In contrast, 71,4% of TBI participants nominated a parent as a significant other. This is indicative both of vastly different living circumstances and the fact that post-injury, many TBI persons become or remain dependent on their parents. Choice of significant other is not unexpected, but it has marked ramifications for the psychosocial development of the person.

Brain injury causes a multitude of impairments. "Patients with brain damage may present with impairments of memory, language, perception, thought, action and other functions. These cognitive deficits can occur both in multiple domains or as highly selective impairments" (Cipolotti and Warrington, 1995, p.655). The effects of specific lesions has been thoroughly documented in the literature and hence "The idea that the human brain is highly differentiated in terms of functional organisation is not new" (Cipolotti and Warrington, 1995, p.655). In terms of site of injury, this study examined a heterogeneous group of brain injured persons and so the significance of results established needs to be seen in terms of traits which affect all head-injured person regardless of site of injury. While neuroradiographic measures such as CT and MRI scans would most certainly have been useful in this study and allowed for finer sample categorization with reference to site, density and effects of lesion, this was outside its scope and expertise.

The questionnaire required participants and their significant others to detail their competency on a range of "had to do" tasks. Following Cipolotti and Warrington (1995), "One of the fundamental principles underlying neuropsychological assessment is to establish whether the subject is still functioning at their premorbid optimal level or whether there has been some deterioration" (p.656). A matched control group was therefore used to establish an understanding of the type of participant-significant other concordance that would possibly have existed prior to TBI.

4.2. Hypothesis 1

Hypothesis 1 was partially supported in that the self-reports of behavioural limitation were found to differ from significant other reports. Using the method outlined in the original research (Prigatano and Altman, 1990), over-estimation of competency was found to occur exclusively in the TBI group and to occur more than one third of the time. Moreover, concordant levels of estimation of competence occurred only 47% of the time in the experimental group compared to over 85% of the time in the control group, emphasising seemingly marked participant-significant other disagreement regarding behavioural limitations in the TBI group.

However, subsequent analysis of the frequency results per question (not undertaken in the original study) for both groups highlighted a subgroup of the control (16%) who similarly over-estimated their competency. Discordance was therefore more rigorously measured using a frequency-based collapsed Likert scale. This demonstrated that TBI participants were twice as likely to over-estimate their ability as control counterparts.

In the original study (Prigatano and Altman, 1990) overall concordance was found to exist 53% of the time. A lower than anticipated concordance level was found to exist both in the experimental group (44% of the time) and in the control group (56% of the time). Contrary to expectation, the control group was not consistently more correlated to their significant other than the TBI sample. The unanticipated control discordance highlights a lack of participant-significant other agreement regarding competency in the 'normal' population.

An analysis of the mean scores for participants and significant others in each group highlighted that overall ratings for both fell within the same category, namely "fairly easy to do" for the control group and "can do with some difficulty" for the experimental group. TBI participants slightly over-estimated their abilities whilst control participants were somewhat less confident regarding their abilities than their significant others.

These TBI scores are somewhat higher than indicated in previous research (Prigatano and Leathem, 1993). This indicates that the TBI persons studied rated themselves and were rated by their significant others (118 and 113,5) more competently than both Maori TBI persons and their significant others (97,5 and 99,1) and Non-Maori persons and their significant others (110,8 and 100,9). They were fractionally higher than Japanese TBI persons and their significant others (116,9 and 108,2) (Prigatano et al., 1997). More importantly, the significant other ratings are similarly elevated, possibly pointing to a more competent experimental group than previously investigated. However, as previously noted by Fleming et al., (1996), "this method is not sensitive to differences in patient and relative ratings on individual items" (p.3).

Significant discordance on specific PCRS items was only found regarding adeptness in doing laundry and controlling finances. Difficulty with these two tasks was supported at the 0.05 level of significance, irrespective of site of lesion in the experimental group. These findings cross-validate previous research in that finance management is an executive skill and discordance was expected here. The capacity "to organize and order one's thoughts and activities spontaneously, to take the abstract attitude and to demonstrate insight and empathy are inherent in the executive functions" (Lezak, 1987, p.64) and are most likely to be compromised following TBI and thus to be lacking in the TBI group.

However, laundry has been regarded as a self-care skill and discordance on this item deviates from previous findings (Prigatano and Leathem, 1993). Researchers elsewhere have consistently found that following TBI, persons are most aware of their abilities in basic, lower order skills. The concordance found on other basic self-care skills in this study supports this, isolating laundry as an item for disagreement.

Because the experimental group all sustained severe injuries and "TBI patients with less severe injuries may be more able to accurately predict their behavioural competencies" (Prigatano 1996, p.198) significant discordance on other PCRS items was anticipated. The lack thereof may be understood from three angles.

Firstly, nominated significant others were most frequently persons with whom the participant resided and thus were acutely aware of participants' actual functional abilities and therefore accurately able to rate their competency on a range of tasks.

Secondly participants had high therapy attendance (100% physiotherapy; 90,5% occupational therapy; 85,7% speech therapy; 71,4% psychotherapy). In such rehabilitative settings participants may gain awareness of their competencies: "It is critical that the patient is given accurate feedback as early on and throughout the recovery process" (Allen and Ruff, 1990, p.16). Furthermore, continued exposure both to support groups and group work may provide forums to discuss difficulties which arise as a result of injury and provide ongoing feedback regarding competency.

Thirdly, the average chronicity for the experimental group was 4,5 years. During this time, it is likely that participants will have had repeated exposure to the items evaluated. As time passes it may become more difficult to deny persistent difficulties. A high correlation between concordance and chronicity may therefore occur. This is in keeping with other studies: "It was assumed that both the MHI (moderately head-injured) and SHI (severely head-injured) would rate their cognitive functions more accurately if evaluated at a later versus earlier period following the accident" (Allen and Ruff, 1990, p.3). The fact that over 52% of participants continued to over-estimate their ability with laundry and finance this long after injury may be a result of lack of practice (for the laundry) and either over-protectiveness or the very real possibility of a caretaker in lieu of the medico-legal settlements. Hypothesis 1 was thus only partially supported. Results instead resembled a 1984 finding that "the severely head-injured frequently demonstrate more insight than has sometimes been recognised. They can provide information and valuable insights into personal change" (Tyerman and Humphrey, p.20).

4.3. Hypothesis 2

Concordance between self-report and significant other report on PCRS items was anticipated to be considerably less in the experimental group than in the control group. This was not wholly supported. Statistical analysis regarding the relationship between participant and significant other perception of ability per PCRS question highlighted an overall TBI group concordance on 16 out of 30 items only. This points to marked difference in perception of competence. However, concordance on only 18 out of 30 items was found in the control group, with similar under-estimation and over-estimation of behavioural limitations.

That relatedness anticipated in the control group did not occur raises two issues. Firstly it points to a weaker participant-significant other concordance than expected in the general population, challenging the usefulness of obtaining collateral for this group. Secondly it evokes the question of whether discordance is, in fact, synonymous with lack of insight.

Prigatano (1996) states that "depressed patients may report fewer behavioural competencies than they demonstrate" (p.192). Here, however, discordance is not synonymous with a lack of insight, but rather a result of insight: "when denial has run its course and the patient's attempts to reduce frustration have proved unsuccessful; realization of the loss and its implications occurs and results in depression" (Tanner and Gerstenberger, 1988, p.83).

Previous studies (Prigatano and Altman, 1990; Prigatano and Leathem, 1993) found underestimation of problems to occur frequently with regard to ten items questioning emotional control and social interaction. This study found that TBI participants under-estimated their ability less than 25% of the time in eight of these items. However, members of the control group were similarly found to underestimate their difficulty with four of these items. Lack of insight with respect to social interaction thus appears to exist for all persons regarding their ability to adjust to unexpected changes; to handle arguments with people they know well; to recognise when something they have said has upset someone else and to control their temper when something upsets them.

Disagreement of perception of emotional control for spontaneous reaction was found to exist in TBI group studied, which may be due to the fact that their ability to control laughter and crying is intimately tied to impulse control and is thus affected by injury. Discordance on emotional items for this group may also be a result of the participant successfully controlling their wish to hide their emotional reactions, something of which their significant other is unaware.

Previous studies consistently found eight that questions which "sample the ability to physically perform various tasks, to remember the names of familiar people, and to control obvious emotional states" (Prigatano and Leathem, 1993, p.124) elicited similar responses from TBI persons and their significant others. This study found over 50% concordance for both groups on the four basic self-care activities of food preparation, personal hygiene, ability to self-dress and ability to wash dishes.

This suggests the usefulness of utilising Maslow's hierarchy to understand the process through which skills require attention. The fact that physiotherapy, followed by occupational therapy, was most attended highlights a shared perception that "only once people have satisfied elemental needs do they strive to meet higher needs" (Papalia and Wendkos-Olds 1989, p.25). This finding is important on three levels. Firstly a shared awareness of competency on lower order self-care skills, which may have been the focus of therapy, is possible. Secondly, the possibility of higher concordance on emotional and social items may occur with increased attendance at individual psychotherapy or group work. Thirdly, insight appears to be a result of - and not necessarily an obligatory pre-requisite for - rehabilitation.

4.4. Hypothesis 3

According to Lezak (1983), "Certain projective techniques have contributed significantly to the evaluation and understanding of brain injury. The effects of brain injury may influence the patient's perceptions of the world. It may compromise the ease and flexibility with which he sorts, selects, organizes, or critically evaluates his own mental contents. Close and extensive observation of the patient as he goes about his daily affairs is the best method of finding out when and how mental impairment affect his behaviour. Short of such exacting procedures, projective testing may be the most effective means of answering these questions"

(p.599).

Concordance of features detailed in self-drawings and drawings of the participant by their significant other was anticipated to be significantly less in the experimental group than in the control group. This was not found to be so and provides no support for hypothesis 3. It was expected that the TBI participants' anticipated compromised awareness would impact on their style of expressing themself in a visual mode. Furthermore it was anticipated that he / she would focus on and symbolically project those areas causing him / her concern. "Since the act of projection is an unconscious mechanism, it is not communicated to others nor is it even recognised as a projection by the person himself" (Anderson and Anderson, 1951, p.3). For this reason, significant others in the experimental group were expected to represent TBI participants in a markedly different ways to the ways in which they represented themselves.

Mean raw scores for participants and their significant others in the control group were identical (46 out of 73). Raw scores attained by TBI participants (34 out of 73) were lower than those attained by the significant others (39 out of 73) and were possibly a result of poor graphomotor control, reduced awareness to detail following TBI or because "sensitivity to their loss has occasioned a highly anxious or depressed mental state that may lower the quality of their drawing or exaggerate the extent of their drawing disability" (Lezak, 1983, p.405). The Goodenough- Harris Scale was found to be useful in quantifying the drawer's perception. It was not, however, seen as sensitive to the TBI or the resultant compromised graphomotor control, despite this being qualitatively apparent: "figure drawings by physically disabled persons could be distinguished by judges from figure drawings by physically normal persons" (Hammer in Rabin, 1981, p.175).

Lack of disparity between drawings at the 0.05 level of significance reflects a correlation between the visual documentation of self-perception and significant other perception of self, in both groups. In this respect, significant others may be seen to provide important collateral with regard to features emphasised. This is reiterated in Hammer's assertion that "the subject's conscious and unconscious perception of himself and significant people in his environment determine the content of his drawing. In such expression, the unconscious levels of the subject tend to utilize symbols" (In Rabin 1981, p.152).

4.5. Hypothesis 4

The drawings of themselves by TBI persons were not found to differ in meaningful ways from the drawings of them by their significant others. Hypothesis 4 was partially supported in that statistically significant differences were found with regard to two features only, namely that TBI participants exclusively drew asymmetrical figures and that their significant others were statistically more likely to draw them with leg distortions.

Analysis indicated that asymmetry was restricted to four TBI participants' drawings, with either asymmetry of limbs (Koppitz, 1968), imbalanced or lopsided arrangement of body parts in respect to size, shape or position (Bodwin and Bruck, 1960) or body awkwardness and a sense of incoordination (Ogdon 1978). "Asymmetry may appear either as a difference in the size of limbs and features of one side of the body relative to those on the other side, or in a tendency of the figure to lean to one side or the other" (Lezak, 1983, p.404).

Projective analyses that asymmetry may reflect poor self concept are not seen as wholly useful regarding the fact that this feature occurred solely in TBI self-drawings. Possible perceptual motor, visual motor or visuographic disturbances may underlie this phenomenon.

Leg distortions were noted significantly more often at the 0.05 level by significant others than by TBI participants. Ostensibly legs are the basic means of locomotion and may reflect feelings regarding mobility. A projective analysis of this feature in the literature suggests "drawings showing unusual treatment of legs or feet typically are related to feelings of security or insecurity" (Ogdon, 1978, p.84). Leg distortions may be symbolic of disrupted independence and may reflect a lack of autonomy. In light of the fact that over 70% of significant others were parents, real awareness of the TBI person's dependence is not surprising. Discordance on this projected lack of autonomy may either be a result of denial or of neurological impaired awareness.

4.6. Implications of the Results

In the discussion of the individual research hypotheses, specific implications of the results were addressed. The general significance of these are discussed below.

4.6.1. General Implications of the Findings

The phenomenon of persons who have sustained closed head injuries continuing to inaccurately appraise their behavioural limitations has been termed "Post-Traumatic Insight Disorder" (Godfrey, Partridge, Knight, and Bishara 1993, p.512)

Previous research highlights the role of insight in rehabilitation and the need to understand the TBI person's appraisal of his/ her competency: "while unrealistic expectations may initially serve to protect the profoundly disabled individual and even motivate him towards recovery, in the long run they are more likely to hamper rehabilitation and adjustment. Effective intervention calls for awareness of the patient's own perspective as well as relatives' reactions to overt difficulties" (Tyerman and Humphrey, 1984, p.11). Furthermore, "TBI patients with impaired self- or social-awareness recognize neither the need for rehabilitation nor their social impact on others" (Prigatano, 1992, p.366) and "patient's awareness of their deficits, and their agreement with therapists about realistic treatment goals, are prerequisites to effective treatment" (Godfrey, et al., 1993, p.513).

This study acknowledges the real difficulties of engaging a TBI person with decreased insight in therapy. It does not agree that awareness of deficits are a prerequisite for therapy, but rather that therapy itself facilitates the development of insight. This is in line with findings by Godfrey et al., (1993): "Another factor that may be an important prerequisite to CHI (Closed Head Injury) patients' accurately appraising the significance of their impairments is the availability of accurate and relevant feedback" (p.513). It is felt that the higher degree of concordance reached on lower-order "self-care" skills on the PCRS and overwhelming therapy attendance for gross and fine motor rehabilitation are not unrelated. In these therapies real deficits would have been made apparent and goals set to ameliorate them. Constant feedback and monitoring of progress would function to reinforce actual level of competency and marked improvements provide the impetus and motivation for further effort.

The semantic usage of the term "recovery" was noted in the literature regarding reacquisition of skills. Lezak's (1983) objection to this term requires attention: "I no longer use the term 'recovery' when discussing brain damage. Brain damage that is severe enough to alter the level of consciousness even momentarily, or to result in even transient impairment of sensory,

motor, or cognitive functions, is likely to leave some residual deficits. In cases where the damage is more than mild, the use of the word 'recover', which implies restoration or return to premorbid status, when discussing the patient's prognosis can give the patient and the family false hopes, delay practical planning and may cause unnecessary anxiety and disappointment" (p.211).

Previous studies suggest that "TBI patients are much more seriously handicapped by emotional and personality disturbance than by their residual cognitive and physical disabilities" (Lezak and O'Brien, 1988, p.456). Psychotherapy may provide the forum to assist the TBI person adapt to his / her post-injury self. It makes explicit his / her actual proficiency in a warm and containing supportive environment and can assist him / her in coming to terms with his / her new self. Recent literature suggests that the process of accepting disability requires "a series of changes in attitudes and values", among them "subordinating physique to other values" (Melamed, Groswasser, and Stern, 1992 p.233).

Psychotherapy, be it individual or group, can be adaptation-focused, providing accurate and relevant feedback and making known the TBI persons reliance on pre-morbid methods of coping, which may perpetuate inaccurate insight. Adjustment to "the best me I can be" (Maslow, 1968 cited in Braun and Linder, 1979 p.434) is a gradual but dynamic process. Although Maslow's "Hierarchy of Needs" was found to be useful in understanding the need to accomplish functionality in lower order skills before self-esteem or self-actualization needs could be attained, this study found insight to be person specific and not "level"-specific, in that awareness appeared to overlap on these levels and occur simultaneously. To this extent, complete rehabilitation needs to be holistic: the "focus on the acquisition of these specific skills has often clouded the bigger picture of life adjustment (e.g., acquisition of strategies to cope with an ever-changing environment and relationships and adaptive self-awareness and social skills to meet these changes appropriately). Such life adjustment skills are requested or demanded by survivors with sufficient awareness to recognise their need and are provided as yet by only a fraction of rehabilitation facilities" (O'Hara and Harrell, 1991, p.5).

Care continuums following onset of injury are not publicly available: "The issue in South Africa is that long after any medical aid expires people are still in need of help and are therefore dependent entirely on their own resources to restore themselves, to finance their own recovery" (Sugarman, 1998). Policy makers need to take cognisance of the ongoing needs of this dynamically adapting population and develop transitional centres for their progression from high care to home re-entry. More specifically community programmes and support services which rehabilitate the TBI person within the context of his/ her family need to be developed.

Previous research found that "while family members may perceive some aspects of dysfunction similarly to their head-injured relative, differences in perceptions may translate to limitations in rehabilitation" (Hendryx, 1989, p.530). This study found the PCRS and self-drawing/ significant other drawing of self to be useful instruments for documenting differences in perception. These differences may provide a focus for therapy. Significant other drawings were found to be useful in gaining collateral information on perception of areas of concern. The mechanism through which significant others perceived areas of difficulty are, however, outside the realm of this study.

The choice of significant other has been an area of contention in past research, with relative and professional input contrasted. This study perceived the choice of significant other as informative in itself and promotes the use of multiple sources to gain the widest understanding of the TBI person in question.

4.7. Limitations of the Study

The results of this study should be viewed in terms of its limitations. In terms of sample size, the degree of self-awareness obtained for the twenty-one severely TBI young adults assessed using the PCRS and self-drawing, should be interpreted cautiously. The representativeness of this sample has already been discussed (4.1.1.). Having been drawn from a predominantly white, upper-middle class group, the results cannot be confidently generalised to a larger South African population. Furthermore, the representativeness of the control group is also questionable with regard to its size and "exclusive" demographics, which may be too specific to guarantee stability and to ensure that infrequent elements in this population are represented.

Secondly, in terms of experimental group characteristics, severity of TBI for the sample was indicated by coma length as Glasgow Coma Scale (GCS) scores were unavailable and period of Post Traumatic Amnesia (PTA) was seen as unreliable in the light of some participants' ongoing memory difficulties. It is possible that participants may have been heavily sedated for the other injuries they sustained and not in a true coma for the period stated. A uniform instrument that measured severity would have been suitable to this study.

Thirdly, the literature agrees that "depression can induce patients to overestimate behavioural problems and feelings of worthlessness" (Prigatano and Altman, 1990, p.1062). In this regard it would have been useful to utilise a depression inventory to establish the exact number of depressed participants in the sample.

Regarding methodology, the following limitations are noted. Firstly, the PCRS is an English questionnaire. Whilst persons not formally schooled in English were not included in this study, many participants spoke English as a second language and may have misinterpreted some items. Secondly, "the PCRS was specifically developed to assess patients with TBI" (Prigatano et al., 1997, p.137) and these items may not be specific enough or relevant to reveal compromised awareness in a non-injured control group. Furthermore, "ability" for this group is certainly a value judgement, as all control participants were physically and mentally competent persons, and therefore needs to be perceived as relative to their whole range of abilities. Lastly, while all drawings were anonymous and coded, poor graphomotor control of some of the TBI participants, may well have alerted the raters to the fact that this group differed considerably from the other three groups in terms of fine motor control.

4.8. Further Research and Applications

This research may be considered an investigative exploration into the domain of impaired awareness following TBI in a South African context. It has identified several possible avenues for future research which can now be pursued.

While the research intended to make the findings representative for the South African population, fewer black South Africans appear to attend support group meetings or speech groups. This may be a result of availability, proximity and language barriers.

Some black persons at the support group appeared reluctant to participate in the research. Moreover, while black participants were made available by the legal channels, on contact these persons did not meet the criterion for English-usage/ competency. In this regard, the possible translation of the PCRS (Prigatano et al., 1993; Prigatano et al., 1997) into other official languages needs to be explored and representative findings for a truly South African TBI population established.

Self-drawings were certainly found to be informative with regard to features noted exclusively by the experimental group. While a projective analysis of these was outside the scope of this research, this would have been interesting in terms of possibly distinguishing this group and may be an area for future research.

The statistically significant difference in choice of significant other between the control and experimental group points to fundamental differences in living circumstances following TBI, in that the TBI sustained may prevent many of these young people from resolving Erikson's sixth crisis of psycho-social development, that of intimacy versus isolation, which their non-injured counterparts do. Research into whether psychosocial development ceases or is delayed may be useful in understanding the choice of significant other in the experimental group.

4.9. Summary and Conclusion

A staggering number of young adults acquire traumatic brain injury in South Africa annually. A higher than anticipated concordance with significant other, both in self-report and artistic expression, was found in the sample studied, suggesting greater insight than usually associated with this group.

The sample's mean chronicity and considerable therapy attendance are seen both as having facilitated awareness and as possible explanations for greater concordance. Acknowledgment that insight appears to be achieved by and through therapy highlights the need to intensify holistic rehabilitation programmes and establish community-based support groups. Recognising that insight is a result of, and not a prerequisite for rehabilitation, could result in earlier intervention and subsequent gains both for the TBI person and his/ her family.

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Appendix A:

Table 9:
Intergroup Differences per PCRS Item using the Kolmogorov-Smirnov Two-Sample Test

	Kolmogorov - Smirnov value		Kolmogorov - Smirnov value
Question 1:	2,76	Question 16:	0,08
Question 2:	0,69	Question 17:	3,57
Question 3:	0,30	Question 18:	1,92
Question 4:	1,92	Question 19:	1,38
Question 5:	8,06	Question 20:	4,61
Question 6:	7,30	Question 21:	0,04
Question 7:	2,54	Question 22:	1,23
Question 8:	3,49	Question 23:	0,17
Question 9:	2,76	Question 24:	3,0
Question 10:	0,17	Question 25:	0,94
Question 11:	0,12	Question 26:	4,92
Question 12:	3,49	Question 27:	0,12
Question 13:	0,58	Question 28:	0,81
Question 14:	1,38	Question 29:	0,81
Question 15:	1,92	Question 30:	1,38

Table 10:
Raters' scores (in percentages) for self-drawings and significant other drawing of self in the Experimental and Control Group

Rater 1 SO, Exp	Rater 2 SO, Exp	Rater 1 Self, Exp	Rater 2 Self, Exp	Rater 1 Self, Control	Rater 2 Self, Control	Rater 1 SO, Control	Rater 2 SO, Control
61.64	61,64	40,09	46,58	30,99	26,76	53,52	40,85
50,68	64,38	31,51	43,84	84,51	77,46	50,70	70,42
68,49	75,34	52,05	63,01	64,79	76,06	74,65	71,83
64,38	69,86	54,79	57,53	70,42	70,42	70,42	70,42
47,88	56,34	77,46	74,65	42,47	58,90	72,60	76,71
76,71	73,97	12,33	21,92	52,11	54,93	57,53	66,20
10,96	12,33	36,98	46,58	47,89	45,07	36,62	35,21
26,03	30,14	36,98	52,05	36,99	57,53	41,10	47,95
16,44	20,55	45,21	42,47	80,82	78,08	82,19	79,45
45,07	49,30	45,07	61,97	56,16	63,01	58,90	65,75
60,27	67,12	65,27	67,12	70,42	77,46	61,97	61,97
63.01	60,27	21,92	27,40	63,01	54,79	63,01	67,12
63,38	76,06	49,29	66,20	-	-	-	-
43,84	39,73	38,36	47,95	69,86	71,23	69,86	69,86
57,75	69,01	8,45	16,90	52,05	56,16	68,49	71,23
35,21	39,44	60,56	64,79	64,38	63,01	60,27	58,90
21,13	23,94	53,52	63,38	58,90	58,90	57,53	64,38
39,73	54,79	43,84	58,9	87,67	83,56	54,79	49,32
42,47	52,05	61,64	56,16	73,24	80,28	83,09	83,10
59,15	70,42	64,79	80,28	76,71	67,12	60,27	60,27
41,09	63,01	-	-	76,05	81,69	71,83	77,46
				72,60	73,97	53,42	58,90
				63,01	68,49	50,68	67,12
				47,89	60,56	77,46	85,92
				46,57	63,01	38,36	36,99
				75,34	73,97	58,90	71,23
				64,79	71,83	63,38	76,06
				46,58	67,12	60,27	67,12

Table 7:

Experimental group correlation of competence with Significant other per PCRS item.

Participant's self (S) response - significant other's (R) response	S < R	S = R	S > R
Q 1: How much problem do they have in preparing their own meals?	9,5%	52,3%	38,1%
Q 2: How much of a problem do they have in dressing themselves?	19,0%	61,9%	19,0%
Q 3: How much of a problem do they have in taking care of their personal hygiene?	9,5%	71,4%	19,0%
Q 4: How much of a problem do they have in washing the dishes?	9,5%	52,3%	38,1%
Q 5: How much of a problem do they have in doing the laundry?	19,0%	28,6%	52,3%
Q 6: How much of a problem do they have in taking care of their finances?	9,5%	38,1%	52,3%
Q 7: How much of a problem do they have in keeping appointments on time?	9,5%	52,3%	38,1%
Q 8: How much of a problem do they have in starting conversations in a group?	19,0%	42,9%	38,1%
Q 9: How much of a problem do they have in staying involved in work activities even when bored or tired?	23,8%	38,1%	38,1%
Q 10: How much of a problem do they have in remembering what they had for dinner last night?	19,0%	57,1%	23,8%
Q 11: How much of a problem do they have in remembering the names of people they see often?	52,3%	28,6%	19,0%
Q 12: How much of a problem do they have in remembering their daily schedule? "	33,3%	28,6%	38,1%
Q 13: How much of a problem do they have in remembering important things they must do?	14,3%	57,1%	28,6%
Q 14: How much of a problem would they have driving a car if they had to?	4,8%	66,6%	28,6%
Q 15: How much of a problem do they have in getting help when they are confused?	33,3%	33,3%	33,3%
Q 16: How much of a problem do they have in adjusting to unexpected changes?	19,0%	52,3%	28,6%

Q 17:	How much of a problem do they have in handling arguments with people they know well?	19,0%	23,8%	57,1%
Q 18:	How much of a problem do they have in accepting criticism from other people?	14,3%	38,1%	47,6%
Q 19:	How much of a problem do they have in controlling their crying?	19,0%	42,9%	38,1%
Q 20:	How much of a problem do they have in acting appropriately when they are around friends?	19,0%	42,9%	38,1%
Q 21:	How much of a problem do they have in showing affection to people?	42,9%	42,9%	14,3%
Q 22:	How much of a problem do they have in participating in group activities?	23,8%	38,1%	38,1%
Q 23:	How much of a problem do they have in recognizing when something they say or do has upset someone else?	23,8%	47,6%	28,6%
Q 24:	How much of a problem do they have in scheduling daily activities?	14,3%	42,9%	42,9%
Q 25:	How much of a problem do they have in understanding new instructions?	28,6%	57,1%	14,3%
Q 26:	How much of a problem do they have in consistently meeting their daily respons'bilities?	19,0%	38,1%	42,9%
Q 27:	How much of a problem do they have in controlling their temper when something upsets them?	23,8%	42,9%	33,3%
Q 28:	How much of a problem do they have in keeping from being depressed?	38,1%	38,1%	23,8%
Q 29:	How much of a problem do they have in keeping their emotions from affecting their ability to go about the day's activities?	33,3%	28,6%	38,1%
Q 30:	How much of a problem do they have in controlling their laughter?	28,6%	42,9%	28,6%

Table 8:
Control group correlation of competence with Significant other per PCRS item.

Participant's self (S) response - significant other's (R) response	S < R	S = R	S > R
Q 1: How much problem do they have in preparing their own meals?	7,14 %	78,57%	14,28%
Q 2: How much of a problem do they have in dressing themselves?	10,71%	82,14%	7,14%
Q 3: How much of a problem do they have in taking care of their personal hygiene?	14,28%	75.00%	10,71%
Q 4: How much of a problem do they have in washing the dishes?	21,43%	60,71%	17,85%
Q 5: How much of a problem do they have in doing the laundry?	21,43%	67,86%	10,71%
Q 6: How much of a problem do they have in taking care of their finances?	35,71%	50.00%	14,28%
Q 7: How much of a problem do they have in keeping appointments on time?	14,28%	71.43%	14,28%
Q 8: How much of a problem do they have in starting conversations in a group?	28,57%	60,71%	10.71%
Q 9: How much of a problem do they have in staying involved in work activities even when bored or tired?	60,71%	25,00%	14,28%
Q 10: How much of a problem do they have in remembering what they had for dinner last night?	21,43%	60,71%	17,86%
Q 11: How much of a problem do they have in remembering the names of people they see often?	28,57%	57,14%	14,28%
Q 12: How much of a problem do they have in remembering their daily schedule?	28,57%	60,71%	10,71%
Q 13: How much of a problem do they have in remembering important things they must do?	32,14%	50,00%	17,86%
Q 14: How much of a problem would they have driving a car if they had to?	7,14%	85,71%	7,14%
Q 15: How much of a problem do they have in getting help when they are confused?	28,57%	57,14%	14,28%
Q 16: How much of a problem do they have in adjusting to unexpected changes?	21,43%	53,57%	25,00%
Q 17: How much of a problem do they have in handling arguments with people they know well?	25,00%	39,29%	35,71%

Q 18:	How much of a problem do they have in accepting criticism from other people?	28,57%	42,86%	28,57%
Q 19:	How much of a problem do they have in controlling their crying?	28,57%	50,00%	21,43%
Q 20:	How much of a problem do they have in acting appropriately when they are around friends?	21,43%	60,71%	17,86%
Q 21:	How much of a problem do they have in showing affection to people?	25,00%	57,14%	17,86%
Q 22:	How much of a problem do they have in participating in group activities?	32,14%	46,43%	21,43%
Q 23:	How much of a problem do they have in recognizing when something they say or do has upset someone else?	28,57%	42,86%	28,57%
Q 24:	How much of a problem do they have in scheduling daily activities?	25,00%	57,14%	17,86%
Q 25:	How much of a problem do they have in understanding new instructions?	28,57%	71,43%	0%
Q 26:	How much of a problem do they have in consistently meeting their daily responsibilities?	39,29%	50,00%	10,71%
Q 27:	How much of a problem do they have in controlling their temper when something upsets them?	21,43%	50,00%	28,57%
Q 28:	How much of a problem do they have in keeping from being depressed?	32,14%	57,14%	10,71%
Q 29:	How much of a problem do they have in keeping their emotions from affecting their ability to go about the day's activities?	42,86%	32,14%	25,00%
Q 30:	How much of a problem do they have in controlling their laughter?	53,57%	35,71%	10,71%

Appendix A:

PCRS
Participant's form

Instructions

The following is a questionnaire that asks you to judge your ability to do a variety of very practical skills. Some of the questions may not apply directly to things you often do, but you are asked to complete each question as if it were something you "had to do". On each question, you should judge how easy or difficult a particular activity is for you and mark the appropriate box.

Competency Rating	Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
1. How much of a problem do I have in preparing my own meals?	☐	☐	☐	☐	☐
2. How much of a problem do I have in dressing myself?	☐	☐	☐	☐	☐
3. How much of a problem do I have in taking care of my personal hygiene?	☐	☐	☐	☐	☐
4. How much of a problem do I have in washing the dishes?	☐	☐	☐	☐	☐
5. How much of a problem do I have in doing the laundry?	☐	☐	☐	☐	☐
6. How much of a problem do I have in taking care of my finances?	☐	☐	☐	☐	☐
7. How much of a problem do I have in keeping appointments on time?	☐	☐	☐	☐	☐
8. How much of a problem do I have in starting conversations in a group?	☐	☐	☐	☐	☐
9. How much of a problem do I have in staying involved in work activities even when bored or tired?	☐	☐	☐	☐	☐
10. How much of a problem do I have in remembering what I had for dinner last night?	☐	☐	☐	☐	☐
11. How much of a problem do I have in remembering the names of people I see often?	☐	☐	☐	☐	☐

	Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
12. How much of a problem do I have in remembering my daily schedule?	☐	☐	☐	☐	☐
13. How much of a problem do I have in remembering important things I must do?	☐	☐	☐	☐	☐
14. How much of a problem would I have in driving a car if I had to?	☐	☐	☐	☐	☐
15. How much of a problem do I have in getting help when I'm confused?	☐	☐	☐	☐	☐
16. How much of a problem do I have in adjusting to unexpected changes?	☐	☐	☐	☐	☐
17. How much of a problem do I have in handling arguments with people I know well?	☐	☐	☐	☐	☐
18. How much of a problem do I have in accepting criticism from other people?	☐	☐	☐	☐	☐
19. How much of a problem do I have in controlling my crying?	☐	☐	☐	☐	☐
20. How much of a problem do I have in acting appropriately when I'm around friends?	☐	☐	☐	☐	☐
21. How much of a problem do I have in showing affection to people?	☐	☐	☐	☐	☐
22. How much of a problem do I have in participating in group activities?	☐	☐	☐	☐	☐

	Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
23. How much of a problem do I have in recognising when something I say or do has upset someone else?	☐	☐	☐	☐	☐
24. How much of a problem do I have in scheduling daily activities?	☐	☐	☐	☐	☐
25. How much of a problem do I have in understanding new instructions?	☐	☐	☐	☐	☐
26. How much of a problem do I have in consistently meeting my daily responsibilities?	☐	☐	☐	☐	☐
27. How much of a problem do I have in controlling my temper when something upsets me?	☐	☐	☐	☐	☐
28. How much of a problem do I have in keeping from being depressed?	☐	☐	☐	☐	☐
29. How much of a problem do I have in keeping my emotions from affecting my ability to go about the day's activities?	☐	☐	☐	☐	☐
30. How much of a problem do I have in controlling my laughter?	☐	☐	☐	☐	☐

PCRS

Significant Other's form

Instructions

The following is a questionnaire that asks you to judge this person's ability to do a variety of very practical skills. Some of the questions may not apply directly to things they often do, but you are asked to complete each question as if it were something they "had to do". On each question, you should judge how easy or difficult a particular activity is for them and mark the appropriate box.

Your relationship to the participant:

1. Mother	☐	8. Niece or nephew	☐
2. Father	☐	9. Cousin	☐
3. Spouse	☐	10. Friend	☐
4. Child	☐	11. In-law	☐
5. Sibling	☐	12. Ward attendant	☐
6. Grandparent	☐	13. Other	☐
7. Aunt or uncle	☐	.....	

Sex of significant other:

Male	☐	Female	☐

How well are you acquainted with the participant's behaviour?

1. Hardly at all	☐	4. Pretty well	☐
2. Not so well	☐	5. Very well	☐
3. Fairly well	☐		

		Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
1.	How much of a problem do they have in preparing their own meals?	☐	☐	☐	☐	☐
2.	How much of a problem do they have in dressing themselves?	☐	☐	☐	☐	☐
3.	How much of a problem do they have in taking care of their personal hygiene?	☐	☐	☐	☐	☐
4.	How much of a problem do they have in washing the dishes?	☐	☐	☐	☐	☐
5.	How much of a problem do they have in doing the laundry?	☐	☐	☐	☐	☐
6.	How much of a problem do they have in taking care of their finances?	☐	☐	☐	☐	☐
7.	How much of a problem do they have in keeping appointments on time?	☐	☐	☐	☐	☐
8.	How much of a problem do they have in starting conversations in a group?	☐	☐	☐	☐	☐
9.	How much of a problem do they have in staying involved in work activities even when bored or tired?	☐	☐	☐	☐	☐
10.	How much of a problem do they have in remembering what they had for dinner last night?	☐	☐	☐	☐	☐
1	How much of a problem do they have in remembering the names of people they see often?	☐	☐	☐	☐	☐

	Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
12. How much of a problem do they have in remembering their daily schedule?	☐	☐	☐	☐	☐
13. How much of a problem do they have in remembering important things they must do?	☐	☐	☐	☐	☐
14. How much of a problem would they have in driving a car if they had to?	☐	☐	☐	☐	☐
15. How much of a problem do they have in getting help when they are confused?	☐	☐	☐	☐	☐
16. How much of a problem do they have in adjusting to unexpected changes?	☐	☐	☐	☐	☐
17. How much of a problem do they have in handling arguments with people they know well?	☐	☐	☐	☐	☐
18. How much of a problem do they have in accepting criticism from other people?	☐	☐	☐	☐	☐
19. How much of a problem do they have in controlling crying?	☐	☐	☐	☐	☐
20. How much of a problem do they have in acting appropriately when they are around friends?	☐	☐	☐	☐	☐
21. How much of a problem do they have showing affection to people?	☐	☐	☐	☐	☐
22. How much of a problem do they have in participating in group activities?	☐	☐	☐	☐	☐

		Can't do	Very difficult to do	Can do with some difficulty	Fairly easy to do	Can do with ease
23.	How much of a problem do they have in recognising when something they say or do has upset someone else?	☐	☐	☐	☐	☐
24.	How much of a problem do they have in scheduling daily activities?	☐	☐	☐	☐	☐
25.	How much of a problem do they have in understanding new instructions?	☐	☐	☐	☐	☐
26.	How much of a problem do they have in consistently meeting their daily responsibilities?	☐	☐	☐	☐	☐
27.	How much of a problem do they have in controlling their temper when something upsets them?	☐	☐	☐	☐	☐
28.	How much of a problem do they have in keeping from being depressed?	☐	☐	☐	☐	☐
29.	How much of a problem do they have in keeping their emotions from affecting their ability to go about the day's activities?	☐	☐	☐	☐	☐
30.	How much of a problem do they have in controlling their laughter?	☐	☐	☐	☐	☐

Appendix B:

Biographical Questionnaire

Gender		Male ☐	Female ☐	
Home Language	English ☐	Other _____		
Handedness	Left ☐	Right ☐		
Age	_____			
Date of Birth	_____			
Date of Injury	_____			
Type of Injury	_____			
	_____			
	_____			
Coma	No ☐	Yes ☐	Length _____	
PTA	No ☐	Yes ☐	Length _____	
Highest Level of Education Pre Injury	_____		Post Injury _____	
Employed Currently	Yes ☐	No ☐		
Employed Pre-Injury	Yes ☐	No ☐		
Marital Status' Current	Single ☐	Married ☐	Involved ☐	
Marital Status Pre-Injury	Single ☐	Married ☐	Involved ☐	
Living Situation Current	With Parents ☐	With Spouse ☐	Communal ☐	Alone ☐
Living Situation Pre-Injury	With Parents ☐	With Spouse ☐	Communal ☐	Alone ☐

Biographical Questionnaire

Religious	Yes ☐	No ☐		
Church Going	Yes ☐	No ☐		
Children	Yes ☐	No ☐		
Siblings	Yes ☐	No ☐		
Rehabilitation/ Assistance Received	Physio-Therapy ☐	Speech Therapy ☐	Occupational Therapy ☐	Psychotherapy ☐
Household Income	Below R1 400 ☐	R1 400 - R9 000 ☐	Above R9 000 ☐	
Living Circumstances	House ☐	Flat ☐	Townhouse ☐	Other ☐

Biographical Questionnaire

Gender	Male ☐	Female ☐
Home Language	English ☐	Other _____
Handedness	Left ☐	Right ☐
Age	_____	
Date of Birth	_____	

Highest Level of Education	CURRENTLY	ONE YEAR AGO	THREE YEARS AGO	FIVE YEARS AGO
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

Biographical Questionnaire

	CURRENTLY	ONE YEAR AGO	THREE YEARS AGO	FIVE YEARS AGO
Employed	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Marital Status	Single ☐	Single ☐	Single ☐	Single ☐
	Married ☐	Married ☐	Married ☐	Married ☐
	Involved ☐	Involved ☐	Involved ☐	Involved ☐
Living Situation	With Parents ☐	With Parents ☐	With Parents ☐	With Parents ☐
	With Spouse ☐	With Spouse ☐	With Spouse ☐	With Spouse ☐
	Communal ☐	Communal ☐	Communal ☐	Communal ☐
	Alone ☐	Alone ☐	Alone ☐	Alone ☐
Religious	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Church Going	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Biographical Questionnaire

	CURRENTLY	ONE YEAR AGO	THREE YEARS AGO	FIVE YEARS AGO
Children	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Siblings	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Household Income	Below R1400 ☐	Below R1400 ☐	Below R1400 ☐	Below R1400 ☐
	R1400 R9000 ☐	R1400 R9000 ☐	R1400 R9000 ☐	R1400 R9000 ☐
	Above R9000 ☐	Above R9000 ☐	Above R9000 ☐	Above R9000 ☐
Living Circumstances	House ☐	House ☐	House ☐	House ☐
	Flat ☐	Flat ☐	Flat ☐	Flat ☐
	Townhouse ☐	Townhouse ☐	Townhouse ☐	Townhouse ☐
	Other ☐	Other ☐	Other ☐	Other ☐

Biographical Questionnaire

	CURRENTLY	ONE YEAR AGO	THREE YEARS AGO	FIVE YEARS AGO
Children	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Siblings	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐
Household Income	Below R1400 ☐	Below R1400 ☐	Below R1400 ☐	Below R1400 ☐
	R1400 R9000 ☐	R1400 R9000 ☐	R1400 R9000 ☐	R1400 R9000 ☐
	Above R9000 ☐	Above R9000 ☐	Above R9000 ☐	Above R9000 ☐
Living Circumstances	House ☐	House ☐	House ☐	House ☐
	Flat ☐	Flat ☐	Flat ☐	Flat ☐
	Townhouse ☐	Townhouse ☐	Townhouse ☐	Townhouse ☐
	Other ☐	Other ☐	Other ☐	Other ☐

Appendix C:

Cross Tabulation Results between Experimental and Control groups with regard to Gender; Educational Level; Home Language; Household Income; Employment Status; Religious Affiliation; Handedness and Nominated Significant Other.

----------Cross Tabs----------
Date/Time 11-07-1998 15:22:26
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Frequency Results

Page 1 /Numeric/Counts/

Variables	Values 1	2	Total
GENDER	13	8	21
CGENDER	17	11	28
Total	30	19	49

----------Cross Tabs----------
Date/Time 11-07-1998 15:22:26
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Chi-Square Statistics

GENDER Versus CGENDER

Chi-Square with 1 degrees of freedom 0.0072
Probability Level 0.9325

Page 1 /Numeric/Counts/

Variables	Values 1	2	3	Total
ED.LEVEL	7	10	4	21
CED	8	11	9	28
Total	15	21	13	49

----------Cross Tabs----------
Date/Time 11-07-1998 15:22:09
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Chi-Square Statistics

ED.LEVEL Versus CED

Chi-Square with 2 degrees of freedom 1.0590
Probability Level 0.5889
WARNING: At less one cell had a value less than 5.

----------Cross Tabs----------
Date/Time 11-07-1998 15:23:40
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Frequency Results

Page 1 /Numeric/Counts/

Variables	Values 1	2	3	Total
LANGUAGE	14	6	1	21
CLANGUAG	21	5	2	28
Total	35	11	3	49

----------Cross Tabs----------
Date/Time 11-07-1998 15:23:40
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Chi-Square Statistics

CLANGUAG Versus LANGUAGE

Chi-Square with 2 degrees of freedom 0.8414
Probability Level 0.6566
WARNING: At less one cell had an expected value less than 5.

Page 1 /Numeric/Counts/

Variables	Values 1	2	3	Total
INCOME	2	11	8	21
CINCOME	0	12	16	28
Total	2	23	24	49

----------Cross Tabs----------
Date/Time 11-07-1998 15:22:55
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Chi-Square Statistics

CINCOME Versus INCOME

Chi-Square with 2 degrees of freedom 3.7874
Probability Level 0.1505
WARNING: At less one cell had an expected value less than 5.

```
----------Cross Tabs----------
Date/Time       11-07-1998  15:24:58
Data Base Name C:\ncss\shell23
Description     Copy of data in spreadsheet file: C:\ncss\shell23.wk1

                Frequency Results

--------------------------------------------------------------------------------
Page 1     /Numeric/Counts/
--------------------------------------------------------------------------------
           Values
Variables |      1|      2|  Total|
-----------------------------------
  EMPLOYED|      6|     15|     21|
-----------------------------------
  CEMPLOYE|     26|      2|     28|
-----------------------------------
     Total|     32|     17|     49|
-----------------------------------
----------Cross Tabs----------
Date/Time       11-07-1998  15:24:58
Data Base Name C:\ncss\shell23
Description     Copy of data in spreadsheet file: C:\ncss\shell23.wk1

                Chi-Square Statistics


CEMPLOYE Versus EMPLOYED

Chi-Square with  1  degrees of freedom          21.8879
Probability Level                                0.0000
WARNING: At less one cell had a value less than 5.


--------------------------------------------------------------------------------
Page 1     /Numeric/Counts/
--------------------------------------------------------------------------------
           Values
Variables |      1|      2|  Total|
-----------------------------------
  RELIGION|     18|      3|     21|
-----------------------------------
  CRELIGIO|     19|      9|     28|
-----------------------------------
     Total|     37|     12|     49|
-----------------------------------
----------Cross Tabs----------
Date/Time       11-07-1998  15:25:18
Data Base Name C:\ncss\shell23
Description     Copy of data in spreadsheet file: C:\ncss\shell23.wk1

                Chi-Square Statistics


CRELIGIO Versus RELIGION

Chi-Square with  1  degrees of freedom           2.0693
Probability Level                                0.1503
WARNING: At less one cell had a value less than 5.
```

----------Cross Tabs----------
Date/Time 11-07-1998 15:57:52
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Frequency Results

Page 1 /Numeric/Counts/

Variables \ Values	1	2	3	Total
HANDNESS	5	15	1	21
CHANDED	2	25	1	28
Total	7	40	2	49

Chi-Square Statistics

CHANDED Versus HANDNESS

Chi-Square with 2 degrees of freedom 2.8437
Probability Level 0.2413
WARNING: At less one cell had an expected value less than 5.

SIGOTH	13	2	0	2	2	0	2	21
CSIGOTH	2	0	3	0	0	9	13	28
Total	15	2	3	2	2	9	15	49

----------Cross Tabs----------

Date/Time 11-07-1998 15:24:32
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Frequency Results

Variables	Values 8	Total
SIGOTH	0	21
CSIGOTH	1	28
Total	1	49

----------Cross Tabs----------

Date/Time 11-07-1998 15:24:32
Data Base Name C:\ncss\shell23
Description Copy of data in spreadsheet file: C:\ncss\shell23.wk1

Chi-Square Statistics

CSIGOTH Versus SIGOTH

Chi-Square with 7 degrees of freedom	34.8444
Probability Level	0.0000

WARNING: At less one cell had an expected value less than 5.

Appendix E:

```
T-Tests                          (Two Sample T-Test Results)
-----C:\ncss\draw1-----------------------------------------------------------------
                        SELF.EXP                        SELF.CON
Count - Mean            21              46.18905        27              64.02704
95% C.L. of Mean        38.72611        53.65199        58.88364        69.17043
Std.Dev - Std.Error     16.39604        3.577909        13.0022         2.502276

Ho:Diff=                ----- Equal Variances -----     ----- Unequal Variances -----
T Value - Prob.         -4.206317       0.0001          -4.085568       0.0002
Degrees of Freedom                      46                              39.06523
Diff. - Std. Error      -17.83799       4.240763        -17.83799       4.366098
95% C.L. of Diff.       -26.37417      -9.301806        -26.66862      -9.00736

F-ratio testing group variances         1.590171        Prob. Level     0.2776

                       |12.67                 95% Conf. Limit Plots                85.61|
SELF.EXP               |                       <-----a----->                            |
SELF.CON               |                                       <---a--->                |

                       |12.67                      Line Plots                      85.61|
SELF.EXP               |1..1....11..........1..131.2...11.12...111........1.......|
SELF.CON               |.............1............11..1.31.121..11.1.3112.1.21...1|

Enter ┘ to continue, or ESC to quit --
```

T-Tests (Two Sample T-Test Results)

C:\ncss\draw1

	SELF.CON		SO.CONT	
Count - Mean	27	64.02704	27	62.87222
95% C.L. of Mean	58.88364	69.17043	58.04466	67.69979
Std.Dev - Std.Error	13.0022	2.502276	12.20382	2.348625

Ho:Diff=	----- Equal Variances -----		----- Unequal Variances -----	
T Value - Prob.	.3365019	0.7378	.3365019	0.7378
Degrees of Freedom		52		53.77661
Diff. - Std. Error	1.154816	3.431825	1.154816	3.431825
95% C.L. of Diff.	-5.731649	8.041281	-5.725534	8.035166

F-ratio testing group variances 1.135123 Prob. Level 0.7490

```
                |28.87              95% Conf. Limit Plots              85.61|
SELF.CON        |                                <----a---->                  |
SO.CONT         |                               <----a---->                   |

                |28.87                    Line Plots                    85.61|
SELF.CON        |1.................2...1..31.1.21...1.1..1.31.21.1.111....1|
SO.CONT         |.......1.1......1.1....1...1..2131112....31..12.....111...|
```

Enter —┘ to continue, or ESC to quit --

T-Tests (Two Sample T-Test Results)

C:\ncss\draw1

	SELF.CON		SO.CONT	
Count - Mean	27	64.02704	27	62.87222
95% C.L. of Mean	58.88364	69.17043	58.04466	67.69979
Std.Dev - Std.Error	13.0022	2.502276	12.20382	2.348625

Ho:Diff=	----- Equal Variances -----		----- Unequal Variances -----	
T Value - Prob.	.3365019	0.7378	.3365019	0.7378
Degrees of Freedom		52		53.77661
Diff. - Std. Error	1.154816	3.431825	1.154816	3.431825
95% C.L. of Diff.	-5.731649	8.041281	-5.725534	8.035166

F-ratio testing group variances 1.135123 Prob. Level 0.7490

```
                |28.87              95% Conf. Limit Plots              85.61|
SELF.CON        |                                <----a---->                  |
SO.CONT         |                               <----a---->                   |

                |28.87                    Line Plots                    85.61|
SELF.CON        |1.................2...1..31.1.21...1.1..1.31.21.1.111....1|
SO.CONT         |.......1.1......1.1....1...1..2131112....31..12.....111...|
```

Enter —┘ to continue, or ESC to quit --

Author Wootton M F
Name of thesis Self-Awareness In Traumatically Brain Injured (Tbi) Persons Regarding Their Post-Accident Ablilities Wootton M F 1998

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