LOCUS OF CONTROL
IN RELATION TO
ATTENTIONAL DEFICITS
IN SCHIZOPHRENIA

I declare that this thesis contains my original work, that no part of it has been
previously accepted or presented for the award of any degree or diploma by any
university.

Joni Bryan

To the best of my knowledge no material previously published or written by
another person is included, except where due acknowledgement is given.

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of the requirements of the
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DECLARATION

I declare that this thesis reports my original work, that no part of it has been previously accepted or presented for the award of any degree or diploma by any university.

To the best of my knowledge no material previously published or written by another person is included, except where due acknowledgement is given.

Joni Bryan
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ABSTRACT

Currently, the principal explanations of attentional deficits in schizophrenia are based on an information processing model which supposes that the impaired performance is a direct, behavioral manifestation of the illness. Yet there are significant problems with this approach. One of the difficulties lies in separating aspects reflecting central or core characteristics from those reflecting transitory states. Episodic clinical states can involve symptomatology contrasting to that of remitted states and thus may differentially affect information processing. Some evidence of the influence of environmental factors such as institutionalisation has also been reported. This paper further explores the importance of external factors and proposes a significant involvement of self-efficacy and outcome expectancies. It is hypothesised that over and above the effects of the illness itself, age and medication, there is a component of poor performance that can be contributed to locus of control.

Fifty-five schizophrenic and 21 control subjects participated in a semi-structured interview eliciting demographic data and utilising locus of control scales. After instruction, attentional processes were measured using a reaction time task in which subjects were asked to detect a target at one of two positions in the visual field.

In general, the hypothesis was not supported. While reaction times on the attentional tasks were poorer for schizophrenic subjects they were not significantly related to any of the variables of the locus of control scales, age, medication, chronicity of illness, number of relapses or period of time since last relapse. Locus of control scales, general and for mental/health, were significantly related to level of medication. The effect of methodological issues such as restricted sampling and scale validity are discussed. The results suggest an independent factor/s is/are contributing to the poorer attentional performance. While these could be either core or epiphenomenal in nature, it is proposed that the results provide further support for the information processing model and that locus of control may be a more significant factor for schizophrenic subjects with a less disabling illness.
CHAPTER 1
INTRODUCTION

Attentional Dysfunction


Research with both normal subjects and psychiatric patients has suggested that attention is a multi-dimensional construct, involving a complexity of
information processing skills and has identified a number of areas of cognitive or information processing dysfunction in people with schizophrenia. These include impairments in attentional span/ short-term memory (Nachmani and Cohen, Koh and Kayton, 1974; Cornblatt and Erlenmeyer-Kimling, 1984), distractibility (Oltmanns and Neale, 1975; Oltmanns, 1982), span of apprehension (Asarnow and MacCrimmon, 1981), and sustained attention (Kornetsky and Mirsky, 1966; Nuechterlein, 1983; Cornblatt and Erlenmeyer-Kimling, 1984). Some investigators have suggested that schizophrenia might be related to an impairment in the regulation of attention (Posner, Early, Reiman, Pardo & Dhawan; 1988, Potkin, Swanson, Urbanchek, Carreon, and Bravo, 1989); Cornblatt, Lenzenweger, Dworkin and Erlenmeyer-Kimling, 1985); Cornblatt, Lenzenweger and Erlenmeyer-Kimling, 1989; Orzack and Kornetsky, 1966; Wohlberg and Kornetsky, 1973; Nuechterlein, 1983). While others have indicated that attentional deficits affect higher order cognitive functions Brenner, Kraemer, Hermanutz, and Hodel (1990); Morice and Delahunty (1992).

While the involvement of an attentional dysfunction in at least some forms of schizophrenia has been extensively documented, a number of important issues remain to be resolved in order to understand the role of attention in the etiology and course of schizophrenia. Most notable among these are questions about the nature of the attentional impairment involved in the illness, the extent to which such a deficit is specific to schizophrenia, and the environmental factors which may be contributing to, or confounding, the attentional decrements.
Information Processing

With respect to the nature and specificity of attentional deficits in schizophrenia, the prevailing models currently proposed are based on the theoretical frameworks of experimental psychology and more specifically have adopted an information processing model which supposes that the impaired performance of the schizophrenic is a direct, behavioral manifestation of the illness. Studies of attention are typically conceived within one or other of two separate (but overlapping) frameworks: capacity and stage models. Processing capacity models emphasise variations in the overall processing capacity of an individual (Kahneman, 1973). Within this type of model, deficits in cognition are attributed to decreases in amounts of processing capacity (possibly due to deviant levels of arousal) or to inefficient allocation of the available processing resources. In contrast, stage models of information processing emphasise a series of processing stages so that the output from one stage is fed to the subsequent stage where the information becomes transformed or elaborated. When considering cognitive deficits, this model leads to a search for the earliest dysfunctional stage of processing. It is presumed that deficits at this level disrupt processing in subsequent stages in a type of cascade effect.

Continuous Performance Test

The experimental instrument most commonly used for investigating attention deficits in schizophrenia is the Continuous Performance Test (CPT) originally developed by Rosvold, Mirsky, Sarason, Bransome and Beck (1956) for investigations in the visual modality. Performance in the CPT is explained by the processing capacity model and is the standard index of 'sustained attention'. The technique may be used with a wide range of vigilance tasks in which
subjects monitor a continuous series of single letters, numbers or figures, briefly presented with a short, fixed inter stimulus interval. The task is to respond with a key press each time that a predesignated target stimulus appears in a random stimulus series. In the distraction condition the stimulus sequence is accompanied by tones, lights or distracting figures. Targets may be single letters or numbers (Rosvold, Mirsky, Sarason, Bransome and Beck, 1956; Bowen, Wallace, Glynn, Nuechterlein, Lutzker and Kuehnel, 1994), sequences of two consecutive letter or numbers (Rosvold et al, 1956; Earle-Boyer, Serper, Davidson and Harvey, 1990) or playing cards (Erlenmeyer-Kimling and Cornblatt, 1978); perceptually degraded numbers (Nuechterlein, 1983; Nuechterlein, Parasuraman, and Jiang, 1983); auditory stimuli (Cornblatt, Lenzenweger and Erlenmeyer-Kimling, 1988) or picture stimuli (Anderson, Siegel, Fisch and Wirt, 1969; Posner, Early, Reiman, Pardo and Dhawan, 1988; Potkin, Swanson, Urbanchek, Carreon and Bravo, 1989; Strauss, Novakovic, Tien, Bylsma and Pearlson, 1991; Kopp, Mattler, and Rist, 1993).

Core Characteristics Versus Epiphenomena

One of the difficulties in studying attention in schizophrenia is to separate aspects of task performance which reflect central or core (also termed 'trait') characteristics of the illness from those which reflect transitory states (episodic or 'state' characteristics) or epiphenomena (which includes environmental factors) (Asarnow and MacCrimmon, 1978). Many studies have investigated subjects in acute states (episodic or transitory states) while others have investigated subjects who, due to prolonged institutionalisation, have been subjected to diminished sensory stimulation and social isolation prior and during testing (epiphenomenon or environmental influences) (See Chapman and
Chapman, 1973; Spohn and Patterson, 1979; Nuechterlein and Dawson, 1984; Asarnow and MacCrimmon, 1978; Braff, 1985; and Boker, Brenner and Wurgler, 1992).

In an attempt to separate core characteristics from those of episodic states or epiphenomena, Wahlberg and Kornetsky (1973) and Asarnow and MacCrimmon (1978) studied schizophrenics in relative clinical remission. Their results which demonstrated significant performance deficits on the CPT for remitted schizophrenics compared with normal subjects supported the argument for core characteristics that transcend the effects of episodic or 'state' features. In these studies, outpatient individuals were presumed to be less likely to have florid symptoms, less likely to be institutionalised, more likely to be active and stimulated and were more likely to demonstrate a sufficient level of adjustment and independence for functioning in the community.

Asarnow and MacCrimmon (1978) also demonstrated that remitted schizophrenics were comparable in performance to acute schizophrenics and further suggested that a distractor condition of the CPT may detect impairment that is independent of a clinical schizophrenic 'state'. This latter finding was strengthened by findings of Grunebaum, Gallant and Cohler (1974 in Asarnow and MacCrimmon, 1978) and Erlenmeyer-Kimling (1976) which demonstrated that children at risk for schizophrenia made significantly more errors on the distractor condition of the CPT than did control children although none of these studies accounted for the depressive clinical state of subjects for either adults or children [See Rosenbaum & Hadari, (1985); Rosvold, Mirsky, Sarason, Bransome, and Beck (1956); and Birchwood, Mason, MacMillan and Healy (1993)].
Core impairments were further studied by Posner et al (1988) in a study of lateralised attention using a spatial priming task, (a development of the CPT, often used to investigate interference effects and specific visual field deficits). In this study, a simple reaction (RT) task was used in which subjects were asked to maintain fixation on a central cross and detect a target presented either to the left or right on a computer screen. On most trials, the location in which the stimulus might appear was cued before its occurrence by brightening one of the two target regions. Eighty percent of the time, the stimulus appeared in the cued location (valid cue). On the other 20% of the cued trials, the stimulus appeared in the other location (invalid cue). In normal individuals, RT to report detection of the target is shorter for validly cued trials because of the alignment of an attentional mechanism with the expected location of the stimulus. Similarly, an invalid cue slows RT because of the need to reorient attention from the cued location (Posner et al, 1987).

In applying this paradigm with 12 acute schizophrenic subjects (three of whom had never been medicated), Posner et al (1988) did find a lateralised impairment in the shift of attention as indicated by a reduced benefit of cue validity. While all subjects showed decrements in performance in the invalid cueing conditions compared with the valid cueing conditions, the patients showed significant deficits overall and were particularly slower on trials in which a target appeared in the right visual field after the left visual field was cued by brightening. Less effect was revealed when it appeared in the right visual field and the target appeared in the left.

This lateralised deficit resembled that found in patients with left parietal lesions (Posner, Walker, Friedrich and Rafal, 1984) and was observed in both
medicated and unmedicated patients. Potkin et al (1989) also found that schizophrenic patients in their study demonstrated a specific deficit in shifting attention to the right visual field after being cued to the left. This finding, especially light of the evidence for both medicated and non-medicated subjects and the similarity with brain damaged patients with left parietal lesions, provides further evidence of the existence of a core and specific deficit.

The findings of both studies are consistent with the clinical neuropsychological evidence of left hemisphere dysfunction in schizophrenia (Gur, 1978; Gruzelier, Seymour, Wilson, Jolley and Hirsch, 1988) and hence lend weight to the hypothesis. However, Posner et al (1988) raised an issue that casts doubt on the evidence for core characteristics. In their discussion, Posner et al described a possible role of neural systems which mediate language and which may have confounded the 'core' visual attentional deficit. This proposition was based on both the prominence of auditory hallucinations in their patients and the finding of a similar but attenuated lateralised deficit in normal subjects engaged in auditory shadowing during the visual attention task and, thus, raised the possibility of an epiphenomenonal influence not previously identified.

Furthermore, because both studies of Posner et al (1988) and Potkin et al (1989) examined acutely ill patients it is not clear whether the observed lateralised deficit was limited to acute psychotic states or was a more trait-like characteristic of schizophrenia.

Further evidence suggesting the episodic nature of the lateralised deficit was found in a study comparing visual attention in control subjects and schizophrenic and manic-depressive patients both in states of remission. Strauss et al (1991) found that although overall RT was slower in both patient
groups, the pattern of disengagement of attention from one visual field to another did not differ among normal, euthymic bipolar mood disorder patients and schizophrenic patients. The absence in this study of the right-sided inattention phenomenon in schizophrenia first reported by Posner et al (1988) and partially confirmed by Potkin et al (1989) may have been due to several differences among the studies not the least of which is the clinical state of the subjects.

Symptomatology

Another factor highlighting the difficulty in defining the nature and specificity of the attentional deficits in schizophrenia is found in studies investigating the effects of positive and negative symptoms. Positive symptoms which are defined as the florid symptoms of psychosis and include delusions, hallucinations and behavioral excitement differ from negative symptoms which represent an absence of functioning and are thought to include such manifestations as alogia, anhedonia, amotivation and social withdrawal. A plethora of research has been generated to address this typology. However, while some researchers (eg Nuechterlein, Edell, Norris and Dawson, 1986) have proposed that attentional deficits are core characteristics associated with negative symptoms there is not yet sufficient evidence that clearly identifies the specific deficits or the relationship with negative symptomatology (Schmand, Kuipers, Van der Gaag, Bosveld, Bulthuis and Jellema, 1994).

An Alternative Explanation

Positive (or productive) symptoms of schizophrenia which are associated with acute psychotic states (eg hallucination and delusions) are often reported with clinically observed attentional problems of distractibility during acute episodes of the disorder and are markedly diminished or even absent during periods of
remission (Walker and Lewine, 1988 in Strauss et al 1991). Consequently, the lateralised disengagement deficit previously discussed might be present only during acute states and absent in remitted patients.

Other Mental Illnesses

Strauss et al's (1991) study raises an additional difficulty of identifying specific attentional dysfunction for schizophrenia because of the evidence reporting similar attentional deficits found in other mental illnesses such as major affective disorder, especially in light of their overlap of related symptomatology. Because of the high degree of overlap on such psychotic symptoms as thought disorder (Cornblatt, 1989) for these diagnoses and since thought disorder has been directly associated with attentional dysfunctions, such shared clinical features may indicate a common or more generalised attentional impairment not specific to schizophrenia and casts further doubt on the findings of core characteristics found by Wohlberg and Kornetsky (1973) and Asarnow and MacCrimmon (1978).

Because of such findings, and the fact that the concept of attention has not been clearly tied either to specific cognitive operations or specific neural systems (Boker et al, 1989), the assumption of a central processing deficit is questionable (Chapman and Chapman, 1973; Mednick, 1967; Spohn, 1972; Schmand, Kuipers, Van der Gaag, Bosveld, Bulthuis and Jellema, 1994).

An Alternative Explanation

An alternative explanation for attentional deficits in schizophrenia was advanced as early as 1967 by Mednick and McNeil who proposed that observed poorer attentional performance is due to "nuisance variables" (previously
referred to as epiphenomena in this study) such as the sociomedical consequence of the disorder (the effects of institutionalisation, medication, the 'sick role', stigmatisation, reduced sensory and social stimulation, motivation, depression etc) - rather than a direct behavioral manifestation of it.

In support of this position, Mednick and McNeil (1968) cited studies which address the effects of institutionalisation. For example, Silverman, Berg and Kantor (1965) provided evidence that institutionalisation per se can produce performance deficits when they found that long term prisoners were indistinguishable from chronic schizophrenics on a number of perceptual tasks. Further support for this argument was provided by Kopfstein and Neale's (1971) finding that schizophrenic and nonschizophrenic psychiatric patients who were comparable in length of institutionalisation did not differ in the performance on a size-estimation task.

The influence of epiphenomena on attentional deficits has also been supported by studies of the behavioral management of schizophrenic clients which demonstrate that, with cognitive and behavioral interventions, such people can become more alert, regain control of their functioning, reduce relapse rates, exert considerable control over certain symptoms which in turn lead to improved adaptation and better performance (Brier and Strauss, 1983).

However, no studies reported so far have attempted to define the characteristics which result from institutionalisation, are challenged in the cognitive or behavioral interventions or may generally contribute to the observed attentional deficits in schizophrenia.
Motivation

One of the possible mediating variables in these cases and one which often plagues research on disorders of cognition in psychotic patients is that of motivation. When a patient with a severe psychiatric disturbance fails on a test, the question often arises regarding the willingness (or unwillingness) of the person to perform the required tasks (Schmand, Kuipers, Van der Gaag, Bosveld, Bulthuis and Jellema, 1994). While the overriding opinion (not always substantiated) in the field of experimental psychopathology is that cognitive disorders of psychotic patients are deficits in controlled, effortful information processing as opposed to automatic, less effortful cognitive processes (Nuechterlein and Dawson, 1984), the literature does not clarify whether a deficit in performance is attributable to a core problem or an energetical or motivational one in which the subject is unable to mobilise sufficient energy or effort.

Motivation (or lack of motivation) to perform may be influenced by a number of factors such as simple lack of interest in a particular activity, a belief that one is not capable of a particular activity or a generalised reduction to engage in life in general.

Schmand Kuipers, Van der Gaag, Bosveld, Bulthuis, and Jellema (1994) investigated motivational deficits of psychotic clients using an a cognitive-energetic model of human performance. In this model several stages of information processing between stimulus input and response are distinguished. The energetical part of the model is formed by the mechanisms of arousal, activation and mental effort. Arousal and activation are viewed as involuntary, energising processes taking place in the nervous system when stimuli are perceived (arousal) and when responses are prepared (activation). The concept
of mental effort, originally defined by Sanders (1983, in Schmand et al, 1994), is one of a coordinating and organizing principle. Effort is viewed as coordinating the activity of arousal and activation but has also has the additional wider function of promoting the competence of the information processing system and, as such, it comes close to the driving force behind reasoning and decision making. Contrary to arousal and activation, mental effort is viewed by these authors as a voluntary, supervising process that is influenced by motivational variables.

**Social Learning**

Motivational variables are an inherent aspect in the tenets of social learning which advances the theory that beliefs about causality and control can impact on behavior in significant and important ways. Rotter (1975) in his theory of social learning postulated that motivation to behave in certain ways is determined by both needs and the pervasive tendency to think and to anticipate within a social context. In this model, behavior is determined by expectations that behavior chosen will bring re-enforcement (either positive or negative) and the potential for particular behaviors is determined not only by the degree that a particular goal is desired but also by the extent to which a person believes that a specific behavior will result in the goal.

Applications of Rotter's social learning theory that show potential for generalisation to psychiatric populations involve social cognition, cognitive behavior theory and therapy, psychotherapy, and health behaviors in regard to physical health (Lau, 1982; Rotter, Chance and Phares, 1972; Strickland, 1978; Wallston & Wallston, 1978; all in Strickland, 1989); emotional disorders such as depression (eg Hale, 1975, 1976, 1977; Haley & Strickland, 1977, 1986; Phares,

Locus of Control

Within the social learning context, Rotter (1966; 1975) developed the concept of locus of control (LOC) to describe significant variables that can determine human behavior and influence the motivation to act. Locus of control, which is based on the assumption that the degree to which an individual perceives events as contingent upon his or her own actions is a measurable individual personality characteristic that is more or less consistent across a variety of situations, relates to the expectancy for internal versus external locus of control of re-inforcement.

The expectancy for contingencies or re-inforcement runs from "internal" to "external". People holding internal expectancies perceive contingencies between their own behavior and subsequent events, whereas individuals with an external orientation are more likely to construe events as resulting from luck, chance, fate, or powers beyond their personal control. Internal-external (IE) expectancies are thought to be influential in learning situations and related to beliefs about one's performance being a function of skill or external influences such as chance of powerful others (Strickland, 1989).

Rotter (1982) also researched the relationship of expectancies to the reality of one's performance by addressing goal setting under conditions of success and failure. Expectancies and goal setting strategies involve the already mentioned role of motivation, and the roles of self-concept, self-esteem and self-schemas. Self interpretations may be relatively rigid for some individuals but usually change in response to life conditions and may be particularly influenced by major
life events, especially of a traumatic nature. This then can affect a person's motivation to act or influence the degree to which he/she participates in particular activities. It is possible, therefore, that people who have experienced a major mental illness such as schizophrenia, manic-depression or major depression (an undesirable life event) may judge themselves as less sociably competent, make decisions that perpetuate their social isolation, withdraw from task or work performance and become more vulnerable to negative events such as accidents, severe illnesses and social rejection. In keeping with the theory, the motivation to perform would be reduced.

The relevance of LOC to research in the area of mental illness increased after the development of the IE scale by Rotter (1966). This included such variables as independence and resistance to external influence, involvement in social action and social desirability. Modification of the Rotter IE scale led to the development of new instruments (eg Levenson & Miller, 1976; Krantz, Baum and Wideman, 1980) which addressed the needs and characteristics of psychiatric clients and especially those with schizophrenia.

Rotter's (1982) theory established and developed the importance of an individual's expectancies in regard to behavior. Expectancies can have implications for motivation to physical and mental health as well as performance in many areas of life including task performance.

**Self-efficacy Research**

The role of self concept and self-schemas in determining outcome expectancies was expanded and refined by Bandura (1982). In Bandura's self-efficacy theory, efficacy expectancy depends on a perception of contingency and involves
confidence in attaining a desired outcomes through one's own action (Bandura, 1977, 1986). Bandura regarded one's personal sense of efficacy as a powerful influence on thought patterns, behavior, and emotional arousal (Bandura, 1982). He distinguished between two judgmental sources of futility or success: perceived personal efficacy and response-outcome expectancies. People can lose motivation because they seriously doubt that they can do what is required (personal efficacy) or because they expect their effort to produce no results due to the unresponsiveness, negative bias, or punitiveness of the environment (outcome expectancies). With regard to schizophrenia, subjects may seriously doubt they can do what is required but, more likely, they may believe that regardless of personal efficacy, their efforts will not affect the outcomes of events in their lives (especially if they believe that the effects of their illness, chance or powerful others are in control).

Bandura (1982) also considered that motivation and cognitive processes are significant influences in determining behavior. According to Bandura, without motivation, the cognitive processes of attention, retention and reproduction will suffer. In combination with motivation, they are powerful determinants of the acquisition and performance of complex behavior.

Following Bandura's theory, research has provided evidence that efficacy expectations (self-perceptions) which are believed to mediate the ability to improve behavioral control, may indeed play a role in a range of motivational dysfunctions and behavioral problems in both psychiatric clients and "normal" subjects. The construct of self-efficacy has been found to mediate change in a range of different types of behaviors Bandura, Reese and Adams, 1982; Kazdin, 1979; Lane and Borkovec, 1984), and has also been shown to moderate the
negative effects of depression in relations to a variety of performance measures (Glynn and Ruderman, 1986). Authors such as (eg Tennen and Herzberger, 1987) have emphasised that self-esteem is a more powerful predictor of failure attributions than depression or depressive style. Self-efficacy has been associated with catecholamine levels in individuals who exhibit coping responses (Bandura et al, 1985) and it has been noted that the construct of self-efficacy can be useful in identifying individuals who effectively make use of self-control procedures, as well as in specifying which behaviors may be amenable to control (Litt, 1988).

Self-efficacy has been shown to play a critical role in determining motivation and the persistence and effort that individuals will display in attempting to perform and incorporate a variety of skills into their behavioral repertoires. The robustness of these findings suggests that it may be productive to extend such concepts to the interpretation and management of behaviors of the more serious psychiatric disorders such as schizophrenia. Rather than influential effects of depression or the illness itself, if people with schizophrenia perceive that their life style or illness is beyond their control (from low self-esteem, decreased self-efficacy or external locus of control) they may be more likely to withdraw or reduce their persistence and effort in task performance.

Bandura (1982) suggested that different patterns of outcome and efficacy beliefs might produce different behavioral pathologies. Individuals who believe that neither they nor comparable others are capable of controlling significant outcomes may develop an apathetic or resigned attitude to life. Individuals who perceive themselves as ineffective but believe that similar other are capable of producing positive outcomes might develop depressive symptoms because "evident successes of others make it hard to avoid self criticism". The belief that
one is not capable of producing the desired behavior (low personal efficacy) and that others are successful may produce not only self-criticism but also a belief that one's fate is determined by other individuals. Such a belief may serve as a basis for the development of paranoid ideation.

**Perceived Control**

Motivation is also central to *perceived control* which assumes that perceived causality is basic to attributions of control. Within attribution theory, causal attributions presumably lead individuals to feel they can gain some sense of meaning, coherence, predictability, and control in their world. Generally, people's motivation and efforts to gain control lead them to be more effective and more positively adjusted (Phares, 1984). For example, Janoff-Bullman (1979, 1982) found that victims of rape demonstrated a better adjustment and less depression when they were able to attribute the event to a controllable, personal cause, thus believing they can change behavior and avoid such events in the future, and demonstrated more motivation to overcome the trauma.

**Psychiatric Populations**

Applications of social learning (including locus of control, perceived control and self-efficacy) have been demonstrated in psycho-social research in schizophrenia (Liberman, Mueser, Wallace, Jacobs, Eckman and Massel, 1986); personal efficacy and outcome expectancies in psychiatric syndromes (Rosenbaum and Hadari, 1985); and depression in schizophrenia (Birchwood, Mason, MacMillan and Healy, 1993). Several authors (Brown & Siegal, 1988) Kanfer & Zeiss, 1983; Lewinsohn, 1980; Pietromonaco & Rook, 1987; Pietromonaco & Markus, 1985) found that depressed individuals demonstrated difficulties in these areas,
ie. they judged themselves as less social competent, became more socially withdrawn, and were less motivated to perform or participate in activities or given tasks.

Support for the hypothesis of the influence of self-efficacy also comes from the area of psychiatric rehabilitation by Liberman, Mueser, Wallace, Jacobs, Eckman and Massel (1986) who proposed that efficacy expectations (self-efficacy) may be related to social skills and competence indirectly via the expression of coping efforts. In this model, social schemata are conceptualised as including basic psycho-biological functions, such as attention and memory, as well as cognitive processes such as inference making. Self-efficacy is defined as the individual’s belief that one has the psychobiological and cognitive capabilities to execute he desired behavior.

Another aspect of Liberman et al's (1986) model is that it incorporates the concept of reciprocal determinism originally, postulated by Bandura (1982), in which all factors influence each other. That is, basic psychobiological functions influence self-efficacy perceptions and these perceptions influence an individual’s ability to make decision and choices with regard to social behavior. In turn, this ability (or inability) to make appropriate choices (problem-solve) influences self-perception of competence (self-efficacy). Accordingly, schizophrenic patients must have favourable efficacy expectations, in addition to possessing adequate skills in order to improve their behavioral functioning.

According to this model, it is not enough or the client to possess the behavioral skill to execute a social behavior. The client must also perceive him or herself as capable of executing the behavior that is needed to deal effectively and skilfully with the environment. Support for such a model can also be found in research
that demonstrates that decrements in efficacy expectations can affect psychobiological functioning (Bandura, Taylor, Williams, Mefford and Barchas, 1985). Accordingly, it anticipated that people with schizophrenia will need favourable efficacy expectations in addition to possessing adequate skills, if they are to improve their behavioral functioning or task performance.

Therefore, as for normal individuals people with schizophrenia are more likely to believe that if they are competent and efficacious, they will be able to control behavioral outcomes, or inversely if they are not effective or competent they will not be able to control their behavior, and as Rotter (1982) and Bandura (1986) theorise will lose motivation and hence performance will decrease. In particular, it is likely that people with chronic schizophrenia will be less likely to have a sense of self-efficacy, more belief in external control by others or chance and hence both lower expectations about their performance in the world and lower motivation to attempt activities or tasks.

Evidence of a lowered sense of personal efficacy in psychiatric populations relative to normal subjects is provided by Rosenbaum and Hadari (1985) who investigated paranoid and depressed patients. Rosenbaum and Hadari's findings supported Bandura's (1982) contention that different combinations of beliefs in personal efficacy and outcome expectancies are associated with different psychiatric syndromes.

Rosenbaum and Hadari (1985), and others [eg Hall et al 1983; Peterson, 1979; and Lao; 1977 all in Rosenbaum and Hadari (1985)] found outcome expectations and beliefs in personal efficacy were highly related in the normal group and unrelated in the two psychiatric groups. In the normal group there were high negative correlations between scores on the personal efficacy scales and on each
of the two external scales while these correlations were not significant for the psychiatric groups. That is, normal individuals are more likely to believe that if they are competent and efficacious, they will be able to control behavioral outcomes, whereas psychiatric patients dissociate personal efficacy judgment from outcome expectations and believe that regardless of their competence, outcomes are either controlled by others or by chance.

Levenson (1973) and Rosenbaum and Hadari (1985) found lower scores on the two external locus-of-control scales for the control (normals) group than for either of the two patient groups. However, while Levenson found no differences between the control and patient groups on the personal efficacy scale Rosenbaum and Hadari found that control subjects expressed stronger beliefs in personal efficacy than did either of the two patient groups.

Following Levenson (1973), Rosenbaum et al (1985) further distinguished between the two outcome expectations of chance and powerful others for psychiatric populations. Two psychiatric groups demonstrated significantly lower expectations for personal efficacy than a 'normal' control group while among psychiatric patients, depressives were significantly more likely to believe in control-by-chance forces than were normal subjects, whereas paranoid patients scored between these two groups on the chance locus of control scale. As expected, paranoid patients believed significantly more than depressives and normals that powerful others controlled their lives. Accordingly, paranoid and non-paranoid schizophrenics may have lower expectations for personal efficacy than normals and that paranoid schizophrenics are more likely than non-paranoid schizophrenics to believe that powerful other control their lives.
McDermott’s (1995) found judgments of social self-efficacy were related to task performance. Self-efficacy beliefs with regard to negative symptoms and social behavior were related to length of illness, going out with friends or having family visits. Patients considered themselves less efficacious with respect to negative symptoms and social skills the longer they had been ill. In addition, the more times patients was hospitalised, the less effective they perceived themselves in all areas.

It is hypothesised that over and above the effects of the illness itself and Depression is another epiphenomenon which may affect attentional deficits in schizophrenia. However, the cross-section prevalence of depression in chronic schizophrenia in a number of studies is approximately 30% Birchwood, Mason, MacMillan and Healy (1993) which suggests that although depression may contribute to lowered performance in some subjects it cannot account for the deficit in the majority of cases.

Hypothesis

As discussed above, there is a diversity of findings regarding attentional deficits in schizophrenia. Furthermore, given the lack of definitive evidence of the specific nature of the deficits, and the obvious relationships found between self-efficacy and locus of control and performance in varying conditions, it is possible that locus of control may significantly affect attentional performance in people with schizophrenia. To date there appears to be almost no studies that investigate the relationship between the decrements in attentional performance and the constructs of self-efficacy and locus of control for this subject group. Therefore the study reported below was designed to fill this gap.
This study questions whether the IE scale can be applied to people with schizophrenia and their performance on cognitive tasks. Consistent with Rotter's and Bandura's theories, the present study postulates that a high external locus of control can lead to a low level of motivation to act, a low expectation of success in task requirements or their consequences and a resultant low performance on specified tasks.

It is hypothesised that over and above the effects of the illness itself (e.g. physiological consequences), age and medication, there is a component of poor performance that can be attributed to locus of control. That is, people with schizophrenia are more likely to have a higher external locus of control and that this will affect their motivation to perform and consequently result in poorer performance on cognitive tasks than controls (normals without schizophrenia).
CHAPTER 2

METHOD

Design

Subjects consisted of three groups of clients with schizophrenia and a control group all of whom were recruited from the Canberra region (ACT) and other smaller country centres in NSW. Subjects with schizophrenia were allocated to one of the three groups according to degree of functioning based on type of accommodation.

Type and frequency of mental health service support for schizophrenic subjects was later investigated and revealed a pattern not originally anticipated in the design. Attempts were made to control for effects of secondary and confounding variables such as depression, drug and alcohol, intellectual disability and episodic symptomatology; however, all schizophrenic subjects reported some residual symptomatology on a regular basis (range daily to monthly); all were receiving mental health support of at least once a week (See subsection Subjects.); and none were employed full-time. This suggested that the sample was restricted and not representative of the spectrum of people suffering from schizophrenia.

Subjects participated in a semi-structured interview eliciting demographic data and utilising locus of control scales. After instruction, attentional processes were measured using a reaction time task in which subjects were asked to detect a target (asterisk) at one of two positions in the visual field. Three blocks of trials each consisting of 72 trials were administered, interspersed equally among the
interview questions. Two rest breaks were included because of the length of the
interview and testing conditions. Overall time ranged between one to two hours.

It was anticipated that:

(i) Schizophrenic subjects would demonstrate a significantly poorer
performance on attentional tasks than controls

(ii) Subjects in the control group would demonstrate a significant relationship
between level of performance on attentional task and degree of locus of
control (ie the lower the reaction time the higher the level of internal locus
or control or the lower the level of external of locus of control

(iii) The schizophrenic groups would also demonstrate a significant
relationship between performance on attentional task and degree of locus
of control (ie the lower the reaction the higher the level of internal locus
of control or the lower the level of external of locus of control)

Subjects

Group 1, "Full-care", consisted of 21 subjects who live in full-care residential
settings such as psychiatric hospital or hostels.

Group 2, "Part-care", consisted of 13 subjects who live in group houses or single
accommodation, participate in rehabilitation programs and/or have contact with
mental health professionals at least twice a week. Data from another 8 subjects
originally from Group 2 was eliminated because of lack of reliable information
on demographic information.
Group 3, "Independent", consisted of 21 subjects who live independently in single accommodation or with family and have contact with mental health workers ranging from weekly to not at all. Although one client has not seen a psychiatrist for six years he is actively involved with a self help organisation on a weekly basis. Other clients see a psychiatrist on a six monthly basis but also participate in a self help network with a minimum of weekly contacts. Data from a further ten subjects was deleted from the study because of prescribed medication which suggested a possible confounding effect of diagnosis. For example, subjects using lithium or anti-convulsants were excluded on the basis that these medications raised the possibility of a mood component.

Group 4, "Controls", consisted of 21 subjects of whom none had a formal diagnosis of mental illness by a psychiatrist or general practitioner at the time of testing. Data on one subject was eliminated because of evidence of possible psychosis. Diagnoses of mental illness for the purpose of this study include delirium, dementia, and amnestic disorders; mental disorders due to a general medical condition; substance-related disorders; schizophrenia and other psychotic disorders; mood disorder; anxiety disorders; dissociative disorders; and adjustment disorders (American Psychiatric Association, DSM-111R, 1987).

Frequencies for sex appear in Table 1. Thirty-nine subjects (approximately 70 percent) of the schizophrenic groups were male and sixteen (30 percent) were female. Groups 1 and 3 each showed a distribution of 15 males to 6 females (71 : 29 percent) while Group 2 showed a split of 9 males to 4 females (70:30 percent). The control group (Group 4) consisted of twelve (57 percent) males and nine (43 percent) females.
Table 11 summarises frequencies for handedness in subjects across groups. Forty-five subjects (82 percent) within the schizophrenic groups were right handed and ten (18 percent) were left handed. The control group showed a similar split of eighteen right-handed to three left-handed subjects (85.5:14.5 percent).

**TABLE 1.**
Summaries of frequencies of subjects by group and sex

<table>
<thead>
<tr>
<th>GROUP</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
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<td>15</td>
<td>71</td>
<td>9</td>
<td>70</td>
<td>15</td>
<td>71</td>
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<tr>
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<td>100</td>
<td>13</td>
<td>100</td>
<td>21</td>
<td>100</td>
<td>21</td>
<td>100</td>
</tr>
</tbody>
</table>

**TABLE 11.**
Summaries of frequencies for handedness in subjects across groups

<table>
<thead>
<tr>
<th>GROUP</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Right</td>
<td>18</td>
<td>86</td>
<td>11</td>
<td>84.5</td>
<td>16</td>
<td>76</td>
<td>18</td>
<td>85.5</td>
</tr>
<tr>
<td>Left</td>
<td>3</td>
<td>14</td>
<td>2</td>
<td>15.5</td>
<td>5</td>
<td>24</td>
<td>3</td>
<td>14.5</td>
</tr>
<tr>
<td>Total</td>
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<td>100</td>
<td>13</td>
<td>100</td>
<td>21</td>
<td>100</td>
<td>21</td>
<td>100</td>
</tr>
</tbody>
</table>

Means and standard deviations for age (subdivided by sex) across all groups is presented in Table 111. The mean age for subjects within the schizophrenic groups (1, 2 and 3) were 35.1 (SD 9.9), 30.5 (SD 8.1), and 38.7 (SD 9.9).
respectively. Mean age for subjects in the control group was 34.5 years (SD 8.5). There was no significant difference for age across groups and sex.

TABLE 111.

Means and standard deviations for age by group and sex

<table>
<thead>
<tr>
<th>GROUP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Male</td>
<td>35.0</td>
<td>8.06</td>
<td>30.6</td>
<td>7.76</td>
</tr>
<tr>
<td>Female</td>
<td>35.3</td>
<td>14.5</td>
<td>30.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Total</td>
<td>35.1</td>
<td>9.9</td>
<td>30.5</td>
<td>8.1</td>
</tr>
</tbody>
</table>

Instruments

Attention Task

The attention task consisted of a spatial timing task, a version of the continuous performance task (Posner et al, 1988; Potkin et al, 1989). For this task subjects were instructed to maintain fixation on a central black dot on a computer screen and to press a key as quickly as possible, with any digit of choice, whenever an asterisk appeared on the screen. Further details are provided under the procedure section.

Diagnosis

Subjects in the schizophrenic groups had received a formal diagnosis by a psychiatrist (standard procedure consisting of a at least one clinical interview and criteria for diagnosis relied on satisfaction of requirements for schizophrenia - subtypes 295.1, 295.2, 295.3, 295.6, and 295.9; American Psychiatric Association (1987), prior to testing. Fifteen clients (28 %) had a diagnosis of
paranoid schizophrenia while the remainder, 38 (73 %), had a residual or undifferentiated classification.

**Current Mental Status**

Schizophrenic subjects included in the study were in a relative state of remission which involved a period of at least six weeks since the last relapse.

Current type and severity of symptoms were assessed using the psychotic and depression sub-scales of the Brief Psychiatric Rating Scale (BPRS) (Lukoff, Nuechterlein and Ventura, 1986; Green, Neuchterlien, Ventura and Mintz, 1990).

The BPRS was chosen because of its use as an efficient, rapid evaluation covering a comprehensive description of major symptom characteristics and its procedure for use in assessing treatment change in psychiatric patients (Overall and Gorham, 1962). It was originally applied to people with a diagnosis of schizophrenia and contained 16 items of which six to nine of the items are specific to schizophrenia. Inter-rater reliability of the individual items ranged from .56 to .90 and the concurrent validity when compared to the Multidimensional Scale for Rating Psychiatric patients was .93. It remains the most widely used scale in research in schizophrenia especially drug trials. The major problem of the scale is that of inter-rater reliability because of the subjective element of rating severity on a seven point scale. The present study attempted to overcome this problem by using only one rater. For the purpose of standardising procedure, initial training was conducted which included joint assessment with another psychologist, of clients not included in the study.

Increasing the reliability of the BPRS has been primarily carried by Neuchterlien and associates (Nuechterlien, Miklowitz, Ventura, Stoddard and Lukoff, 1990;
Lukoff, Liberman and Nuechterlein, 1986; Lukoff, Nuechterlien and Ventura, 1986). Their expanded version includes a behavioural definition of each item, a list of questions attached to 14 items to elicit a description of symptoms from the individual, and a description of each behavioural state on the seven point scale for every item. All six items used in present study had behavioral definitions and some questions.

All subjects included in the study demonstrated a moderate to zero level of 'state' disturbance on the psychotic and depression subscales of this assessment instrument. Scores on each of the two sub-scales required a total score of less than sixteen. All subjects demonstrating a score higher than fifteen were eliminated from the study to control for effects of depression and positive symptomatology. Schizophrenic subjects who were observed with moderate to severe state psychotic or depressive symptoms by staff immediately prior to testing were excluded from interview.

The psychotic sub-scale consisted of the variables unusual thought disorder, hallucinations and conceptual disorganisation; the depression sub-scale consisted of the variables of depression, suicidality and guilt (Green, Neuchterlein, Ventura and Mintz, 1990). The depression sub-scale was included to eliminate those subjects who demonstrated state symptoms of depression.

**Handedness**

Handedness was assessed using the thirteen item Measurement of Handedness scale (Chapman and Chapman, 1987).
Medication

Medication is reported in equivalent dosages of chlorpromazine (Kaplan, Saddock and Grebb, 1989) per day. The range was from no medication to the equivalent of 4000mg. The mean dose was 860mg with a standard deviation of 857mg. Forty-nine percent of schizophrenic subjects were receiving between 300 and 1000mg chlorpromazine per day; 29% were receiving between 1050 and 4000mg per day and a total of 73% were receiving between 300 and 400mg chlorpromazine per day.

Locus of Control

Locus of Control was assessed using

(i) Levenson's (1981) 24 item measure with a 7 point rating scale, and

(ii) a 16 item measure (also utilising a 7 point scale) adapted from the Health Locus of Control Scale (Wallston, Wallston, Kaplan and Maides, 1976) and Levenson's measure, and which focussed on locus of control with regard to health and illness.

The Levenson scale was used because of its external scales of chance and power which have been reported in the literature as relevant for psychiatric populations (Levenson, 1981). Levenson's scales are composed of items adapted from Rotter's IE scale (1966) and a set of statements written to tap beliefs in personal efficacy and control (I), and external beliefs about powerful others (P) and fate or chance (C).

Internal consistency estimates of the scales are moderately high and compare favourably with those obtained by Rotter (1966) and other researchers. For a
student sample, (N=152) Kuder-Richardson reliabilities yielded .64 for the I Scale, .77 for the P scale, and .78 for the C Scale (Levenson, 1974). Wallston, Wallston and DeVeliss (1978, in Levenson, 1981) found similar estimates for their adult sample (N=115) (.51, .72, and .73, respectively) as did Levenson (1973) for a hospitalised psychiatric sample (.67, .82, and .79).

Split-half reliabilities (Spearman-Brown) are .62, .66, and .64 for the I, P, and C scales. Test-retest reliabilities for a 1 week period are in the .60 - .70 range (Levenson, 1973) and Lee (1976, in Levenson, 1981) found comparable correlations with a 7 - week test-retest interval (.66, .62, and .73). Zukotynski and Levenson (1976, in Levenson, 1981), using simplified version of the scales with an elderly sample, found test-retest reliabilities of .85, .91, and .65.

The validity of the I, P and C scales has been demonstrated chiefly through convergent and discriminant methods (Campbell and Fiske, 1959, in Levenson, 1981) that are designed to show significant low-order correlations with other measures of the general construct as well as a pattern of theoretically expected positive and negative relationships with other variables.

Locus of Control indices were calculated in a number of ways. Using the standard Levinson scale, a general internal-external (IE) score was calculated by subtracting the total of the external scores from the total of the internal scores. The internal score of personal efficacy and control, power and chance external scores, (P) and (C), were calculated by totalling the scores on each of the these sub-scales.
**Modified Mental/health Scale**

The mental/health scale was used as an exploratory measure to establish if perceived control over physical or mental health can generalise to influence performance on attentional tasks. The scale was obtained by adapting the Health Locus of Control (HLC) scale, an area-specific measure of expectancies regarding locus of control developed for prediction of health related behavior. With regard to physical health, Wallston, Wallston, Kaplan and Maides (1976) found that HLC internals who value health highly sought information more than other subjects. Although the HLC is an initial attempt to operationalise health-related locus of control beliefs, Wallston et al's findings provide evidence of discriminant validity for the scale. Consistent with the hypothesised prediction, when HLC was used as the basis of classification of subjects, high health value internals were more likely to take action to control their health than all other types of subjects. In this study, the authors claim that the results would not have been evident had the more general IE scale been the only basis for classifying subjects as internals or externals. The present study, therefore, considers the possibility that those schizophrenics who believe they have control over their illness may be more motivated and so apply themselves more aptly to the attentional task.

Using the modified mental/health scale, the mental/health internal-external scale (IEH) was calculated by subtracting the total of the external health scores from the total of the internal health scores. The mental/health power and chance external scores, (PH) and (CH), were calculated by totalling the scores on each of these sub-scales.
Procedure

For each trial of the task subjects were seated in front of a computer screen (approximately 60 cms from the screen) on which visual cues and targets were presented. Subjects were instructed to maintain fixation on a central black dot (approximately 0.25 degree diameter) and to press a key as quickly as possible, with any digit of choice, whenever an asterisk appeared on the screen. A one degree square appeared approximately five degrees to the left or right of fixation simultaneously with the central dot at the commencement of each trial.

Within each block of seventy-two, ninety-four trials comprised the cued/uncued condition of which twenty percent were uncued. In these trials, following a previous key press, the target (an asterisk) occurred in the centre of one of the two squares with equal probability (and thus accounting for field).

On cued trials, one of the two squares was highlighted with a slightly smaller square before the target appeared. On eighty percent of cued trials the target appeared in the centre of the highlighted square. For the remaining twenty percent the target occurred in the opposite square from that highlighted in the cued condition. A three second response time was allowed before presentation of the next trial. 'Catch trials' consisted of cued conditions which were not followed by a target and comprised six percent of trials.

Figure 1 shows the arrangement of conditions for the visual orienting task.

The spatial priming task (STT), a version of the CPT, was chose for two reasons:

(i) Confirmation of earlier findings of generalised attentional deficits.

Like previous CPTs, this paradigm has been able to detect significant
decrements in reaction times of attentional tasks for schizophrenics compared with controls (Posner et al, 1988; Potkein et al, 1989); and

(ii) Investigation of laterised deficits in states of remission. The STT has been used to demonstrate laterised deficits in attentional performance in schizophrenic subjects in acute states (Posner et al, 1988; Potkin et al, 1989). The present study is exploring possible laterised deficits for clients who are in a state of remission or a non-episodic state.

Figure 1. Schematic diagram of visual-orienting task. Cue involves highlighting one of the peripheral boxes. When target appears on cued side, condition is valid and is invalid when it appears on uncued side. Some trials were uncued and others comprised 'catch trials' in which no target was presented after cueing.
Given the evidence and arguments outlined in the introduction and the choice of subjects it is anticipated that the specific lateralised deficits will not be in evidence.

**RESULTS**

Results include products of investigations with ANOVA and correlations.

**Reaction Time Task**

Mean reaction times for all subjects are summarised in Table IV, dissected by group, field and cueing condition:

<table>
<thead>
<tr>
<th>CUE</th>
<th>Full-Care Mean</th>
<th>SD</th>
<th>Part-Care Mean</th>
<th>SD</th>
<th>Independent Mean</th>
<th>SD</th>
<th>Controls Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Valid Cue</td>
<td>303.0</td>
<td>223.3</td>
<td>504.4</td>
<td>135.7</td>
<td>522.3</td>
<td>221.0</td>
<td>358.3</td>
<td>10.3</td>
</tr>
<tr>
<td>Left Invalid Cue</td>
<td>617.5</td>
<td>271.9</td>
<td>599.7</td>
<td>168.6</td>
<td>590.3</td>
<td>293.8</td>
<td>415.2</td>
<td>64.4</td>
</tr>
<tr>
<td>Left Non-Cue</td>
<td>626.9</td>
<td>182.2</td>
<td>576.8</td>
<td>147.8</td>
<td>573.5</td>
<td>228.4</td>
<td>444.9</td>
<td>67.7</td>
</tr>
<tr>
<td>Right Valid Cue</td>
<td>687.7</td>
<td>215.4</td>
<td>597.7</td>
<td>134.4</td>
<td>529.6</td>
<td>209.3</td>
<td>308.8</td>
<td>56.3</td>
</tr>
<tr>
<td>Right Invalid Cue</td>
<td>639.2</td>
<td>239.4</td>
<td>589.9</td>
<td>198.8</td>
<td>593.8</td>
<td>290.9</td>
<td>415.4</td>
<td>72.3</td>
</tr>
<tr>
<td>Right Non-Cue</td>
<td>675.9</td>
<td>258.2</td>
<td>554.0</td>
<td>174.0</td>
<td>565.2</td>
<td>248.2</td>
<td>407.5</td>
<td>57.0</td>
</tr>
<tr>
<td><strong>Overall Reaction</strong></td>
<td>613.7</td>
<td>269.7</td>
<td>548.0</td>
<td>163.0</td>
<td>569.3</td>
<td>240.3</td>
<td>407.5</td>
<td>57.0</td>
</tr>
</tbody>
</table>

Initial analysis of reaction times involved a 4 x 2 x 5 ANOVA with repeated measures on field (right/ left), and cueing condition (valid, invalid and no cue), and group (three schizophrenic and one control group(s)) as the between measures variable.
CHAPTER 3

RESULTS

Results include products of investigations with ANOVA and correlations.

Reaction Time Task

Mean reaction times for all subjects are summarised in Table 1V, dissected by group, field and cueing condition.

<table>
<thead>
<tr>
<th>CUE</th>
<th>Full-care Mean</th>
<th>Full-care SD</th>
<th>Part-care Mean</th>
<th>Part-care SD</th>
<th>Independent Mean</th>
<th>Independent SD</th>
<th>Controls Mean</th>
<th>Controls SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Valid Cue</td>
<td>595.0</td>
<td>222.1</td>
<td>504.8</td>
<td>151.3</td>
<td>523.2</td>
<td>233.0</td>
<td>368.7</td>
<td>50.8</td>
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<td>221.9</td>
<td>559.7</td>
<td>169.6</td>
<td>590.5</td>
<td>233.8</td>
<td>415.2</td>
<td>64.4</td>
</tr>
<tr>
<td>Left Non Cue</td>
<td>636.9</td>
<td>182.2</td>
<td>576.4</td>
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<td>573.5</td>
<td>223.4</td>
<td>444.9</td>
<td>67.7</td>
</tr>
<tr>
<td>Right Valid Cue</td>
<td>587.7</td>
<td>233.4</td>
<td>508.7</td>
<td>154.4</td>
<td>529.6</td>
<td>249.5</td>
<td>368.5</td>
<td>56.5</td>
</tr>
<tr>
<td>Right Invalid Cue</td>
<td>639.2</td>
<td>225.4</td>
<td>589.9</td>
<td>195.8</td>
<td>593.8</td>
<td>290.2</td>
<td>416.8</td>
<td>75.3</td>
</tr>
<tr>
<td>Right Non Cue</td>
<td>635.9</td>
<td>218.2</td>
<td>554.0</td>
<td>174.6</td>
<td>604.8</td>
<td>241.6</td>
<td>431.4</td>
<td>64.7</td>
</tr>
<tr>
<td>Overall Reaction Time</td>
<td>618.7</td>
<td>208.7</td>
<td>548.9</td>
<td>165.0</td>
<td>569.3</td>
<td>240.2</td>
<td>407.6</td>
<td>57.8</td>
</tr>
</tbody>
</table>

Initial analysis of reaction times involved a 4 x 2 x 3 ANOVA with repeated measures on field (right/ left), and cueing condition (valid, invalid and no cue), and group (three schizophrenic and one control group/s) as the between measures variable.
The ANOVA revealed a main effect for group \((F_{3,72} = 5.11, p = .003)\), and a main effect for cueing condition \((\text{Wilk's lambda } = 0.28; F_{2,71} = 90.69, p = 0.0)\). Main effect for field was not significant \((F_{1,72} = .93, p = .338)\) and there were no significant interaction effects between group and cueing conditions \((\text{Wilk's lambda } = .923; F_{6,142} = .9678, p = .449)\). See Figure 1.

A 3 x 2 x 3 ANOVA with repeated measures on field and cueing conditions for reaction times across schizophrenic groups was conducted to analyse differences between the schizophrenic groups. This yielded a significant main effect for cueing condition \((\text{Wilks lambda } = 0.32 F_{2,51} = 55.93, p = 0.0)\), but no main

\(^1\text{Wilks lambda was adopted because of a violation of Mauchly's assumption of sphericity.}\)
effect for group \( (F_{2,52} = .51, \ p = .605) \) or field \( (F_{1,52} = 1.35, \ p = .25) \) and no significant interaction. In view of the lack of difference in performance among these subjects, the three schizophrenic groups were collapsed into one for subsequent analyses.

There was a significant difference in reaction time between the control group and the combined schizophrenic subjects \( (F_{1,74} = 14.10, \ p < 0.001, \text{ unequal groups}) \) with the control group performing significantly faster than the schizophrenic group.

Because of the absence of a main effect and interaction effect for field, cueing conditions were collapsed across field and group (e.g., right and left valid cues were added and averaged, right and left invalid cues were added and averaged, etc.). Subjects showed significantly faster reaction times in the valid cueing condition than both the invalid cueing condition \( (t_{75 \text{ paired samples}} = 9.96, \ p < 0.01) \) and the non-cueing condition \( (t_{75 \text{ paired samples}} = 10.52, \ p = 0.0) \). No significance difference was revealed between the invalid and non-cueing conditions \( (t_{75 \text{ paired samples}} = .83, \ p = .409) \).

There was no significant difference between males and females for either the schizophrenic or control groups. Analysis for the effect of handedness also showed no significant difference in performance between right and left handers in either the schizophrenic or control groups.

**Locus of Control**

Table V presents means and standard deviations for locus of control, health locus of control and medication. Compared with controls, schizophrenic subjects demonstrated lower scores on the IE and IEH scales \( (t = -4.0, \ p < 0.01; \ t = 5.88, \ p = .0) \).
p< 0.01 respectively). Both comparisons showed a significant violation of Levene's test for equality of variances (F = 2.2, p< 0.15; F = , p< 0.25). Schizophrenic subjects did not differ from the control group on the personal effectiveness sub-scale but had higher scores for the external subscales of chance and power (t = 4.61 or 4.36, p< 0.01; t = 3.94 or 4.26, p< 0.01 respectively).

### TABLE V.

Means and standard deviations for locus of control (IE) and its three subscales, and health locus of control (IEH) for schizophrenics and controls

<table>
<thead>
<tr>
<th></th>
<th>Schizophrenics</th>
<th>Controls</th>
<th>Schizophrenics</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>35.3</td>
<td>9.4</td>
<td>34.5</td>
<td>8.5</td>
</tr>
<tr>
<td><strong>IE Locus of Control</strong></td>
<td>-27.3</td>
<td>16.9</td>
<td>-.63</td>
<td>21.8</td>
</tr>
<tr>
<td><strong>Internal Control (P)</strong></td>
<td>39.2</td>
<td>6.7</td>
<td>39.6</td>
<td>8.5</td>
</tr>
<tr>
<td><strong>External - Chance (C)</strong></td>
<td>33.4</td>
<td>9.1</td>
<td>22.2</td>
<td>10.3</td>
</tr>
<tr>
<td><strong>External - Power (P)</strong></td>
<td>33.3</td>
<td>9.9</td>
<td>23.7</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>IEH Locus of Control</strong></td>
<td>-7.26</td>
<td>16.9</td>
<td>14.1</td>
<td>12.7</td>
</tr>
</tbody>
</table>

### Predictors of Reaction Times

Table VI and VII present correlations for the control and schizophrenic groups, respectively, between reaction times (RT), age, medication (Med)[schizophrenic group only] locus of control (IE) (positive score represents internality), mental/health locus of control (positive score represents internality) internal personal efficacy and the external scales of chance and power.
### TABLE VI

Correlations between variables for control group (N=21)

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>IE</th>
<th>IEH</th>
<th>Internal</th>
<th>Chance</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Time</td>
<td>*.4778</td>
<td>*.4214</td>
<td>-.1200</td>
<td>-.3055</td>
<td>.3035</td>
<td>.4193</td>
</tr>
<tr>
<td>Age</td>
<td>1.00</td>
<td>.1321</td>
<td>-.0112</td>
<td>-.0245</td>
<td>-.1507</td>
<td>-.1864</td>
</tr>
<tr>
<td>IE - Locus of Control</td>
<td>1.00</td>
<td>**.6678</td>
<td>**.6679</td>
<td>**.8765</td>
<td>**.8587</td>
<td></td>
</tr>
<tr>
<td>IEH Health Locus of Control</td>
<td>1.00</td>
<td>*.5393</td>
<td>-.3176</td>
<td>-.3347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td>**.7406</td>
</tr>
</tbody>
</table>

* p<0.05; ** p<0.01

### TABLE VII

Correlations between variables for schizophrenic group (N=53)

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Med</th>
<th>IE</th>
<th>IEH</th>
<th>Internal</th>
<th>Chance</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Time</td>
<td>.0032</td>
<td>.2129</td>
<td>-.1144</td>
<td>-.0455</td>
<td>.0044</td>
<td>.0836</td>
<td>.1216</td>
</tr>
<tr>
<td>Age</td>
<td>1.00</td>
<td>.1338</td>
<td>.0452</td>
<td>.0222</td>
<td>-.1473</td>
<td>-.1261</td>
<td>-.0606</td>
</tr>
<tr>
<td>Medication</td>
<td>1.00</td>
<td>**-.4034</td>
<td>**-.3027</td>
<td>.1057</td>
<td>*.3443</td>
<td>**.4442</td>
<td></td>
</tr>
<tr>
<td>IE Locus of Control</td>
<td>1.00</td>
<td>.2295</td>
<td>.2324</td>
<td>**.8111</td>
<td>**.8064</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEH Health Locus of Control</td>
<td>1.00</td>
<td>.1067</td>
<td>-.0740</td>
<td>-.2523</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Chance</td>
<td>1.00</td>
<td>1.1102</td>
<td>.1763</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<0.05; ** p<0.01
Control Group

Regressional analysis for the control group showed that age (beta= -0.49, p< 0.01) and IE (beta= 0.54, p< 0.01) as the most important predictors of performance on reaction times (method = enter). These two variables accounted for 40% of the variance. A correlation between the power component of external locus control and reaction times approached significance (r= .4193, p= .058) although it was not significant in the regression equation.

The general locus of control scale was significantly related to the mental/health locus of control scale (r=.6678, p=<0.01) indicating that, for controls, the belief of the degree to which individuals have control over their lives in general is related to the belief of the degree to which they have control over their mental/health. Age was not significantly related to any locus of control scale indicating that age did not affect the belief individuals had about the degree to which they had control of their lives or their mental/health. The external scale of chance was significantly related to the external scale of power indicating that the more controls believed in the influence of chance on their lives the more they believed in the influence of powerful others on their lives.

Schizophrenic Group

Initial data screening of data for the schizophrenic group revealed two univariate outliers for medication. Bivariate regression analyses of medication on reaction time and locus of control for the schizophrenic group revealed two outliers (criterion in excess of 3 standard deviations). Subsequent analyses for predictors of reaction times excluded these subjects.
For the schizophrenic group, no variable investigated in the present study was found to be a significant predictor of reaction time performance.

**Other Relationships for Schizophrenic Subjects**

Subsequent analysis for the schizophrenic groups indicated that level of medication was significantly correlated to the number of relapses (r = 0.3273, p = < 0.05); IE, r = -0.4034, p < 0.01; IEH, (r = -0.3027, p < 0.05) and both the external loci of control of power and chance (r = 0.44, p < 0.01; r = 0.34, p < 0.05) respectively.

The general locus of control scale (IE) was not significantly related to the mental/health locus of control scale (IEH) (r = .2295, p < 0.1). There was a significant correlation between the external scales of chance and (r = .5408, p = 0.01)

Medication was found to be significantly correlated to general locus of control (r = -0.4, p < 0.01) and locus of control for mental/health (r = -0.3, p < 0.05). That is, the higher the dosage of medication subjects were taking the greater the belief in external control about both life in general and mental/health or, alternatively, the greater the belief subjects have in external control over both about life in general and their mental/health the more medication they were taking. Conversely, the more subjects felt control over their lives and their mental/health the less medication they were taking, or the less medication they were taking the more subjects felt control over their lives.

Chronicity of illness, number of relapses and interval since last relapse were not significantly related to task performance.
Paranoid schizophrenics were significantly faster than non-paranoid schizophrenics on reaction times \( t_{74} \) unequal groups = 5.65, \( p < 0.01 \). No differences were found between paranoid and non-paranoid schizophrenic groups for means of IE or medication. There were no significant correlations between reaction times and other variables for either the paranoid or the non-paranoid schizophrenic groups.
CHAPTER 4

DISCUSSION

The purpose of the present study was to establish a significant relationship between locus of control and attentional deficits in schizophrenia. In particular, it was hypothesised that schizophrenic subjects would demonstrate deficits in attentional performance compared with controls, that controls would demonstrate a significant relationship between locus of control and attentional performance over and above age and, that schizophrenic subjects would demonstrate a significant relationship between locus of control and attentional performance over and above age and medication.

As expected, the results revealed that schizophrenic subjects were consistently slower on reaction times for a cognitive task and had consistently lower scores than control subjects on scales reflecting beliefs about their expectancies of outcomes from their behavior on the environment. That is, they were slower to react to cues and believed they were less able to control or effect changes in their lives or to be in control of their health. On the other hand, schizophrenic subjects demonstrated similar beliefs about their self-efficacy or personal control.

The expected significant relationship between performance (reaction times) and beliefs about locus of control for the non-schizophrenic group was demonstrated. That is, the greater the belief this group had in their skills and the ability to control their lives and their health the better the task performance.
However, the corollary of this, the principal hypothesis that poorer performance (slower reaction times) in schizophrenic subjects would be strongly correlated with a belief of little self-efficacy and low outcome expectancies (little internal control and greater external control) was not supported. For the sample of schizophrenics studied, poorer performance on attentional tasks was not related to beliefs about personal effectiveness or the ability to have control over their lives or their mental/health. As well, results revealed no relationship between performance on attentional tasks and any of the other variables of age, medication, chronicity of illness, number of relapses or period of time since last relapse. While reaction times were slower for schizophrenic subjects these are not for the reasons hypothesised.

The findings indicate a need to re-examine the possible existence of core or trait characteristics and further investigate other epiphenomenal or environmental factors that may be contributing to attentional deficits in schizophrenia. Why is it that epiphenomenal factors such as locus of control appear to be operating for normal subjects but are not influencing performance for schizophrenic subjects?

**Information Processing**

The most logical place to start seems to be with the prevailing models of explanation which are based on the theoretical frameworks of experimental psychology. These adopt an information processing model which supposes that impaired performance is a direct, behavioral manifestation of the illness and is a result of a neurological or biological disorder (Neuchterlein and Dawson, 1984). One interpretation of the present findings is that the theoretical framework of experimental psychology is supported and that there are characteristics of information processing which are critical components of a neuropsychological
vulnerability to schizophrenia and which are unrelated to social learning effects and the effects of medication. Specifically, the results of schizophrenics on the attentional task may be primarily accounted for by either the stage model, which emphasises a series of processing stages where the output from one stage is fed to the subsequent stage where the information becomes transferred or elaborated, or the processing capacity model which emphasises the overall processing capacity of an individual (Kahneman, 1973).

Within the processing capacity model, deficits in cognition are attributed to decreases in amounts of processing capacity, possibly due to deviant levels of arousal or to inefficient allocation of the available processing resources (Kahneman, 1973). Because of the lack of relation with other significant factors it is possible that the decrement in attentional performance demonstrated in the present study may be due to a deviant level of arousal. It may also be possible that reaction times increased throughout successive trials (a pattern not examined as performance over trials was averaged) and this would be in keeping with the results of Schmand et al's study (1994) which found that cognitive resources of schizophrenic subjects are rapidly exhausted thus supporting the argument for decreased amounts of processing capacity.

On the other hand, stage models of information processing emphasise a series of processing stages so that the output from one stage is fed to the subsequent stage where the information becomes transformed or elaborated. When considering cognitive deficits, this model lead to a search for the earliest dysfunctional stage of processing. It is presumed that deficits at this level disrupt processing in subsequent in a type of cascade effect (Nuechterlein and Dawson, 1984).
The identification of performance abnormalities using tasks that are simple and have separate cognitive components have been related to discrete neural systems and in conjunction with the control for nonspecific variables provides the basis for constructing reasonable hypotheses to support the stage model (Posner et al, 1988). Because of the use of a simple identification task in the present investigation which has demonstrated an information deficit presumably involving few attentional components and that is unrelated to any other variable studied concurrently, it may be the case that a dysfunction in the earliest stages of processing is taking place.

In line with this position, Nuechterlein, Dawson and Green (1994) found evidence, with varying the conditions within a continuous performance test condition that potential mediating factors yielded a distinction between a stable vulnerability factor across clinical states and a potential mediating vulnerability factor. This suggested that top-down attentional influences on sensorimotor skills influenced the role of central executive processes in modulating early sensory processes. Within a backward masking paradigm they were able to separate two initial sensory-perceptual processes from attentional shifting processes. Chronic schizophrenic clients demonstrated both an increased initial interruption of perceptual processes and then also greater attentional intrusion by the mask. Their results suggest that an abnormality in an early perceptual aspect of rapid visual information processing may be an enduring and stable vulnerability indicator for schizophrenia.

In contrast, Brier and Strauss's (1983) study found that information processing was found to be significantly related to social competence even after controlling for patient demographics, chronicity and symptomatology. In Brier and Strauss's
study, higher global social competence was related to more efficient early information processing on a continuous performance/span of apprehension task. Composite indices of specific social competence (ie paralinguistic and nonverbal skills) were related to other aspects of information processing (eg reaction time). Higher ratings of global social competence were related to both more total hits and fewer total false alarms on the continuous performance/span of apprehension task. These tasks are presumed to be a measure of early information processing that, cognitive functioning that does not require higher order skills (eg conceptual reasoning) and that occurs within the first few seconds of stimulus presentation. In Strauss et al’s study, however, it is probable that social competence is skill-based and as such differs from the concepts of self-efficacy and locus of control.

A number of factors arising from the present study lend weight to the argument for the involvement of a central information processing deficit in the observed attentional decrements of schizophrenic subjects. The lack of significant relationship with other variables, the possibility of fatigue effects, the possibility of deficits in level of arousal, and the use of a simple discrete identification task which does not require higher order cognitive skills, together, suggest that a neuropsychological impairment is likely to be influencing the poorer attentional performance. However, similar to previous findings, it is not clear whether the breakdown in processing is occurring because of limited capacity or a disruption in an early stage.

**Lateralisation of Deficit**

The lack of lateralised difference found in the present study is consistent with the findings of the Strauss et al (1991) study in which the schizophrenic patients
were in substantial remission and contrasts with both Posner et al's (1988) and Potkin et al's (1988) studies in which the patients were floridly ill.

The discrepancy in performance between the two differing clinical states provides further evidence for the hypothesis that a lateralised attentional deficit may be a state phenomenon in schizophrenia possibly due to the presence of features such as auditory hallucinations and thought disorder, that do not extend into the remitted phase of the disorder. This interpretation is consistent with the hypothesis of Posner et al (1988) that the attentional and language systems interact so that right-sided inattention in acute schizophrenic patients may be due to a deficit in the anterior attentional system, a system that is important both for attending to language and for exercising control over the posterior visual spatial system.

Medication

Another difference in the studies involves the pharmacotherapy. In Strauss et al's (1991) schizophrenic subjects were all medicated and in the present study all but one schizophrenic subjects were receiving medication. On the other hand both the first episode and acutely ill chronic patients with schizophrenia studies by Potkin et al (1989) were unmedicated at time of testing. This raises the possibility that neuroleptics may normalise a lateralised attentional deficit in schizophrenia. However, Posner et al (1988) found no attentional deficit between medicated and non medicated acute patients. Furthermore, the present study found no correlation between reaction times on the attentional task and dose of medication.
While medication was significantly related to locus of control it was not related to task performance. Similar results were found for chronicity of the illness, number of relapses and interval since most recent relapse. The lack of relationship between medication and performance levels on attentional tasks have been reported in other studies (Strandberg et al, 1994). For a sample of children and adults with schizophrenia, those taking medication performed equally well on a span of apprehension task from those who were not. In this study which recorded event-related potentials, all schizophrenic groups were found to be impaired compared with normals in the ability to discern visually presented stimuli. Other studies have also found a lack of effect of medication on information processing.

The finding that medication was related to locus of control but was not related to task performance adds further weight to the argument that for some schizophrenics attentional decrements are an independent characteristic not influenced by epiphenomic variables and possibly attributable to information processing deficits resulting from a neurological or biological condition.

**Modified Mental/Health Scale**

The mental/ health scale was used as an exploratory measure to establish if perceived control over physical or mental health can generalise to influence performance on attentional tasks. The scale was obtained by adapting the Health Locus of Control scale (Wallston, et al 1976), an area-specific measure of expectancies developed for prediction of health related behavior. As expected, normal subjects believed they had more control over their health and had less conviction that powerful others or luck had a significant effect on their health. In contrast, as expected, schizophrenic subjects believed they had less control over
their health and more conviction that powerful others and, to a lesser degree, chance, had a significant effect on their health. Neither group, however, demonstrated a significant correlation between these beliefs and their performance on the attentional task which suggests that belief in locus of control for mental/health, does not contribute to the ability to attend.

In the present study, control subjects' beliefs about the degree to which they have control over their health is directly related to their beliefs about general locus of control. On the other hand, schizophrenic subjects did not consider that the degree to which they have control over their mental/health is related to the extent to which they have control over their lives. A further finding, which is that schizophrenic subjects who believe they are more in control of their mental health are taking less medication and those that have a greater belief in external control of chance or powerful others are taking higher levels of medication, provides some support for the validity of the use of the adapted mental/health scale.

**Personal Control**

An interesting finding was that schizophrenics had similar scores on personal control despite their reliance on medication and mental health services and their lack of independent living. While this replicates the findings of Levenson (1973), the meaning of the result is unclear. Given that many are highly dependent on services, does this mean that the schizophrenic subjects studied perceive they have personal control over what happens within specified parameters because they choose to follow medication and treatment; that their personal efficacy is equal to controls; or are they unrealistically perceiving (in
accord with perceived control theory) that they generally control outcomes of
events?

**External Control**

The finding that schizophrenics consider powerful others and, to a lesser extent, chance control their lives is commensurate with the findings of Levenson (1973) and Rosenbaum and Hadari (1985) who found higher scores on the two external locus of control scales than those for normals. This is in accord with Bandura's theory that (1982), despite a belief in the ability to perform tasks, individuals' expectancies of behavior may be low if they perceive they have little control over the external variables of chance or other powerful influences. The relationship found between locus of control and medication for schizophrenic subjects further suggests that, indeed, regardless of their ability to perform tasks, expectancies of behavior are reliant on factors such as the amount of medication they need to take (an external influence).

**Methodological Issues**

Methodological issues must be taken into consideration. One issue of concern is whether the locus of control scale can realistically measure self-efficacy and outcome expectancy beliefs for chronically ill subjects. Observations of responses to the questionnaires raises doubts about the validity of self beliefs of schizophrenic subjects in regard to the degree of control they have over their lives. For example, a number of schizophrenic subjects considered they "... can pretty much determine what will happen in my (their) life" or "When I (they) make plans, I (they) am almost certain to make them work" when, in fact, they have been residents of mental health facilities for many years, are under the care
of others, are sometimes under involuntary treatment orders which restrict their movements and activities, and are unable to function independently in the community and, hence, are not personally in control of their lives.

While theoretical distinctions are made between perceived self-efficacy and response-outcome expectancies (Bandura, 1982), standard questions such as those mentioned above are not adequately able to differentiate between them and hence it is difficult to know whether a low internal control score is reflecting a deflated belief in one’s own ability or a lowered belief in positive outcomes. The results of the present investigation appear unable to clarify the situation. Either the schizophrenic subjects studied believe they have the same ability to carry out tasks as controls but are more controlled by external factors, or they believe their actions will lead to the same outcomes as normals. Either way, the reality of these positions is questionable.

Of primary importance in the methodology is the sample of schizophrenic subjects used in the study. Although no research is cited to substantiate the perception, it is expected that the level of severity and disability associated with schizophrenia would at least range from little to extreme if not demonstrate a normal distribution. While attempts were made in the present study to recruit subjects from a range of levels of independence and disability, later investigation revealed that all schizophrenic subjects studied reported residual symptomatology on a regular basis, all were receiving frequent mental health support and none were employed full-time. This suggests that the sample was restricted and not representative of the spectrum of people suffering from schizophrenia.
It is possible that a significant generalised attentional disorder is experienced only by a subset of patients such as those with a poor prognosis or a chronic condition and that others may show increasingly smaller degrees of impairment according to the severity of the illness. The sample of schizophrenic subjects in the present study represent the more chronically disabled end of the spectrum of people with schizophrenia and may be those more likely to sustain greater cognitive disturbances reflecting neurobiological and neuropsychological substrates. It may be the case that locus of control may be of less significance in cognitive performance for people with more severe or chronic schizophrenic conditions and a more important component contributing to cognitive performance for those with less severe or chronic conditions. In this case, as the effects of the illness approach zero, the relationship between performance and locus of control may approach those found for normals.

**Motivation**

One of the possible mediating variables and one which is often reported in research on disorders of cognition in schizophrenic subjects is that of motivation. When a subject with a severe psychiatric disturbance performs poorly on a test, the question often arises regarding the willingness of the person to perform the required tasks (Schmand et al, 1994). While it is not possible to substantiate qualitative data, it was observed and noted that most if not all schizophrenic subjects were either prepared or keen to be involved in the research activities. This raises questions about the influence of motivation on task performance. If it is the case that schizophrenic subjects were willing to be involved it again suggests that other factors are operating in the attentional process.
Underlying the concept of motivation is the assumption and overriding opinion in the field of experimental psychopathology that cognitive disorders of schizophrenic patients are deficits in controlled, effortful information processing as opposed to automatic, less effortful cognitive processes (Nuechterlein and Dawson, 1984). If a task is to require effort then one must be prepared to rally the necessary resources, determine which are needed and carry out the action. If one is motivated then the effort is produced, if not then a required task will not be adequately completed. If motivation is positive and a subject puts in effort, difficulties may still arise because of a lack of mental energy or resource (defined by Sanders, 1983 in Schmand et al, 1994). The finding of performance decrements which can attributed to a lack of mental energy or fatigue (rather than motivation) would provide further evidence in support of the existence of an information processing deficit. Analysis of the current data to determine if reaction times for schizophrenics increased over the duration of each group of trials may reveal possible fatigue effects which are over and above those experienced by the control group.

**Depression**

To a large degree the present study excluded many of those clients who may be identified with depression because of the screening factors of diagnosis, medication (mixed diagnoses and cases where clients were taking medication other than anti-psychotics were eliminated) and current mental status. This may have affected results in terms of the relationship between locus of control and cognitive/perceptual performance. That is, if locus of control, is related to depression or demoralisation, clients in this study may not have demonstrated the
associated difficulties with external locus of control and poorer performance on task.

The cross-section prevalence of depression in chronic schizophrenia found in Birchwood et al's (1993) study (29%) was similar to previous studies and some of its correlates (greater admissions unemployment) were replicated. A psychological profile of the depressed, chronically psychotic patient was identified, centering on the patient's acceptance of the cultural stereotypes of mental illness and perception of controllability over illness. The meaning of this profile suggests a continuum between demoralisation and depression. The question then arises as to at which point does demoralisation become depression. Does demoralisation equate with low outcome expectancies? Do low outcome expectancies lead to a greater likelihood of the development of depression? And how will these impinge on performance of cognitive tasks.

Rehabilitation

Finding a distinction between neuropsychological attentional processes related to the illness itself and cognitive deficits which may be affected by motivational or social learning factors is important for purposes of rehabilitation. Understanding the nature of attentional problems more accurately will enable skills training will be more effective and will enable staff dealing with these clients to accommodate problems and focus on more relevant areas. It may be, for example, that the emphasis on motivational factors may be placing too high expectations on clients who have information processing deficits and thus contributing to repeated failures and lowered self-esteem which in turn may effect other areas of life functioning such as social interactions. This knowledge, therefore, has
implications for the development and enhancement of primary and secondary treatment and prevention strategies.

Such a finding has implications for rehabilitation for people with severe or chronic schizophrenia (especially those with negative symptomatology). It suggests that deficits in such areas need direct attention in the rehabilitation process before motivational factors are taken into consideration. Before clinicians attribute motivation as the major factor to be addressed it is important to assess the cognitive and attentional capacities of clients before expectations in performance or improvements can be made. Findings from studies by Delahunty and Morice (1993), Delahunty, Morice and Frost (1993) and Frost, Morice, Delahunty, Gulliver, Ryan, Frampton, Connolly and Hunter (1994) have demonstrated improvements in cognitive and general functioning as a result of direct cognitive skills training.

In terms of rehabilitation, this may mean the usefulness of assessing neuropsychological deficits especially in the areas of attention and distractibility before rehabilitation plans and strategies are introduced. For clients who demonstrate an associated depressive component, focus on self-efficacy and outcome expectancies may be advisable while for those presenting without a depressive component and with evidence of neuropsychological deficits a focus on cognitive remediation may be more advisable. Those with evidence of difficulties in both areas may need a more comprehensive approach to address the associated complexities.
Summary

The present study has investigated the possible contribution of locus of control to performance deficits in attention for schizophrenic subjects. While subjects were found to perform poorer on attentional tasks and to have greater belief in the external influences of power and chance, there was no significant correlation between the two variables.

The present findings suggest that schizophrenic subjects in remission may be demonstrating a core characteristic or direct behavioral manifestation of the illness that is relatively independent of epiphenomenal or environmental factors. The most likely explanation appears to be the involvement of an information processing deficit resulting from a decreased processing capacity or a dysfunction in an early stage of processing. However, factors such as sample representativeness and suitability of measures of locus of control need to be investigated before firm conclusions can be drawn.

It may be the case that for a subset of schizophrenics, a neuropsychological and neurological condition is more influential on attentional performance than epiphenomenal variables, and that the importance of locus of control in performance increases as the severity and chronicity of the illness lessens.

Such findings may have important implications for rehabilitation of schizophrenic clients. It suggests the usefulness of assessing neuropsychological deficits before rehabilitation plans and strategies are introduced, and that such deficits need direct attention before or simultaneously with other factors such as motivation.
Further Research

Although the results of the present study do not support a relationship between attentional decrements and locus of control for subjects with schizophrenia, consideration of other factors suggests these constructs and the proposed hypothesis are still viable areas for investigation. The replication of findings of an attentional deficit in a remitted sample which has not demonstrated a lateralised pattern suggests that future investigations comparing remitted and acute subjects would help clarify the distinction between core characteristics with those of episodic states and further address the issues of sustained attention and distractibility. Future studies need to ensure that a more representative sample of schizophrenics is recruited so that the relative effects of severity and longevity on information processing can be more accurately recorded. Comparison groups of subjects with other mental illnesses would be useful to further determine whether the attentional deficits are specific to schizophrenia or common to a number of illnesses such as manic depression.

One of the most frequently neglected areas in terms of research into schizophrenia is that of exploring the person's perception of their capabilities, their environment and their situation (Corrigan, 1989). Gaining such knowledge will increase understanding of motivation and attitudes and enable better prediction of behavioral patterns. The results of the locus of control (LOC) scales in the present study to measure perceived personal and external control replicated earlier findings and therefore confirmed previous perceptions and added validity to the use of the scales. However, the results of the LOC scales suggest a need to develop and refine items in the sub-scales to more accurately
and realistically measure the perception of long-term or severely disabled schizophrenic subjects.

With regard to the original hypothesis, the use of such a framework may be valid if the objective is to study the effects of perceived control on attentional tasks for the spectrum of schizophrenic subjects. A wider sample range and a locus of control measure which more accurately distinguishes between personal self-efficacy and outcome expectancy may indeed show a greater relationship between the two constructs.
REFERENCES


