Creativity and the Schizophrenia Spectrum Unveiled: The Similarities and the Differences

by

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Abstract

This study examined the commonalities and the differences between creativity and the schizophrenia spectrum. The variables measured as potential commonalities and differences were creativity, schizotypy, cognitive inhibition, spatial ability, balancing skills, positive and negative presence, absorption, mystical experiences, childhood abuse, and neuroticism. Three community groups were recruited, consisting of 31 artists, 10 people with schizophrenia, and 31 comparisons matched for gender and age with the artists. A larger student group consisting of 102 students was also recruited in order to examine the correlations among the same variables within a larger, more normative, group.

The largest commonality between the artist and the schizophrenic groups, who represented the extreme end of the schizophrenia spectrum, was the propensity to mystical experiences. The greatest differences between the artist and the schizophrenic groups were that the artists were higher in creativity, performed better on spatial abilities, had better balance, had more positive states of presence, and were lower in neuroticism than the schizophrenic group. In the student group, creativity was correlated with spatial ability, positive presence, absorption, and mystical experiences. In addition, creativity was significantly related to two facets of schizotypy, unusual experiences and impulsive nonconformity. In other words, students high in certain facets of schizotypy, who may share certain characteristics with those who have schizophrenia, are higher in creativity, but people who are on the extreme end of the schizophrenia spectrum, who have been diagnosed with schizophrenia, are not.

The differences between the artist and schizophrenic groups on spatial ability, balance, sense of presence, and neuroticism may help to determine whether mystical experiences help to integrate creative work or destabilize and disorganize the sense of self. It may be that mystical experiences can be used more positively by the creative individuals than people with schizophrenia, in that artists and people high in creativity were higher in positive traits such as positive presence and lower on negative variables such as neuroticism, and introvertive anhedonia.

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Introduction

The debate over the relationship between creativity and psychopathology has taken many forms. One may find it winding its way through arguments of semantics, or at the local art gallery, in the history of scientific discovery, and between the lines of lyrics that touch the hearts of all who listen. It began to appear in literature as far back as the writings of the Greeks, where it was the inner daimon that was thought to communicate creative ideas to the individual, and subsequently induce a state of "inspired madness" (Becker, 2001). Many contemporary studies, both qualitative and quantitative, have shown positive correlations between creativity and various mental disorders, or the risk of mental disorders, yet others show no such relation. Additional research has begun to tap into the personality factors and cognitive mechanisms that underlie both areas. The present study will examine these underlying factors more closely to determine which ones unite and which might separate creativity and psychopathology, more specifically in this study, the schizophrenia spectrum.

The research regarding the creativity and psychopathology debate has come from many different theoretical and research perspectives. The variables of interest in these different literatures, however, often seem to have overlapping content. One literature examines the problem of creativity from the perspective of psychiatry. This literature looks for direct relations between creativity and various mental illnesses such as schizophrenia and bipolar disorders. It also looks at creativity in the relatives affected with these disorders. Another literature, based on personality research, focuses on the trait of schizotypy. Researchers of this literature believe that schizotypy is a dimensional trait, in other words, the lower one's score, the more "normal" one is, while the higher one's score, the more characteristics one would have in common with those with schizophrenia. Those who examine the creativity versus mental illness debate from this perspective believe that creative people are higher in schizotypy than the average population, but short of actual schizophrenia. A more transpersonal/positive psychology literature looks at creativity in terms of transpersonal or mystical experience. For instance, Rank (1932) spoke of

artists as having the potential to use their creativity for the purposes of finding spiritual meaning in the face of death. Likewise, Csikszentmihalyi (2000) described flow, which is often experienced by artists while creating, as an intense feeling of clarity and concentration, as an experience in which time is often distorted, and as an intense intrinsically rewarding experience to the artist. These characteristics are often also described in mystical experiences (Hood, 1975). A final literature focuses on underlying traits that could account for both creativity and mental illness. Some examples of traits that could fit that role on the level of personality and cognitive style differences are absorption/ fantasy proneness/ imaginative involvement, while a literature on neurocognitive processes has researched the possibly overlapping concept of attentional "overinclusion". The following study will attempt to unite these distinct literatures by encompassing integral features of each one, in order to arrive at a more holistic and fully contemporary perspective of the relation between creativity and mental disorders or characteristics of mental disorders.

The following review of the literature will first discuss creativity in terms of its definition, the processes involved, its personality and cognitive correlations, and finally, its measurement. This will be followed by the relations found between creativity and psychopathology. Some personality traits that could account for both creativity and psychopathology will then be discussed. Since this study focuses on the relations between creativity and the schizophrenia spectrum, schizophrenia and schizotypy will be described. More specific similarities will then be discussed, namely, cognitive similarities. The literature review will then be concluded with some differences between creative individuals and those afflicted with more serious levels of the schizophrenia spectrum, such as spatial ability and sense of self presence.

Overlapping Research Perspectives

1. Creativity

Creativity has been defined as the ability to bring something new into existence (Barron, 1969). The idea of bringing something new into existence could explain why creativity has often been seen as something magical or mystical.

Mednick (1962) pointed out that in addition to an idea being original, it also needs to either meet a specific requirement, or be useful in some way. How then does one define usefulness? Some would say that if an idea benefits society, such that it satisfies technical, professional, aesthetic, or scholarly criteria, then it is useful (Cropley, 1999). However, what it is that constitutes a benefit to society could still be questionable. In response, Amabile (1983) proposed that creativity is the production of responses or works that are reliably assessed as creative by appropriate judges such as art critics or a specific scientific field, which, of course, could still be relative.

Definitions of creativity such as these focus on abilities of creative people or on the creative product itself. Other definitions, alternatively, focus on the creative process; for example, Finke (1990) defined creativity not as the product of a creative act, but the way one engages in creative exploration. He emphasized that creativity lies in the use of the things we create rather than the creation of the things that we use (Finke, 1990).

Generally, those who use definitions which focus on the creative person, such as those who take the individual differences approach to the study of creativity, study exceptional creativity (e.g. Barron, 1969; Eysenck, 1995). These researchers make the assumptions that some people are inherently more creative than others and that there are qualitative differences between their thinking styles and with those who are less creative (Ward, Smith, & Finke, 1999). Alternately, those who emphasize creative processes, such as those who take a cognitive approach to creativity research, often study normative creativity (e.g. Ward, Smith, & Vaid, 1997). These researchers make the assumption that everyone has the ability to be creative and that there are no qualitative differences

between the processes that account for high creative achievement and those that account for everyday problem solving.

This study is examining both exceptional creativity, such as can be seen in working artists, and normative creativity as distributed within a student population. Exceptional creativity will be studied as a category defined by one's placement in a group of visual artists, and normative creativity will be studied as a distribution that is present in any given normative university student population. Personality traits will be examined as well as cognitive processes potentially involved in creativity. Ultimately, creativity may be a combination of a creative person, a creative process, and a creative product, for it requires a creative person who is able and likely to employ a creative process to generate novel and useful outcomes.

There are many different theories attempting to account for the creative process, one being that of breadth of association. Association, often referred to as conceptual combination, is the merging of concepts that were previously separate, resulting in a novel entity that is more than the sum of its parts (Ward et al., 1997). Mednick (1962) stressed the importance of remote, or less common, associations for creativity. There has been some research indicating that defocused attention makes remote associations more accessible (Martindale, 1977-78). In a later study by Martindale (1995), he explained that defocused attention results in a greater activation of nodes in a network, therefore widening the range of relevant concepts and increasing the chances of creativity.

In contrast, Wertheimer (1959) advocated that creativity is a result of productive thinking, a type of thinking that involves productive processes such as grouping, centering, and reorganizing. Productive thinking involves restructuring, essentially grasping the crucial features of a problem and their relationship to the final solution. Restructuring works by changing the representation of the problem; in other words, new information is taken into consideration and a new perspective is taken in order to understand the problem (Runco, 2007). Wertheimer (1959) contrasted this type of thinking to problem solving using traditional logic and to associationism.

It is likely that both forming wider associations and taking a new perspective or grasping essential features of a problem are essential for creativity.

Most researchers in creativity would agree that much of the creative process, including forming associations and restructuring, happens unconsciously. Anecdotal evidence confirms this, given that spontaneous insights often present themselves to the individual in the form of a dream or a sudden flash, the origin of which cannot be pinpointed by the artist (Blackmore, 2004). Artists and scientists often describe the process of working deliberately on a problem, setting it aside to do something else, and then having the solution to the problem come to them seemingly out of nowhere (Blackmore, 2004). This experience has been tied into a widely used model of creativity that proposes four stages: the preparation stage, in which the problem is identified and the skills needed to solve the problem are acquired and applied; the incubation phase, where consciousness is diverted away from the problem; the illumination or insight phase, in which a creative insight flashes into view; and, finally, the verification phase, in which the insight is subjected to evaluation and criticism (Wallas, 1926).

Goswami (1996) compared these stages of the creative process to quantum theory, and more specifically, to chaos theory. According to Goswami (1996), chaos theory would predict that new creative ideas can happen only when old and more rigid patterns of associations in one's mind are first destroyed, thus, allowing unconscious processes to self organize as more novel associations.

Psychoanalysts also believe that creative ideas come from unconscious processes (Cropley, 1999), understanding the type of thinking that leads to creative ideas as primary-process thinking. Freud (1915/58) described primary-process thinking as a disinhibited and primitive system of thought containing unconscious conflicts and wishes, not subject to logic or oriented in reality. Primary-process thinking is the type of thinking exhibited in dreams, imagination, and fantasy. Kris (1952) extended Freud's theory by stating that artists are more able to regress to primary-process thinking in a controlled fashion, which he called adaptive regression and contrasted with

uncontrolled regression in psychosis. In creativity, these thoughts are then elaborated on during secondary, or reality oriented, thinking.

Some evidence for the involvement of unconscious processes in creativity has been found by Dijksterhuis and Meurs (2006), who presented three groups of participants with a creative task. One group was instructed to respond immediately, one was told to give the problem conscious thought, and the third was distracted for a few minutes so that unconscious processes could take place. The results revealed that the responses of the group in the unconscious thought condition were more original and divergent than those of the other two groups. Of course, in order for the unconscious mind to come up with creative solutions, one must first do the work of pondering the problem, as well as actually possessing the facts needed to solve the problem.

There are some social and environmental factors that can create unconscious conflicts and potentially lead to creativity. For example, Simonton (1975) found that periods of revolt against oppressive rule tended to increase the amount of creativity in the following generations. Similarly, Rank (1932) believed that the contemplation of the inevitability of death is a major motivator of creativity. Goodman (1981) found support for this belief by interviewing artists and finding that many of them have an upsurge of creativity after the death of a loved one. In addition, the knowledge that one could die at any time hastens the process of creativity out of fear that the artwork may not be completed (Goodman, 1981). Another explanation for revolt and death motivating creativity is perhaps that creativity happens as a result of the process of resolving trauma, whether it is personal or cultural.

Otto Rank (1932) proposed an intricate theory to further describe some of the inner conflicts experienced more directly by creative individuals. He argued that creative individuals face existential concerns more directly, partly because they are not as good at denying them and accepting the constructed realities spoon-fed to the general population. He also described a constant struggle artists have with their art and how this struggle is closely coupled with their fear of life and death. He suggested that artists paint because they fear the ever-changing

unpredictability of life and the inevitability of death. He said they wanted to crystallize life in order to gain control over its unpredictability, and also to leave something that will outlive them in order to transcend death and achieve immortality. The artist, however, cannot control life because a painting always changes from its original conception and thus, creates the unpredictability of life once again. Society then takes the painting, changes its meaning in order to incorporate it into its own ideology of immortality, and as a result, strips the artists from his or her more personal triumph.

Rank also points out that by trying to achieve a personal immortality beyond that of the collective one, the artist becomes isolated, and often experiences guilt for placing personality above the collective. Furthermore, the artist needs to draw from experience in order to create, which often leads to sacrificing the fullness of one's living in order to create. The artist thus faces a continuous struggle between the will to create and the will to live a normal life. Finally, artists crave fame, but this depersonalizes them from their art, threatens their immortality by making it collective, and robs them of the hope of living a normal life by exerting a constant pressure to continue creating at the level that made them famous in the first place. Abra (1995) agreed with Rank by saying that artists are especially sensitive to the questions that trouble all of humanity such as the meaning of life and death. Thus creativity becomes for many a tool for finding such meaning, reaching for the only type of immortality they can find: the immortality of their work. The contemplation of the inevitability of death, therefore, becomes both a drive to create and to finish one's work (Abra, 1995).

There has been some empirical evidence for conflict leading to greater creativity. Akinola and Mendes (2008) found that placing individuals in a social rejection condition resulted in more creativity than placing them in a social approval or nonsocial situation. They believed that this followed because the negative emotions induced by the social rejection condition produced more introspection and self-reflection and so led to more creative ideas. They also found that individuals who were predisposed to negative affectivity (i.e. had lower levels of

dehydroepiandrosterone sulfate, also found in people suffering from depression) were even more affected by the social rejecting condition, producing even greater levels of creativity. This demonstrates a person-situation interaction between a predisposition to negative emotions and a negative situation producing more creativity. Not all studies, however, found such a relation. For example, Ayers, Beaton, and Hunt (1999) failed to find any group differences between artists and controls matched for absorption in either a predisposition to negative affectivity or in having experienced more trauma that could have led to their creativity. The present study includes a measure of childhood maltreatment to determine one level of trauma, namely that of early childhood experiences.

Several other environmental factors that have been found to influence creativity are birth order, early parental loss, creative role models, and supportive environments (Eysenck, 1995). Motivation, sometimes considered an environmental variable (e.g. Amabile, 1983), is also essential for creativity. According to Amabile (1983), intrinsic motivation, which is engaging in a creative task for the purposes of enjoyment rather than for external rewards such as praise and financial gain, is an integral part of being successfully creative. Another variable that may affect creativity is age of the individual. Mednick (1962) reported that many great discoveries were made by individuals early in their careers. Mednick (1962) accounts for this by suggesting that people who possess the associations needed to solve problems will, over a long period of time, begin to develop inhibitory response habits that could actually hinder new creative ideas.

One aspect of creativity that has been widely studied is the personality of creative people. Barron (1969) conducted a series of studies in which he compared creative architects with non-creative architects and found that the creative architects were more unconventional, non-conforming, impulsive, independent, rebellious, open, sensitive, and emotional. He noticed that artists, especially visual artists, showed a noticeable preference for drawings that are complex and asymmetrical, as opposed to ones that are simple and symmetrical. More recently, using the five factor model for comparison, Feist (1998) found in his meta-analysis of creativity that artists

differed from non artists on two of the five dimensions: conscientiousness and openness to experience. He found that artists were less cautious, conscientious, controlled, orderly, and reliable; and they were more aesthetic, curious, imaginative, open to experience, sensitive, and original. Dispositions of creative people seem to be stable across the lifespan (Camp, 1994), and are also perhaps passed down through generations. Studies have confirmed that creativity does, in fact, have a genetic component (Eysenck, 1995).

Barron (1969) also reported that creative people lived more complex lives, and were more observant of their surroundings than their less creative colleagues. Their drive for finding purpose and understanding in their lives seems to be higher, as does their drive for expressing the transpersonal states that are thought to be repressed during socialization (Goswami, 1996). Similarly, Cowling (1985) imagined that the capacity to see things as unified, as happens in mystical experiences, would enhance the imaginative, novel, and emergent ways of thinking required for creativity. He found creativity to be correlated with mystical experiences in a normative sample (Cowling, 1985). Ayers et al. (1999) extended this research by finding that highly creative individuals had significantly more mystical experience, as well as archetypal-mythological dreams, than imaginative controls. They concluded that these intense states of consciousness may be part of their creativeness. However, the Tellegan Absorption Scale (Tellegen & Atkinson, 1974) has often been found to correlate with creativity (e.g. Roche & McConkey, 1990), and it has also been found to be correlated with the propensity to mystical experiences (Hood, 1975; Hunt, Dougan, Grant, & House, 2002). Therefore, this study will attempt to tease out whether creativity relates directly to the tendency to have mystical experiences, or whether this relation is mediated by absorption.

Another individual difference variable that has been widely studied in the creativity literature is cognitive style, the most popular being divergent versus convergent thinking. Guilford (1950) was the first to make a distinction between these two thinking styles, maintaining

that artists are higher in divergent thinking (Guilford, 1950). Eysenck, (1995) has added that people differ along a continuum between these two types of thinking.

Divergent thinking is made up of fluency (the number of ideas generated), originality (the uniqueness of ideas generated), and flexibility (the number of different categories implied by ideas generated), and has often been used as a way to measure creativity empirically (Runco, 2007). Many, however, such as Eysenck (1995), do not believe that divergent thinking is an accurate measure of creativity because it does not predict creative achievement; in fact, Eysenck reported that divergent thinking has a normal distribution, while creative achievement has a J curve, meaning that only a few ever reach a great creative achievement. This signifies that divergent thinking may be picking up on normative rather than exceptional creativity. According to Mumford, Vessey, and Barrett (2008), creativity is more than simply generating a large amount of ideas, in that gathering information, selecting from generated ideas, and evaluating one's work are all essential factors of creativity that go beyond divergent thinking. Evidently, creativity depends on a plethora of variables that include personality and the environment. Furthermore, Runco (2008) speculated that divergent thinking may be an estimate of potential creativity, but cannot guarantee creative behaviour. Similarly, Silvia, Winterstein, and Willse (2008) hypothesized that divergent thinking may predict creativity in novices, but not in experts, since knowledge and strategies used by experts cannot be accounted for by divergent thinking.

Besides knowledge of a field and learned strategies, Barron and Harrington (1981) found that intelligence itself is essential for creativity. They concluded that there is a threshold level of intelligence that is required for creativity to take place. According to Sternberg (2006), people need intelligence to see things in new ways, to recognize good ideas, and to persuade others of their ideas. Many of the above characteristics shared by creative people suggest that intelligence is necessary, but not sufficient for creativity (Dellas & Gaier, 1970).

In this study, creativity will be measured using the Barron-Welsh Art Scale (Barron & Welsh, 1952). This measure was devised by determining which items out of 400 free-hand figures

drawn in black ink were consistently preferred, or not preferred, by artists and non-artists. It was found that artists consistently preferred more complex, asymmetrical, free-hand, restless and moving figures to simple, bilaterally symmetrical, and predictable figures (Barron & Welsh, 1952). Artists would often describe the figures they preferred as more "organic" as opposed to the static, dull, and uninteresting ones preferred by non-artists (Barron, 1953a). Welsh (1975) concluded that people who scored high on this test were shown to be creative in real life, and had similar personality characteristics to people with high creative achievements.

There are several reasons why the Barron-Welsh Art Scale was chosen over fluency and divergent thinking tests, despite the fact that the latter are more commonly used (e.g. Silvia et al., 2008). First, it was chosen because of its emphasis on visual material. Many other tests of creativity use words and language, something which may not be a strong point in visual artists, such as those examined in this study. Many verbal tests of creativity, including divergent thinking tasks, tend to correlate too highly with IQ, which poses the threat that the tests may be testing intelligence instead of creativity (Eysenck, 1995). Divergent thinking is also thought to be highly confounded with fluency: the generation of many, not necessarily creative, ideas (Silvia et al., 2008). This problem would particularly pertain to this study because a creative response may be indistinguishable to a response made by someone experiencing psychosis. A schizophrenic may respond to a word generation task with a word salad that could be very novel but not necessarily creative. Furthermore, many of the divergent thinking tasks require an expert to judge the responses as being creative, and although there exists training on how to score them, the subjectivity in raters will always be an issue (Baer, 2008). Finally, divergent tasks have been found to have poor predictive and construct validity (Simonton, 2003). For example, one longitudinal study found that divergent thinking did not predict future productivity (Kogan & Pankove, 1974).

Silvia and his colleagues (2008) made an attempt to improve the validity of divergent thinking tests by constructing a new scoring method that involved the participants picking their two best answers after they have generated their ideas. They believed that this would eliminate the

confound problem between divergent thinking and fluency and also more closely replicate real life creativity where people must present their best work. They then attempted to find preliminary evidence for the construct validity of their new scoring method by finding correlations with their measurement of divergent thinking and various personality constructs related to the big-five traits that are known to correlate with creativity. They found correlations between creativity and openness to experience and conscientiousness with their new scoring of divergent thinking. However, conscientiousness is not a personality variable often found to be associated with creativity. Furthermore, personality itself is not equal to creativity, and therefore does not provide enough evidence for the construct validity of their new scoring method (Baer, 2008; Mumford, Vessey, & Barrett, 2008). As can be seen thus far in our discussion, personality is but one predictor of creativity and is not sufficient to predict creative behaviour. There is no substantive evidence, therefore, that the new scoring method devised by Silvia et al. (2008) is a more valid measure of creativity.

The Barron-Welsh Art Scale does not necessarily address all of the problems encountered in the measurement of creativity, but it does potentially fix a few. The measure has been found to be uncorrelated with intelligence (Welsh, 1975); however, it does correlate somewhat with fluency (Eysenck, 1995). It does not ask of the participant to generate anything, so there is no danger that non-useful answers will be scored as creative. Some validity has been found for this measure; more specifically, more creative individuals obtain higher scores than less creative individuals (Hall & MacKinnon, 1969). It has also been shown to correlate with personality variables that have been found to be characteristic of creative people, such as independence, openness, wide interests, intuitiveness, flexibility, and rejection of external constraints (Welsh, 1975). Likewise, it has been found to have good reliability (Welsh, 1975). The ultimate reason, however, that the Barron-Welsh Art Scale has been chosen is because the present study follows up much of the approach of Eysenck (1995), and he found this measure to be the most valid in his own research.

The measurement of creativity has suffered from the fact that these different measures of creativity do not often correlate highly with each other, and there does not seem to be a measure of creativity that perfectly predicts real life achievement (Eysenck, 1995). One reason for this is that creativity depends on more than responses to a given task, but depends on other variables such as personality and the environment. To increase the chances of measuring creativity in this study, there are also some direct questions about one's creativity such as rating oneself on the concept itself, and on various creative skills such as drawing, writing, and creating melodies. Participants are also asked to list their creative hobbies, how creative they consider themselves to be in these hobbies as opposed to the average person, and how much time they spend doing their hobbies. Hocevar (1981) has argued that simply asking the individual is one of the most valid ways of measuring creativity. Furthermore, several studies found that a self-rated measure of creativity was not overly confounded with a measure of intelligence, although some correlation given the needed threshold of intelligence is inevitable (Batey & Furnham, 2008; Furnham & Bachtiar, 2008).

This present study will include a group of self-identified creative individuals, namely working visual artists. They will be recruited from organizations of artists and galleries, and will be involved in creating visual art. They are asked to participate only if they have shows and/or if they make at least part of their income from selling their art, so that society has confirmed their creative potential and at least to some extent proved the relevance of their art. Furthermore, Hocevar (1981) argues that past creative behaviour is generally a good predictor of future creative behaviour, so that their involvement in creating visual art suggests that they will continue to create it.

Including a group of working visual artists will also help to validate the two measures of creativity. If the artists score higher than the matched-age comparison group on the measures of creativity, then it provides some extra evidence for the validity of the measures. It they do not, the measure has failed to properly measure creativity in working visual artists.

The reason working visual artists have been chosen over other areas of creativity is the author already has access to their community. Furthermore, mixing various types of artists may not

be useful because there is no certainty that creativity is a general ability that can be applied across domains (Baer, 2008). However, since the self-rated questionnaire already contains items that cross several creative domains, then perhaps having homogeneity in the group of high creatives would help lessen the ambiguity of the results. There is also no reason to believe that the personalities and cognitive styles of artists in different domains are comparable. In addition, it might be found that different groups of artists show different patterns of background psychopathology (Post, 1994).

2. Creativity and Psychopathology

Another approach to the debate between psychopathology and creativity has focused on the direct correlations between the two concepts. There is growing evidence that creativity is linked in some fashion to psychopathology (Eysenck, 1995; Ludwig, 1995). This affiliation can be seen first and foremost if one takes familial factors into account. In his study of female writers, Ludwig (1994) observed that the more creative ones were more likely to have mental illness in their immediate families, especially in their mothers. Although Ludwig suggests that these results may demonstrate a familial basis for the mental disorders of female writers, this should not obscure the potential impact that certain traumatic childhood experiences may have had on their lives. Several studies found that mental illness is a common phenomenon in the families of eminent people, or those who became famous due to their creative accomplishments (Ludwig, 1995; Post, 1994). This was especially found to be true when it came to artistic creativity. Kinney, Richards, Lowing, LeBlanc, and Zimbalist (2001), who conducted a controlled family study, found that children of people who had schizophrenia were only more creative than controls if they inherited some of parent's schizophrenic traits. These traits were determined by very high scores in schizotypy, showing a predisposition to schizophrenia, and schizoid personality disorders. Kinney et al. found that, generally, the more schizotypal traits people possessed, the more their vocational and avocational activities were rated as being creative.

Other studies have found a higher prevalence of various forms of psychological disturbances, including traits that may predispose people to mental illness, in creative individuals.

For example, in his series of studies on creative architects and writers, Barron (1969) found that the more creative groups were higher than normal on several dimensions associated with psychopathology. He found that creative writers were in the upper 15th percentile on many of the psychopathology measures (Barron, 1969). Similarly, MacKinnon (1962) found that in a sample of architects, creativity correlated with both the psychopathic deviate and schizophrenia scales of the MMPI. Based on applying DSM-III-R standards to biographical information, Post (1994) found that artists, composers and writers had more episodic psychiatric conditions, psychopathology, and personality disorders, in the sense of disrupting work, needing time off, and sometimes needing treatment than people in other professions such as scientists. Likewise, Ambers and Burke (2000) found that students doing their masters in fine arts showed similar cognitive processes as psychologically disturbed individuals on Rorschach tests when compared with students doing their masters in other subjects. The answers of the students doing their masters in fine arts revealed more fluid self-other boundaries, more preoccupation with early separation issues, more self-cohesion anxiety, and more manufacturing of idealized objects. Not all studies have found such relations, for example, Chavez-Eakle, del Carmen Lara, and Cruz-Fuentes (2006) did not find that high creative achievers scored significantly higher on a checklist of psychopathological symptoms.

Direct correlations have been found between creativity and both the schizophrenia spectrum and the bipolar disorder spectrum (Jamison, 1993; Prentky, 1989). For instance, Jamison (1993) found a high prevalence of depression and a history of lithium treatment in British writers and artists. Ludwig (1998) conducted a series of interesting studies in which he compared people in more creative professions with people in less creative ones. He started by comparing artists with scientists, and then reduced the scale of his comparison until he was comparing formal with symbolic visual artists. In all cases, he found that people in professions that required more intuitive, subjective, and emotional forms of expression had a higher prevalence of all types of mental illness than those in professions that required more logical, objective, and formal forms of expression. In one particular study, Ludwig (1995) reported that his creative participants had a

higher prevalence of alcohol use, drug use, depression, mania, anxiety, schizophrenia, and suicidal ideation in their lives.

Interestingly, it has also been found that there are different patterns of psychosis in different types of artists. For example, in her study of writers, Andreasen (1987) found that poets were more likely than other types of writers to have schizophrenia, and musicians were more likely than other types of artists to abuse drugs. Post (1994) found differences in types of pathology amongst different professions as well. More specifically, he found that creative writers were higher in antisocial, narcissistic, and histrionic tendencies, and suffered more from depressive conditions, while artists and philosophers were higher in paranoia, schizoid personality traits, and schizotypy.

Differences were also found in the way creativity was expressed in people's lives in terms of psychiatric diagnosis. Richards (2001) noted that there are more bipolar tendencies found in people who show more work-related creativity, and more schizophrenia found in people who engage in creative endeavors as leisure activities. The latter's creativity, therefore, is more out of the public eye. This could be accounted for by the notion that bipolar tendencies make creativity more relevant to the general population, while the more withdrawn personality of those with schizophrenic tendencies may prevent them from sharing their art or being business minded enough to properly promote it. Another study found no differences between creativity scores in people who are bipolar or schizophrenic (Ghadirian, Gregoire, & Kosmidis, 2001), but they also found that higher creativity is found in people who have tendencies towards schizophrenia or bipolar disorder, but do not have full blown diagnoses of either one. If someone is more seriously ill with either psychiatric disorder, he or she is less likely to be creative in such a way that society would find relevant.

These findings raise the question of how creativity and tendencies towards mental illness are related. Many believe that it could have something to do with underlying traits that these two groups have in common. Some of the personality characteristics mentioned above that Barron (1969) found in creative people are characteristics that would also apply to people high in

psychopathology. Non-conformity may be one of these, as well as unconventionality and impulsiveness. Eysenck (1995) also mentions uniqueness and forming unusual responses. Other shared characteristics mentioned by Neihart (1998) were intense feelings and racing thoughts. In her overview of creativity and psychopathology, Neihart focused on three areas of commonalities: mood, thinking styles, and tolerance for irrationality. As mentioned above, creative people are more prone to mood disturbances such as depression and mania.

People high in both creativity and psychopathology seem to have a higher concern for more abstract rather than social issues, and seem to see the world more magically. These observations, according to Otto Rank (1932), are partially due to the egocentricity often seen in creative people and those high in psychopathology. Such a characteristic would undoubtedly make social situations more challenging, which could perhaps bring about either a creative or a pathological response, or both. Neuroticism, which comprises emotional reactivity, a tendency to worry, a susceptibility to negative mood, and a proneness to psychopathology (Claridge & Davis, 2001) may also be implicated in creativity. Eysenck, (1993) proposed that creativity should be correlated with neuroticism due to the emotional involvement necessary for the creative process. Others have agreed that creative people are more prone to mood disturbances and are generally more sensitive and emotional (e.g. Barron, 1969). Several studies indeed confirmed this theory. Some found a correlation between neuroticism and creativity in the form of divergent thinking (Komarik, 1972; Furnham & Bachtiar, 2008), while another study found higher neuroticism scores in visual arts students than students in other departments (Burch, Pavelis, Hemsley, & Corr, 2006). Others, however, have failed to find that connection (King, McKee, & Broyles, 1996). Neuroticism will be measured in this study to see if it relates to either creativity in the general population or to the classification of being a working visual artist.

3. Absorption and the Propensity to Mystical Experiences

One of the most likely candidates for a factor common to both creativity and psychopathology appears to be imaginative absorption and a closely related cluster of overlapping

measures. The term absorption was first coined by Tellegen and Atkinson (1974), who described it as "a disposition for having episodes of total attention that fully engage one's representational resources (i.e., perceptual, enactive, imaginative, and ideational)" (p. 262). Roche and McConkey (1990) describe it as an "openness to experience emotional and cognitive alterations across a variety of situations" (p. 91). People high in absorption tend to have periods of becoming fully absorbed in attentional stimuli. They are more likely than others to experience a heightened sense of reality for a given stimulus, are unaware of distracting events, and often experience an altered sense of reality (Tellegen & Atkinson, 1974). Absorption has often been associated with creativity. This relation is not surprising since most art requires for its production a very absorbing type of attention.

Absorption is sometimes thought to be a facet of openness to experience, as one of McCrae and Costa's (1999) five basic traits of personality. Measures of the two concepts are, in fact, correlated (.40 to .55) (Hunt et al., 2002; Roche & McConkey, 1990; Wild, Kuiken, & Schopflocher, 1995). Openness is described by McCrae and Costa (1997) as manifested in "the breadth, depth, and permeability of consciousness, and in the recurrent need to enlarge and examine experience" (p. 2). McCrae (1993-94) also observed that people who are high in openness have more vivid fantasies, are more creative, are more sensitive to their feelings, are more behaviorally flexible, are more intellectually curious, and possess less conventional attitudes. They also tend to be more in tune with their intuition, and have thin mental boundaries. Openness is thought to be genetic, and is relatively stable in adulthood (McCrae, 1993-94).

Other traits that have been associated with absorption, and sometimes even used interchangeably with it, are imaginative involvement and fantasy proneness. Imaginative involvement entails the suspension of reality and the expansion of consciousness (Roche & McConkey, 1990). It was a term used by Hilgard (1974) to describe highly hypnotizable people. She described it as "the savoring of sensory experiences, drama, reading, childhood fantasy...and creativity" (p.138). Hunt et al. (2002) found significant correlations between imaginative

involvement and absorption. Wilson & Barber (1981) similarly describe fantasy prone people as those who spend a lot of their time in a world of imagination and fantasy. They are also often creative, have vivid mental imagery, and see themselves as unique individuals who do not conform to the mainstream (Lynn & Rue, 1988). There seem to be two routes to fantasy proneness: parental encouragement for creative activities and isolating childhood trauma that can make fantasy a refuge (Lynn & Rhue, 1988). Many have found a relation between childhood abuse and absorption (e.g. Eisen & Carlson, 1998). Post (1994) found that 56 percent of a group of eminent creative writers had unhappy childhoods. Ayers at al. (1999) failed to find a connection between childhood trauma and creativity in a study; however, they compared working creatives to controls matched for levels of absorption, suggesting conflict would be more related to a background absorption than to creativity per se. This study will also examine these variables in an attempt to replicate or extend these findings.

Dissociation, another correlate of absorption, has been defined by Bernstein and Putnam (1986) as "the lack of the normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory" (p. 727). In earlier literature, absorption and dissociation were often used interchangeably; however, Irwin (1999) argued that absorption is the nonpathological side of dissociation. Although it has a significant positive correlation of .35 to absorption and .30 to imaginative involvement, Hunt et al. (2002) agreed that dissociation represents the negative side of these traits, since of all these measures it alone was correlated with neuroticism. Spiegel (1986) reported that dissociation is a defense mechanism that is used to deal with the pain caused by trauma. Dissociation separates consciousness from the immediate effects of fear and pain. Although it may be helpful at the time of abuse, dissociation may become an integral part of one's functioning and might cause psychological dysfunctions later in life.

Absorption has also been found to correlate with several processes. Wild et al. (1995) related it to experiential involvement (also an engagement with an attentional stimulus), aesthetic experience, flow (specifically, intense involvement with an optimally stimulating task so that one

loses track of time), and peak experience (an experience of profound meaning). Wild et al. also found that absorption is related to the motivation to listen to music, to paint, and to view art. In addition, it is related to the perceived importance of these things, and the impact of these activities on mood. Absorption involves the ability to become open to a variety of domains such as fantasies, actions, ideas, feelings, and values (McCrae, 1993-94). It also has been found to relate to the frequency of mystical experiences (Hood, 1975; Hunt et al., 2002).

Carl Jung coined a term very similar if not identical to the ones described in the preceding paragraphs. He labeled his concept innate sensitiveness and described it as a predisposition to more reflection and intuitiveness. Aron (2004) revisited Jung's concept and found in her research that people high in sensitiveness are easily over stimulated, and as with the concepts mentioned above, are particularly affected by childhood trauma. According to Jung, people who were high in sensitiveness and also experienced childhood trauma were more likely to develop depression, anxiety, and shyness later in life (Aron, 2004).

Many believe that absorption and its correlates have two sides, one more positive, such as their association to creativity (e.g., Manmiller, Kumar, & Pekala, 2005) and some more negative (e.g., Roche & McConkey, 1990). For instance, most of the above measures have also been associated with some degree of psychopathology. Openness has been known to correlate with measures of schizotypicality and narcissism (Costa & McCrae, 1995; Widiger & Trull, 1992), and Watson (2001) found that dissociation was highly correlated with schizotypy. There is also evidence that higher scorers on absorption and fantasy proneness are more at risk to be distressed, symptomatic, and have an elevated score on schizotypy measures. Absorption has been found to correlate with nightmares (Belicki & Belicki, 1986), hypochondriacal concerns (McClure & Lilienfeld, 2002), panic attacks (Lilienfeld, 1997), and somatization and global distress (Gick, McLeod & Hulihan, 1997). Lynn and Rhue (1988) found that fantasizers scored higher on the MMPI schizophrenia scale; however, it was only a small number of the fantasizers that had those heightened scores. Absorption has also been associated with a tendency to place personal

meaning on events that may not be widely relevant consensually, something that is also present in patients with schizophrenia (Roche & McConkey, 1990). Tellegan and Atkinson (1974) agreed that high absorbers may have difficulty discerning fantasy from reality:

> Even if the attentional object is constructed from memory, it is experienced as present and real. It is assumed that an already fully engaged representational system cannot, in addition to representations of the focal object, maintain salient qualifying "meta-cognitions," that is, thoughts about the primary representation, such as "this is only my imagination" or "this is not really happening".

As mentioned earlier, absorption and its related concepts have also been known to correlate with childhood trauma. One study in particular found that college students with high scores in dissociation had more psychopathology and a greater history of all types of abuse in their childhoods (Sandberg & Lynn, 1992). One possibility is that if one is high in absorption and then experiences childhood trauma, then the negative face of absorption, in other words dissociation, might be expressed. This theory was partially confirmed in a study by Irwin (1999) who found that pathological dissociation was predicted by childhood trauma, but non-pathological dissociation, or what he referred to as psychological absorption, was not. Jung also mentioned that people high on his trait of sensitiveness tend to resort to fantasy while stressed, and are more prone to anxiety, depression, and dissociation when faced with adversities (Aron, 2004).

The positive side of absorption has been referred to as a more transpersonal, or growth-enhancing state of consciousness (Hunt et al., 2002). As well as being related to dissociation, Hunt et al. (2002) found that absorption is related to the Hood (1975) mysticism scale. Mystical experiences are sometimes thought of as the core experiential aspects of religious experiences (Hood, 1975). Despite their slight variations in ideological interpretations, these experiences are often thought of as being universal. This study will employ the Hood Scale of Mystical Experiences, which includes experiences such as a loss of sense of self, unity, inner subjectivity, spatial and temporal transcendence, the acquisition of special intuitive knowledge, ineffability, intense positive affect, and religiousness. Hood (1975) found that the propensity to mystical

experiences was also related to several other religious experience scales and openness to experience.

The two sides of absorption have been distinguished further by the finding that dissociation was not related to the mysticism scale, and that the negative qualities of neuroticism and ego grasping, described as over-controlling one's experience instead of simply accepting it, were related to dissociation but not to mysticism (Hunt et al., 2002). This demonstrates that although both positive and negative traits are related to absorption, these traits are not related to each other, meaning absorption likely has two sides.

Despite the differences between the more positive and negative faces of the traits discussed above, overlap is seen in many cases. In addition, Hunt et al. (2002) found evidence for the inseparability between the more positive states of consciousness such as mystical experiences, and some degree of conflict and emotional pain. Hunt et al. (2002) suggest that these traits may even come from a common predisposition to sensitivity and openness to spontaneous altered states of consciousness. Concepts such as these might help explain some of the similarities between creativity and psychopathology by providing characteristics from which both may stem. Both absorption and mystical experiences will, therefore, be tested to see if they are related to both creativity and the schizophrenia spectrum more so than to a comparison group. To test the two sides of these traits, correlations within the artist and the schizophrenic groups will be examined to see if the propensity for mystical experiences correlates more with positive states in the artist group and negative states in the schizophrenic group. If it does, then it will provide additional evidence for the positive and negative sides of altered states. Finally, absorption will be tested to see if it mediates the relations between creativity and mystical states and creativity and more negative states. If they do then it will provide evidence for absorption being a core altered state from which others, both positive and negative, may stem.

4. The Schizophrenia Spectrum

One thing that could be helpful in deciphering the correlation between creativity and psychopathology would be to examine mental illnesses more directly. Schizophrenia and bipolar disorders are the most widely studied mental illnesses in relation to creativity due to their sharing of perceptual and cognitive anomalies with both absorption and creativity. Furthermore, Claridge (1997) suggested that it is the schizophrenic element rather than the affective element of the schizo-affective continuum that is more closely related to creativity. Since visual artists will be examined in this study, and were found by Post (1994) to be higher in paranoid, schizoid, and schizotypal disorders than other groups of creative individuals such as writers, then the schizophrenic spectrum is the mental illness dimension that will be emphasized. This will include schizophrenia at the extreme end of the spectrum and schizotypicality to represent the features of the illness present in non-patients.

Schizophrenia

A description and short history of the schizophrenia spectrum follows, beginning with the illness itself, which represents the extreme end of the spectrum. Schizophrenia, which affects approximately one percent of the population, can be characterized by a difficulty in distinguishing between what is inside and what is outside of the self (Barron, 1969). Bleuler (1924) saw people with schizophrenia as highly autistic, in other words, they seem to turn away from reality towards a more inner world of fantasy. The symptoms of schizophrenia can be classified into three categories: positive symptoms, negative symptoms, and cognitive disorganization (Javitt & Coyle, 2004). Most people with schizophrenia have a combination of symptoms that may include one or more of the three categories. The positive symptoms are the ones that are the most noticeable to the public eye. Some of these symptoms include agitation, paranoid delusions, and hallucinations. Some of the more common paranoid delusions are feeling conspired against, believing one is somehow special or chosen for some great task such as saving the world, believing one's thoughts are being broadcast, and believing that one's feelings, thoughts, and

actions are dictated by forces outside oneself (Bernheim & Lewine, 1979). In a study in which they looked at first-person accounts of delusions, Santon and David (2000) found that people with schizophrenia think that everything around them possesses personal meaning, in other words, every thing that happens fits into their delusions. An example would be if someone read something seemingly unrelated to them in a newspaper, but still related it to themselves by claiming that it was written in code. This would indeed seem to demonstrate a lack of boundary between the self and the outside world. Some examples of hallucinations people may have are hearing their thoughts spoken aloud, and hearing voices commenting on their actions and/or giving them instructions. These perceived instructions can be especially dangerous because they can bring on violent actions. According to Hughlings Jackson (1932), positive symptoms are created by the individual in order to fill the void left by the negative symptoms, which include a loss of interest in others, emotional withdrawal, and blunted affect.

Negative symptoms can be particularly distressing to the individual who is experiencing them since they can be experienced as signs that something is wrong with one's mind. One example of trying to cover up blunted affect with a delusion would be to accuse the government of releasing chemicals into the environment that prohibit people from realizing their full emotional potential. One of the most common cognitive symptoms, and one which according to Bleuler (1924) is one of the fundamental features of schizophrenia, is loosened associations, which can result in mixing words together and creating so called "word salads" (Javitt & Coyle, 2004). In some cases, a thought may be articulated coherently in one's mind, but when the attempt is made at communicating the thought, it is not produced in a meaningful way.

Like most physical and mental disorders, schizophrenia has both a biological and an environmental basis. According to Bernheim and Lewine (1979), schizophrenia occurs as a result of physiological and psychological predispositions, and environmental stress. People with schizophrenia have an excess of the neurotransmitter dopamine and a lack of the neurotransmitter glutamate in their brains (Javitt and Coyle, 2004). This does not mean, however, that everyone

with this type of brain chemistry necessarily has schizophrenia. According to Javitt and Coyle (2004), studies conducted with monozygotic twins showed that when one twin has schizophrenia, the other twin only has about 50 percent chance of also being afflicted. It seems as if people may be born with a predisposition for schizophrenia, but the environment determines whether or not it will develop. Environmental causes are more difficult to identify because of the large number of variables that are involved.

One likely antecedent to schizophrenia is stress. According to Fairbairn (1994), maternal deprivation and hostility is one of the major causes of adult psychopathology. Fairnbairn's theory suggests that as a result of experiencing abuse or parental neglect, children develop split ego structures. This either happens because they internalize the "badness" that they see in their parents, or create a split within themselves in order to remain attached to an object that they also hate. This same split is seen in many adults with schizophrenia: they have difficulty integrating good and evil, and have difficulty accepting the aspects of themselves they find less favorable.

Sullivan also suggested very strong environmental factors as being the main causes of the disorder (Sullivan, 1956). He argued that schizophrenia is not completely intrapersonal, but rather it stems from people's relationships with others, more specifically relationships with family members. He took a dynamic approach by claiming that childhood is extremely important in the development of schizophrenia, since it is childhood stress that is reactivated later in life which triggers the onset of the disorder (Sullivan, 1956). Like Bleuler, Sullivan saw the self as being an important aspect of the disorder, but he went further by stating that the self was damaged by negative appraisals from the parents that were detrimental to self-esteem. Arieti (1974) then took Sullivan's theory further by stating that the children then grow up feeling guilty for being angry at their parents, and generally detach themselves emotionally to prevent further blows to their self-esteem. Despite their aloofness, however, they are often very emotionally sensitive and can show much emotion if need be. Sullivan believed further that once their aloof defenses are threatened,

and can no longer protect them, they become very anxious and blame others for their difficulties. The full blown psychosis is seen as the last attempt to heal oneself (Arieti, 1974).

Other researchers disagree with blaming the parents and instead believe that schizophrenia could be caused by internal or environmental toxins. For example, Bleuler (1924) theorized that schizophrenia had an organic cause, and that some sort of toxin could play a part. Earlier, Kraepelin (1904) posited that schizophrenia was due to a metabolic disorder. Some research has found differences in metabolic functions in schizophrenia; for example, Takahashi (1953) found that people with schizophrenia have more problems in metabolizing sugar in their brain tissues, and Henry (1927) found that a high percentage of people with schizophrenia have problems with their gastro-intestinal functions. A more recent study suggested that prenatal exposure to lead and/or delta-aminolevulinic acid could play a part in the later development of schizophrenia (Opler et al. 2004). Of course an inborn hypersensitivity would also be associated with more negative parental experiences, thus fitting with the later adult recall as documented by Fairbairn and Sullivan.

Placing the nature/nurture debate aside, Sass and Parnas (2003) have focused on the homogeneity of schizophrenic symptoms, searching for an underlying psychological cause. Together, they rejected the earlier notions of schizophrenia as irrationality. Instead, Sass (1992) argued that the diminishing of mental functions in schizophrenia was in fact the result of a heightening of conscious awareness. This heightening of awareness is often experienced as a preoccupation with inner life rather than with the outside world (Ogilvie, 2000).

Sass and Parnas (2003) proposed that schizophrenia is a disorder of the self, and that all of the symptoms could be accounted for by two distortions in awareness: a diminished self-presence and hyperreflexivity. The former refers to a diminished sense of existing as an autonomous source of awareness and action. This is reflected in many cases in which people feel their thoughts or actions are controlled by external forces. They often feel separate from their bodies, as if they are no longer their own. These symptoms can be paradoxical, as in the sense of

controlling the universe, but being unable to control one's own body. Hyperreflexivity refers to an exaggerated form of self-consciousness in which inner processes become focal objects of awareness (Sass, 1992). It is as if a heightened introspection is imposed on the individual. The fact that inner processes are continuously and involuntarily scrutinized makes these processes seem distant, or separate from the individual. Another symptom that is most likely due to hyperreflexivity is the dissolution of ego boundaries (Sass, 1992). It becomes difficult for the individual to distinguish what is inside and what is outside the self. Hallucinations and altered states would most likely arise, subsequently, as expressions of these alterations. The potential connection between hyperreflexive introspection and absorption seems obvious. Previous research has also found that people with schizophrenia had equal Hood questionnaire of mystical experience scores as long term meditators (Stifler, Greer, Sneck, & Dovenmuehle, 1993). This, again, could be another outcome of both hyperreflecivity and a diminished sense of self. Since artists have also been found to be high in mystical experiences (Ayers et al., 1999), mystical experiences may be a variable that could potentially be shared by the two groups. This will be the first study to compare mysticism scores in artists and people with schizophrenia.

One of the difficulties in diagnosing schizophrenia is that it is rarely seen in its purest form. Schizophrenia is often seen in combination with affective disorders such as manic depression. In fact, ever since Emil Kraepelin (1904) distinguished between manic-depressive (now bipolar) disorder, and what we now call schizophrenia, the validity of this classification has been in question (Greene, 2007). Those who have tried to find a clear distinction between the two were unable to do so (Brockington, Kendell, Wainwright, Hillier, & Walker, 1979). This view would lead to a more general factor of psychopathology and/or schizo-affective psychosis as advocated by Eysenck (1995).

Most would agree, however, that patients with full blown schizophrenia are not necessarily creative. For instance, Rubinstein (2008) found that people with schizophrenia were very low in conceptual fluency. He concluded that because the patients are often chronic, they no longer have

any creatively productive psychotic episodes. Rather, their post psychotic impairment leads to verbal deficiency and general deterioration of personality that is responsible for their lack of fluency.

Schizotypy

Several researchers (e.g., Cox & Leon, 1999; Eysenck, 1995; O'Reilly, Dunbar, & Bentall, 2001) pointed out that since outwardly recognized creativity is not often seen in full blown schizophrenia, it may be more profitable to look at creativity correlates with the background characteristics that predispose one to schizophrenia or subclinical psychopathologies. Schizotypy is a good candidate for this type of inquiry. Schizotypy is a trait possessed by certain people who others often find unusual. It was a clinical label created by the psychoanalyst Rado (1953) and further developed by Meehl (1962) to identify the potentially inherited deficit that could interact with environmental influences and lead to the development of schizophrenia. Schizotypy has much overlap with schizoid personality disorder, defined in the DSM-IV (American Psychological Association, 1994) as including signs of indifference to social relationships, constricted affect (cold, aloof), and a preference for solitary activities. The schizoid personality is also similar to schizophrenia in that people high in the trait tend to lack affect towards others and are often very independent and autistic (Eysenck, 1995). People who score high on questionnaires of schizotypy (Claridge, 1997) are more likely than the average person to experience unusual perceptions, have odd ideas, behave inappropriately, and are often described as being "eccentric" (Fisher, Mohanty, Herrington, Koven, Miller, & Heller, 2004).

Loren and Jean Chapman and their collaborators developed a series of self-report, true-false questionnaires that measured symptoms and traits that characterized schizotypy and schizophrenia (Chapman, Chapman, & Raulin, 1976). They found that with these scales they could identify a large proportion of the normal population as having experienced psychotic-like experiences (Chapman et al., 1976; Eckblad & Chapman, 1983), some of which, however, overlap with experiences included in absorption measures. Some of the scales they developed were the

Perceptual Aberration Scale (Chapman et al., 1976), which measures perceptual distortions of objects and the body; the Magical Ideation Scale (Eckblad & Chapman, 1983), which measures beliefs such as implausible causality and special powers; the Revised Social Anhedonia Scale (Eckblad, Chapman, Chapman, & Mishlove, 1982), which measures asociality and an indifference to others; the Physical Anhedonia Scale (Chapman et al., 1976), which measures deficits in sensory and aesthetic pleasure; the Impulsive Nonconformity Scale (Chapman et al., 1984), which measures impulsivity and the failure or refusal to conform to society; and finally, the Hypomanic Personality Scale (Eckblad & Chapman, 1986), which measures chronic affective conditions. Chapman, Chapman, Kwapil, Eckblad, and Zinser (1994) found in a 10-year longitudinal study that those high in what they considered the positive symptoms of schizotypy (perceptual aberrations and magical ideation) had a significantly greater prevalence of psychotic disorders later in life.

Brod (1997) reviewed several factor analysis studies, including those by the Chapmans and their collaborators, and found evidence for at least four distinct syndromes in schizotypy. The first factor is Aberrant Perceptions and Beliefs, sometimes referred to as unusual experiences, and is often associated with the positive symptoms of schizophrenia, and so is referred to as positive schizotypy (Venables, 1995). This factor includes magical thinking, perceptual aberration, paranoia, suspiciousness, a tendency to experience hallucinations, and a tendency to experience manic states. This factor combined both the perceptual aberration and the magical ideation scales by Chapman, Chapman, and their collaborators, and shows the greatest overlap with absorption. The second factor is Introvertive Anhedonia, which includes social and physical anhedonia, and flat affect (Brod, 1997). It encompasses the negative and withdrawal symptoms often found in schizophrenia and schizoid personality disorder. The third factor is Cognitive Disorganization, and closely resembles the cognitive disorganization often found in schizophrenia. It includes social impairment or anxiety, attentional difficulties, distractibility, and sometimes introversion and neuroticism (Brod, 1997). The fourth factor, Asocial Behaviour, is sometimes referred to as impulsive noncomformity and is the factor that most closely resembles Eysenck's (1983) original

psychoticism trait. According to Claridge et al. (1996), it consists of asocial behaviour, impulsiveness, and mood-related disinhibition.

When the label of schizotypy was created, most researchers believed that it was a distinct type of mental disorder, and that this disorder was basically a milder version of schizophrenia, and thus, categorical (Meehl, 1962). The quasi-dimensional model of schizophrenia introduced the idea of continuity between schizophrenia and its milder forms such as schizotypy or schizoid personality disorder (Claridge, 1997). This continuity is often referred to as the schizophrenia spectrum. Bleuler (1924) was the first to suggest a fully dimensional model, in which milder forms of schizophrenia can exist within healthy individuals. This model was further taken up by Claridge (1997) who proposed that schizotypal traits can range from healthy or adaptive variations to a predisposition to psychosis. For instance, Holmes and Steel (2004) conducted a study in which they found that people with positive schizotypy experience more PTSD-like intrusive experiences than controls, and intrusive experiences may be one of the mechanisms behind the positive symptoms of psychosis (Holmes & Steel, 2004). Further support for the dimensional model was found by Rawlings, Williams, Haslam, and Claridge (2008) who used a taxometric analysis to demonstrate that Meehl's finding that schizotypy is categorical may have just been due to the skewed distribution of the data rather than the presence of a taxon. The obvious temptation, supported by research (below) is to equate this healthy variant of schizotypy with absorption and openness to experience.

Eysenck and Eysenck (1976) was one of the first to propose a related model of schizophrenia as the extreme end of a personality continuum. Eysenck (1995) argued that the more extreme psychological disorders came from a personality trait, called psychoticism, on which all people vary. Eysenck defined psychoticism as a dispositional trait in which people show similar cognitive features to psychotic patients, and developed a questionnaire for its measurement (Eysenck & Eysenck, 1976). Also, if combined with environmental stress, this trait can predispose people to functional psychotic disorders of all types. However, in the absence of psychosis, people

who score higher on this trait could be as psychologically healthy as people who score lower. He stated that the positive face of psychoticism could be creativity. Several researchers have found a positive correlation between psychoticism and creativity (Barron, 1969; Stavridou & Furnham, 1996; Woody & Claridge, 1977). Psychoticism, however, is not the dimension that defines schizotypy, for it loads only on one of the schizotypy factors, namely, impulsive nonconformity (Claridge et al., 1996; Claridge, 1997). In other words, Claridge (1997) concluded from his research that psychoticism is only one of the factors that comprises schizotypy. Hypomanic personality and borderline personality disorder loaded on the unusual experience and the cognitive disorganization factors respectively, not the psychoticism factor (Claridge et al., 1996), which suggests that not all psychotic disorders may stem from psychoticism as Eysenck (1995) had suggested.

Several recent studies have supported a dimensional model of schizotypy, otherwise known as the schizophrenia spectrum (Goulding, 2004). McCreery & Claridge (2002) believe that some of the facets of schizotypy that are present in the subclinical population could be seen as being positive or adaptive. They conducted a study with people who have experienced an out-of-the-body experience and controls and found that those who have had an out-of-the-body experience scored higher than the comparison group on the positive schizotypy facet of Aberrant Perceptions and Beliefs, but not higher on the other negative facets of schizotypy or on neuroticism. Although some may pathologise out-of-the-body experiences, many deeply value them, and even give them a religious significance (McCreery & Claridge, 2002).

A similar study conducted by Day and Peters (1999) found that members of new religious movements scored significantly higher than non-religious groups and mainstream Christians on an unusual experiences scale. This signifies that one can score high on schizotypy and still be a functioning member of society. Both the new religious groups and the mainstream Christians scored higher than the non-religious group on Introvertive Anhedonia, although the authors believe that could be at least partially accounted for by the qualities promoted by most religious groups of

quiet prayer and meditation. Finally, Jackson (1997) conducted a study in which he found a substantial correlation between positive schizotypy (unusual experiences) and mystical experience. He found that the correlation to schizotypy was higher than the correlation of any other personality variable to mystical experience. The studies above all support the notion that positive schizotypy overlaps with mystical states, which suggests that there is a facet of schizotypy that could indeed be considered adaptive.

Another adaptive attribute that has been found to correlate with schizotypy is that of creativity. Indeed, the choosing of art as a career is likely correlated with aspects of schizotypy. Support was found for this in a study by O'Reilly et al. (2001) who compared humanities and creative arts students and found that the creative arts students scored higher on the unusual experiences dimension of schizotypy. Several studies have found that positive schizotypy was related to creativity (Green & Williams, 1999), including one that used a measure of self-rated creativity (Batey & Furnham, 2008). This finding is expected to be replicated in the present study. Fisher et al. (2004) found that the combination of magical ideation, perceptual aberration, odd beliefs, and unusual perceptions were significantly correlated with scores of figural fluency, a measure of creativity. Several researchers have made the connection that both creativity and schizotypy result from an increase in brain activity in the right hemisphere (Fisher et al., 2004; Weinstein & Graves, 2002). It has been asserted that the linking of uncommon ideas is a right-brained process which is often associated with creativity, but in extreme cases, can lead to the creation of delusions (Fisher et al., 2004).

Several researchers found that only positive schizotypy, which includes unusual perceptions and magical beliefs, can be linked to creativity, while negative schizotypy, which includes anhedonia and flat affect cannot (Fisher et al., 2004; Tsakanikos & Claridge, 2005). Several creativity measures, namely the Barron-Welsh Art Scale, an alternate uses test (which measures divergent thinking), and several assessments of creative activities, were found to be positively correlated with positive schizotypy, impulsivity, and hypomania; and negatively

correlated with negative schizotypy and depression in a study by Schuldberg (2001). Similarly, Batey & Furnham (2008) found that self-rated creativity is positively correlated with positive schizotypy (unusual experiences) and impulsive nonconformity, but negatively correlated with cognitive disorganization. These findings give support to Eysenck's (1995) theory of a relation between creativity and psychoticism, since his measure of psychoticism is similar to impulsive nonconformity (Batey & Furnham, 2008). Conversely, Cox and Leon (1999) did find a positive correlation between an alternate uses test and Introvertive Anhedonia. One possibility is that different domains and styles within the creativity dimension might account for these variations; for example, perhaps the differences lie in the relevance of the creative ideas.

There are other explanations that could account for the correlations between positive schizotypy and creativity. For example, there is evidence that both positive schizotypy and creativity are associated with similar brain waves. Stough, Donaldson, Scarlata, and Ciorciari (2001) found that those high in questionnaire openness had greater theta production, and suggested that these waves would most likely be a requirement for magical or unusual thoughts or experiences. Glickson and Naftuliev (2005) found similar brain wave differences in those high on Eysenck's questionnaire measure of psychoticism. Another theory is that positive schizophrenic-like unusual experiences could be the product of a higher automatic spreading activation; for instance, one word could automatically activate another similarly sounding word, which could in turn activate another semantically related word (Tsakanikos & Claridge, 2005). This type of process is also thought to facilitate creative ideas.

It is expected that the positive results between creativity and both positive schizotypy and impulsive nonconformity will be replicated in this study. Besides finding these correlations, it is expected that working artists will score higher on these facets of schizotypy than non-artists. People with schizophrenia, conversely, are not expected to be significantly higher in creativity than a matched-age comparison group, but are expected to be higher than this group on the introvertive anhedonia subscale of the schizotypy measure. If these expected results are found, then it would

provide evidence that creativity is related to being moderately high on the schizophrenia spectrum (being high on certain aspects of schizotypy), but not at the highest end (having schizophrenia).

Cognitive Similarities: Overinclusiveness and Semantic Inhibition

Much of the recent research on the correlations between creativity and psychopathology has focused on the commonalities of cognitive processes in the two groups. According to Heinrichs (2005), cognitive measures are better at distinguishing people with and without schizophrenia than neurological tests such as structural magnetic resonance imaging and positron emission tomography. For these reasons, a cognitive measure will be used to demonstrate some commonalities between creativity and the schizophrenic spectrum in this study.

There have been many theoretical arguments made for the cognitive commonalities of creativity and psychopathology. Heinrichs (2005) believed that cognitive differences are the primary symptoms of the schizophrenic brain. It has already been mentioned that people with schizophrenia have looser boundaries of the self. This same phenomenon may also be true for those high in creativity. Rose (1964) argued that artists possess the capacity to loosen their boundaries of the self so that they can then reshape their surroundings into art. A related cognitive similarity found in the two groups is that they both have the tendency to make loose associations. Bleuler (1924) argued that impaired associative thinking was the fundamental defect in schizophrenia, and that it is what leads to observable behaviours such as delusions and hallucinations. Similarly, making associations between remote ideas is considered a necessary step to developing creative ideas (Mednick, 1962).

A related cognitive trait that has been associated both with creativity and psychopathology is that of overinclusiveness. Cameron (1939) originally used this term to describe the thinking styles of people with schizophrenia. He described it as the inability to maintain normal boundaries, and the use of abnormally large and vague categories.

This theory of overinclusiveness was later reformulated so as to include an increased awareness of, or a failure to inhibit, internal and external stimuli that are irrelevant to the task at

hand (Eysenck, 1995; Payne, Matussek, & George, 1959). Payne and Hewlett (1960) found evidence for the significance of overinclusiveness in schizophrenia in that they found that schizophrenics had higher overinclusiveness scores than controls, depressives, and neurotics on several classification tasks. They rejected earlier theories of "concreteness" in schizophrenic thought that portrayed people with schizophrenia as having an inability to think in an abstract way. They found instead that schizophrenics responded to a card sorting task in an overinclusive way, and that responses in previous studies that were highly unusual had been arbitrarily classified as "concrete" (Payne & Hewlett, 1960). Payne and Hewlett (1960) found that those with paranoid delusions were the most overinclusive, while those who were not significantly overinclusive had other symptoms.

Frith (1979) further developed Payne and Hewlett's theory by proposing that the positive symptoms of schizophrenia are due to a breakdown of the inhibitory processes that help screen distracting information from the environment, in other words, they are due to overinclusiveness. The inability to screen sensory input could conceivably be related to the flooding of thoughts. Loose associations could then be made between these thoughts, creating delusions. In a dichotic listening study, Dykes and McGhie (1976) found that both creative and schizophrenic individuals sampled a wider range of environmental input than those in the control group.

Two common experimental paradigms used to study cognitive inhibitory processes are negative priming and latent inhibition. Eysenck (1995) describes negative priming as a situation in which a distractor object which had been previously ignored is represented later as the target object to be dealt with. Because the distractor was to be ignored before, it takes longer for the participant to identify it as the target. An example would be if a participant had to identify a word as belonging to a certain category, and this word was preceded by a distractor word. If the distractor word became the target stimulus on the following trial, it would take longer for the participant to identify this word as a target than if the word was novel. Another example would be if one was doing the STROOP task, and had to identify the colour of a word. If the next colour they had to identify is

the same as the previous word, then it should take longer to identify this colour. A similar concept, latent inhibition, can be described as a paradigm in which the conditioned responding to a previously exposed stimulus is lower than to a stimulus that has not been exposed (Lubow, 1989). In other words, a stimulus is presented without having a consequence. It becomes a distraction and is thus ignored. It is then presented again with a reward; however, because it was ignored before, it takes longer for the participant to make the association between the stimulus and the reward.

The reduction in the tendency to screen from consciousness stimuli that have previously been experienced as irrelevant has been associated with psychosis (Baruch, Hemsley, & Gray, 1988). Several researchers have found a reduction of cognitive inhibition in patients with schizophrenia (Laplant, Everett, & Thomas, 1992; Williams, 1996). Williams (1996) found that only certain subgroups of schizophrenics showed this weakening of inhibitory process, and these were the reality distortion and the disorganization subgroups that characterized the positive symptoms of schizophrenia. These groups of participants showed a reduction in, and in some cases a reversal in, negative priming. Individuals who demonstrated only negative symptoms that contribute to psychomotor poverty did not show reduced inhibition.

A reduction in cognitive inhibition has also been found in non-clinical samples of participants high in schizotypy (Beech, McManus, Baylis, Tipper, & Agar, 1991; Ferraro & Okerlund, 1996; Tsakanikos, 2004). This demonstrates that it is not only people with schizophrenia who demonstrate a reduction in cognitive inhibition but also people who are in the middle of the schizophrenia spectrum. Beech, Baylis, Smithson, and Claridge (1989) found a reversal of the negative priming in some of their high schizotypes. Other researchers tested cognitive inhibition in participants scoring high on different subtypes of schizotypy. The pattern found was that positive schizotypy was related to a reduction of negative priming, but negative schizotypy was not (Moritz & Mass, 1997; Peters, Pickering, & Hemsley, 1994; Steel, Hemsley, & Jones, 1996). These results were found by Williams (1995) as well, but she also found a reduction in negative priming in some participants high in negative schizotypy, but only when positive features were also present. This is

the same pattern that was found in patients with schizophrenia, or those on the extreme end of the schizophrenia spectrum.

Carson, Higgins, and Peterson (2003) conducted a study in which they used a latent inhibition paradigm to test cognitive inhibition in lifetime creative achievers in the fields of art and science. The results indicated that the participants who scored higher in overall creative achievement had significantly lower scores on latent inhibition than the control group. This indicates that, similar to patients with schizophrenia and participants who score high in positive schizotypy, creative individuals show a reduction in cognitive inhibition. These results offer further support for the notion that there are qualitative differences, as shown by the reduction of cognitive inhibition, between highly creative and less creative individuals. They also further sustain the notion that creative people and those with schizophrenia or schizotypy share certain neurobiological properties (Carson et al., 2003).

This study will attempt to replicate these findings in the sense that both artists and people higher on the schizophrenia spectrum (i.e. those with schizophrenia and those higher in schizotypy) will show a reduction in cognitive inhibition. If this result is found then it provides evidence that that there is a cognitive similarity between creativity and the schizophrenia spectrum.

Several researchers looked more closely at the mechanisms behind the reduction of negative priming to ensure that it is in fact the result of a reduction of inhibition. Tsakanikos (2004) tested the hypothesis that it may not be a lack of inhibition that makes high-schizotypy scorers show a disruption in latent inhibition, but a tendency to see every stimulus as salient. His results failed to support this hypothesis. Beech et al. (1991) wanted to find out if the people high in schizotypy were not fully processing the distractors instead of not inhibiting them, so they gave the groups a semantic facilitation test as well as the negative priming one. The people who scored high in schizotypy had shorter reaction times to previously ignored stimuli in the semantic facilitation test. This demonstrates that the high-schizotypy scorers were fully processing the distractors, and supports the reduced inhibition hypothesis (Beech et al., 1991). Ferraro and Okerlund (1996) found

evidence that the differences in negative priming between low and high schizotypes are not a result of simple motor reaction time differences. Moritz and Mass (1997) compared high-schizotypy scorers with controls on a Stroop type colour word reading task and a priming condition, in which the target of a stimulus is identical with the distractor in the subsequent stimulus, and successfully ruled out the possibility that the reduction in negative priming seen in high schizotypes is simply due to dyslexia or deficits in early processing. To ensure that reduced inhibition is specific to schizophrenia and not solely to a non-specific psychiatric state, Laplante et al. (1992) tested depressive subjects in negative priming, and found that they showed the same amount of negative priming as controls. Tipper and Baylis (1987), however, did find a similar effect of a reduction of negative priming in participants who scored high on a measure of everyday absent-mindedness and failures of attention. The measure they used was called The Cognitive Failures Questionnaire, so logically, people high on schizophrenic symptomatology would most likely also score high on this questionnaire.

There have been a handful of studies that did not find a reduction of negative priming in high schizotypal participants. For instance, Green and Williams (1999) failed to find a significant association between schizotypy and negative priming. Moritz and Andresen (2004) found a slight correlation between a lack of negative priming and positive schizotypy; however, the effect was not significant. Both of these studies used the Stroop (1935) colour-word ink-naming task, and although many of the studies that did find a significant effect between a reduction in negative priming and positive schizotypy also used this task, it seems to be very sensitive to small nuances in timing. In one study, Beech et al. (1989) found that as presentation time of the stimulus increases, the relation between schizotypy and priming decreases. They suggest that to find an effect, the presentation time of the displays should be equal to or less than 100 ms. Green and Williams (1999) also suggested that their negative finding could have been due to the fact that they did not find a strong negative priming effect across all of their participants, making it more difficult to find a reduced priming effect in high schizotypes.

Another nuance of the negative priming paradigm is that the participant needs to know that the test situation will be difficult and that there will be distractors. When participants know there will be distractors, they get into a "selection state", and block all that is irrelevant (May, Kane, & Hasher, 1995). If they do not think that it will be difficult, then they take in everything, distractors and all, and instead of negative priming happening, their responses to the distractors may become facilitated when they become target stimuli. May et al (1995) suggested that this could be one of the reasons a reversal in negative priming was found in some schizophrenic and high schizotypal participants, in terms of attentional and experiential openness. This is one of the reasons instructions are so important in the negative priming task. Of course, another problem in trying to discern the mechanism responsible for any cognitive task when measuring participants with schizophrenia is that they may not be as motivated to perform well on a given task. If that is the case, then even if the task is difficult, they may not be motivated enough to access the "selection state" needed to bring about the effects of negative priming. Careful observations and directions would be needed to ensure that inhibition, not motivation, is being tested. One example of such a direction would be to let the participants know that they are being timed so they know they must work quickly.

The assumption that inhibition operates during selection to reduce the future interference of current distractors was challenged in a review by May et al. (1995). Instead of inhibition acting in a future direction to assure that a distractor remains a distractor, they found data that supported the hypothesis that inhibition acts in a backward fashion and instead is a function of memory. The assumption behind this hypothesis is that every stimulus activates all recent memories of it, and if something is remembered to be a distractor, then it takes longer for the participant to now see it as a target stimulus (May et al., 1995). An example of a study supporting this hypothesis was one by Lowe (1985) who found that inhibition requires some time to develop, suggesting that it does not happen during current selection. Instead of inhibition, in which a distractor activates its internal memory representation and an inhibitory mechanism decouples it from the response output, this

new mechanism, called episodic retrieval, works so that the presentation of a stimulus automatically evokes the most recent memory of that stimulus, so it is remembered as a distractor and ignored. In their paper, May et al. (1995) offer ways to avoid the activation of the episodic retrieval mechanism and to ensure that it is, in fact, inhibition that is being tested. They suggest longer stimulus displays, using response requirements such as naming, and to omit repeated target trials. They also concluded that negative priming is still the best mechanism for testing inhibition (May et al., 1995).

The results found with negative priming and latent inhibition offer further support for the dimensional model of schizophrenia since the same pattern of cognitive inhibition is found in people high in positive schizotypy as well as in those showing positive symptoms of schizophrenia. Additional support was obtained by Carson et al. (2003) who found that more or less the same pattern of cognitive inhibition was present in high lifetime creative achievers. One possible conclusion from this data on cognitive similarities is that the more one is creative, the more schizotypal or predisposed to schizophrenia one is as well. The other possibility, one that will be mentioned below, is that the creative people have additional characteristics that act as buffers from psychosis, such as intelligence, allowing them to use their cognitions in more productive ways.

An examination from an evolutionary standpoint as to why the cognitive abnormalities associated with schizophrenia would remain in the gene pool suggests that although these cognitive mechanisms could cause problems for those affected with schizophrenia, they could work in different and more adaptive ways for creative individuals, and in turn, could benefit society with culturally valued creativity. Several researchers (e.g., Kinney & Matthysse, 1978) have proposed a compensatory model in which genes that predispose people to mental illness remain in the population for their benefits of creativity. Creativity is a highly valued characteristic for the purposes of defining and advancing culture and also from the perspective of most individuals. Artists and musicians, especially those of high caliber, will certainly be deemed as desirable by many. Therefore, if there are creativity genes that may predispose some to mental illness, then there is an utmost probability that they will be passed down.

Frith (1979) believed that excessive or overly inclusive information processing helps stimulate delusions in the schizophrenic patient. Creative individuals, who also experience an excess of information from the environment, may be able to use this information to help create new associations for creative ideas. Of course, creative individuals likely experience this excess of information to a lesser degree than schizophrenic patients or possess some compensatory characteristic, making it less overwhelming. For example, perhaps artists are more able to switch between high and low arousal states, so that not only do they generate new ideas, but they are also able to examine them to make sure they are relevant. A related theory is the biological model proposed by Claridge (1972) in terms of arousal states of people with schizophrenia. He found that the usual inverted U shape that dictates optimal functioning at a moderate level of arousal in non-psychotic participants is actually a right-side-up U shape for schizophrenic participants and normal participants on LSD-25. In other words, instead of functioning optimally at a moderate level of arousal on various tests, these groups function better at extremely high or low levels of arousal. In a later study, Claridge and Chappa (1973) found a similar pattern of optimal functioning in high participants demonstrating high levels of psychopathology. Claridge (1972) concluded that these results offered further evidence for the dimensional model of psychosis. In a later paper, Claridge (1987) suggested that this atypical pattern of nervous system functioning might be an important biological characteristic in predisposing people to schizophrenia. It could also be one of the main reasons for the cognitive deficits and personality characteristics seen in these patients in everyday social circumstances. Yet this overinclusiveness may be beneficial for finding creative solutions in situations of high stress. In stressful times when most people would be overwhelmed and functioning at a less than optimum level, those predisposed to overinclusiveness would perhaps be able to function at a more creative level. Perhaps more stress could induce a more manic state that helps generate many ideas.

Creativity and Psychopathology (With a Focus on the Schizophrenia Spectrum): Differences

Apart from the numerous similarities between creativity and psychopathology there are many fundamental differences showing that the phenomena are not identical. First of all, many researchers would agree that the psychotic's responses on a test of creativity may fit into the definition of creativity by being original, but does not necessarily fit into the second part of the definition of being relevant (Eysenck, 1995). Relevance would likely include other factors that help individuals reject responses that are merely idiosyncratic (Eysenck, 1995). As mentioned above, Rubinstein (2008) found low creativity scores in a group of people with schizophrenia. Many people with schizophrenia engage in creative endeavors, but there seem to be some fundamental differences in their art as compared to art created by non-schizophrenics. Arieti (1974) analyzed the art of many patients with schizophrenia and found the motivating factor behind many of their works to be an adjustment to their new vision of reality. Often their realities are quickly changing, which can be quite distressing for the patient. An attempt to crystallize their realities, therefore, often comes out in their art. Some typical themes that can be found in schizophrenic art include concrete representations of ideas, forms that are bizarre, geometricized, distorted, fragmented, lack wholeness, have disconnected pieces, and at times disintegrate into scrawls (Arieti, 1974). They also typically fuse two or more subjects or make collages without unifying principles, similar to their word salads. Arieti (1974) found similar patterns in the poetry of schizophrenics, in that they focused on individual rhymes rather than whole meanings. He also found that artists who are later diagnosed with schizophrenia begin to show the features typical of schizophrenic art prior to their diagnosis.

Despite the cognitive similarities in creative and schizophrenic individuals, some researchers believe that the similar cognitive mechanisms may produce differing effects in the two groups. For example, although Dykes and McGhie (1976) found that both creative individuals and those with schizophrenia appeared to take in a wider range of environmental input than the control group, a card sorting task revealed that this widening of environmental input may have detrimental

effects on the performance of those with schizophrenia, but not for those high in creativity. Their creative participants seemed to cope with their influx of environmental stimuli, and were able to process it without being overloaded with information. They concluded that what was different between the two groups was the amount of voluntary control they had over the amount of information entering their awareness (Dykes & McGhie, 1976). Perhaps highly creative people can step back from the flow of ideas and become more analytical in order to make sure what they are creating is also relevant.

In his study of creative writers and architects, Barron (1969) found that his groups of high creatives were also high on a measure of ego strength. Ego strength was originally devised to predict which psychotic patients would benefit the most from psychotherapy. It measures such qualities as adaptability, resourcefulness, personal functioning, amount of secluding oneself, morality, sense of reality, and coping mechanisms. In the general population, ego strength is highly and negatively correlated with various types of psychoses. However, it was found to be quite high in creative individuals despite their high scores on all facets of the MMPI that would indicate psychopathology, which Eysenck would consider as predisposing one to schizo-affective disorders (Barron, 1969). Eysenck (1995) endorsed Barron's original suggestion and reported that ego strength, characterized by high motivation, the ability to work hard, and the capability of intense concentration or controlled attention, is often negatively correlated with psychopathology, but positively correlated with creativity. Both Barron and Eysenck concluded that in the case of highly creative individuals, ego strength compensates for their psychopathological features, and allows the creative person to function in society (Barron, 1969; Eysenck, 1995).

Rank (1932) had earlier observed differences between creative individuals and those he labeled as "neurotics". In context, what he meant by "neurotic" would now mean narcissistic, bipolar, and schizotypal disorders. He suggested that creative people are dominated by will whereas "neurotics" are weak-willed, and therefore, dominated by their instincts or their constant struggle to suppress them. Another clinically observed distinction between creative people and

"neurotics" is their dissimilar way of dealing with death. In Goodman's (1981) interview study, she found that artists tend to deal with death more directly and consciously than others. Many artists in her study found the contemplation of death to be stimulating and, as mentioned earlier, used it as motivation to create. "Neurotics", however, often struggle with their existential fears of death (Rank, 1932), even to the point of delusions of immortality.

In a recent study, Nettle (2006) argued against the notion that creatives share all of the same characteristics of those high in schizotypy. Schizotypal lack of voluntary control over selective attention, lower scores in ego strength, and less constructive ways of dealing with death support this notion. Nettle (2006) found in his study that poets and visual artists scored as high as mentally ill patients on measures of unusual experiences and cognitive disorganization, but lower than even controls on introvertive anhedonia. Like other theorists mentioned above (e.g., Schuldberg, 2001), he found that creatives share positive schizotypal symptoms (i.e. unusual experiences) with patients, but not negative ones (i.e. introvertive anhedonia). He connected this to Barron's theories of ego strength, concluding that while creatives have more schizotypy, but not as much as schizophrenics, there are two factors of psychopathology (positive and negative) and creatives share only the positive.

Interestingly, Nettle (2006) also found that visual artists and poets who described themselves as seriously involved but not working as professionals in their craft had higher levels on all facets of schizotypy, both positive and negative, than professionals who made all or part of their income from their craft. This indicates that those who are able to benefit socially from their craft, and tie it in with the way they make their living, are less schizotypal, or have less of the qualities that predispose others to schizophrenia. Perhaps those more seriously and personally involved create art that comes mostly from within, and so reflects more conflicted and less socially relevant states. Professionals, who are perhaps more business minded, may alternatively be more inclined to see a marketing opportunity for a specific craft, and reproduce ideas in mass quantities that may not be as personally significant, and in which they are not as emotionally involved.

Building from this notion, there is another possibility that conflicted states in creativity could vary depending on the stage of completion of a given project. In other words, the differences between high creatives and those with schizo-affective disorders may be smaller or greater depending on whether they are in the midst of a project or at the end of it. Support for this idea can be found from Goswami's (1996) comparison of creativity to chaos theory. As mentioned above, he proposed various stages in the creative process. One of these stages consisted of the destruction of rigid patterns of associations in one's mind, which gives an opportunity for new and creative ideas to be formed. Following this reasoning, it is possible that there is greater conflict experienced prior to the completion of a project than when it is complete. Rank (1932) would in all probability agree with this notion as well, since he believed that the artist faced a constant struggle between life and art. He recognized that artists need to draw from experience in order to create, which often makes them sacrifice living their lives for their art. He also documented that artists face life's existential problems more directly, which increases their level of conflict. This conflict, however, is necessary to create. In other words, artists create due to deprivation, but then rise above their conflicts with a solution, their finished product (Rank, 1932). Rank (1941) also believed that some experiences can be directly transforming, a notion that was shared by many transpersonalists and existential philosophers such as Sartre (1964), who relieved his "nausea" in part by the writing of his novel.

Other theorists have looked at intelligence as a candidate for accounting for the differences between creative people and those with mental disorders. Payne and Hewlett (1960) found that schizophrenics, like those with depression, perform slower on reasoning and cognitive tasks, and that this cannot be accounted for by their overinclusiveness. Others have suggested that certain people, although predisposed to schizophrenia, do not become clinically psychotic because they are immunized by their superior intellect (Carson et al., 2003; Claridge, 1972). This seems like a plausible theory given that people with schizophrenia are generally known to have a lower IQ level than average (Hu, Liu, Huo, & Li, 2000). It is also potentially related to Barron's original

definition of ego strength. Zannit et al. (2004) conducted a longitudinal study in which they found that people who developed schizophrenia had lower premorbid IQ scores than those who did not. This suggests that schizophrenia might not cause lower intelligence, but that low intelligence might be a risk factor for developing it in the first place. Conversely, Sheringham (1999) found that there is a subgroup of schizophrenics patients who have excellent premorbid grades in school. In fact, he found that eleven percent of people who later developed schizophrenia had excellent premorbid grades, while equivalent grades were found in only three percent of controls. To solve this dilemma, there is a possibility that it might be spatial intelligence that is lacking in people with schizophrenia, rather than verbal intelligence. Evidence for an intellectual asymmetry in schizophrenia with superiority of verbal skills to spatial skills has been found in several studies (Heinrichs & Zakzanis, 1998; Park, Puschel, Sacter, Rentsch, & Hell, 2002). Heinrichs & Zakzanis (1998) found evidence for a similar pattern in those who go on to develop schizophrenia, and Kravariti, Dixon, Frith, Murray, and McGuire (2005) found the pattern in first-degree relatives of people with schizophrenia. Furthermore, Longevialle-Henin et al. (2005) found that the severity of disorganization influences the visuospatial context of processing and visuospatial working memory in people with schizophrenia. Spatial intelligence will thus be measured in this study using the Embedded-Figures Test (Thursone, 1944).

Interestingly, in terms of a general factor of spatial orientation, studies have found that people with schizophrenia have poorer physical balance than their non-schizophrenic counterparts (Sullivan, Rosenbloom, & Pfefferbaum, 2002). Balance may not be directly correlated with spatial intelligence, but Hunt (1995) suggested that balance and spatial skills are aspects of the core sense of self, the same self that Sass (1992) argued to be diminished in patients with schizophrenia. In other words, the deletion of the self talked about by Sass and schizophrenic symptoms that can lead to positive symptoms such as hallucinations in schizophrenia are directly related to body image distortions, spatial disorganization, and dizziness (Schilder, 1950). Furthermore, Ayers et al. (1999) found a correlation between good balance beam performance and mystical experiences, mystical

experiences being the major variable separating creatives from imaginative controls in their study. Similarly, Swartz and Seginer (1981) found that a task related to both balance and spatial orientation (namely, pin-the-tail-on-the-donkey) was related to the proclivity to mystical experience. Ayers et al. (1999) also found that nightmares correlated with poor balance. These findings demonstrate that good balance is, indeed, correlated with positive and more integrative states while poor balance is associated with more disintegrative states. Perhaps a similar pattern could be seen in creative individuals, who tend to score higher on measures of mystical experience, and the opposite may be found in those with schizophrenia, whose balance and spatial intelligence tends to be diminished. This is precisely what is expected to be found in this study. Some evidence has been found for creativity relating to spatial ability. For instance, Moreno and Morales (2008) found that spatial ability predicted student's ability to recreate a work of visual art. Similarly, Spotts and Mackler (1967) found field-independence, which they measured using a similar task used in this study to measure spatial ability, to be related to a battery of creativity tasks. If spatial ability including balance is indeed something that separates creativity and the schizophrenic spectrum, then the artists in this study should score significantly higher than the people with schizophrenia in both of these variables, and they should be negatively correlated with negative schizotypy.

As mentioned earlier, Sass and Parnas (2003) believed that the sense of presence is diminished in schizophrenia. This is often felt as a detachment from the self or the body. Some may even begin to experience that they not are directing themselves, but instead, are being directed by an external force. Sense of self-presence could be another variable that separates those who are creative, and those who develop schizophrenia. In fact, sense of presence is noted to be affected in both mystical states and in schizophrenic states, although in mystical states, it is enhanced, whereas in schizophrenic states it is deleted (Hunt, 2004). According to Hunt (2007), sense of presence is the underlying variable of which spatial abilities and balance are more outward measures.

In addition to measuring spatial abilities and balance, presence will also be directly assessed using a sense of presence measure devised for this study. This measure consists of words used as metaphors to describe states of being felt by the participants. Positive presence will be measured by rating the amount participants experienced states that can be described by positive words, such as "centered" or "expanding". These words would be considered to enhance presence and would be positively related to integrated body image and spatial abilities. These types of states could also lead to mystical experience (Hunt, 2007). Negative presence will be measured with words that describe deletions in presence, such as "hollow" and "fragmented". These words are often used by people suffering from schizophrenic and related disorders to describe their feelings about themselves (Binswanger, 1963). Similar words, both positive and negative, are a major part of Barron's (1953b) original ego strength questionnaire. Again, if artists score higher on positive presence than people with schizophrenia than sense of presence can be considered yet another variable that differentiates creativity and the schizophrenia spectrum.

Hypotheses

The present study will measure the concepts of creativity, negative priming, spatial abilities, presence, absorption, mystical experience, and schizotypy in three groups of participants: people high in creativity (the artist group), people on the extreme end of the schizophrenia spectrum (the schizophrenic group), and a comparison group matched for gender and age with the artist group. The correlations between the same variables will also be examined within a larger group of university students.

1. *The Creativity Measures, Creativity, and Schizotypy*

    a. To help demonstrate the validity of the creativity measures, it is hypothesized that the artist group will score higher than the matched-age comparison group on measures of creativity.

b. To demonstrate that people on the extreme end of the schizophrenia spectrum are less creative, it is expected that the artist group will score higher than the schizophrenic group on the creativity measures.

c. It is expected that the artist group will score higher than the matched-age comparison group on unusual experiences (positive schizotypy) and impulsive nonconformity. It is also expected that the schizophrenic group will score higher than the other two groups on social anhedonia (negative schizotypy).

d. Furthermore, it is expected that unusual experiences and impulsive nonconformity will correlate positively with the creativity measures in the student group.

2. *Negative Priming and Distractibility*

It is hypothesized that the artist group and the schizophrenic group will have reduced negative priming as opposed to the matched-age comparison group. Similarly, it is hypothesized that creativity and positive schizotypy will correlate negatively with negative priming in the student group (revealing a reduction in negative priming). Furthermore, it is expected that the schizophrenic group will be higher in distractibility than the other groups. No predictions are made for the artists in distractibility.

3. *Spatial Ability, Balance, and Presence*

It is expected that the artist group and the matched-age comparison group will score higher on spatial intelligence, balance, and positive presence than the schizophrenic group, while the schizophrenic group will score higher on negative presence. There is, however, a possibility that the artist group will score higher on spatial intelligence than the matched-age comparison group because of their practice with spatial activities, that is, visual art, and since Moreno and Morales's (2008) found that spatial ability predicted student's ability to recreate a work of visual art.

Furthermore, it is expected that negative schizotypy will be negatively correlated with spatial intelligence, balance, and positive presence in the student group, and positively correlated with negative presence. Previous research found that balance correlated positively with mystical experience and negatively with more disintegrative states such as nightmares (Ayers et al., 1999). Similar findings are expected to be replicated in this study.

4. *Absorption and Mystical Experiences*

    a. It is hypothesized that the matched-age comparison group will have lower scores on absorption and mystical experience, than the other two groups. Similarly, it is expected that both creativity and schizotypy will correlate positively with absorption and mystical experiences in the student group.

    b. It is hypothesized that both the artist and the schizophrenics will score high in mystical experiences; however, the mystical states should have different patterns of relation with schizotypy and its correlates. These patterns are expected to be found within the correlations of the creative and schizophrenic groups. More specifically, it is expected that mystical experiences will be correlated with more positive states (e.g. positive presence, spatial abilities, and balance) in the creative group, as well as in the student group, but with more negative states (e.g., neuroticism and negative presence) in the schizophrenic group.

    c. It is expected that absorption will at least partially mediate the relation between creativity and the propensity to mystical experiences, and to measures that show conflicted states such as schizotypy.

5. *Measures of Conflictedness: Childhood Trauma and Neuroticism*

    a. It is expected that childhood trauma will be higher in the schizophrenic group than in the other groups. In the student group, it is expected that it will be related to absorption, but not to creativity per se.

b. It is hypothesized that neuroticism will be related to childhood abuse in the student group. The differences between the community groups are unknown due to the conflicted nature of the topic in the creativity literature.

There has been no other study that has tested all of these variables simultaneously. For instance, the propensity to mystical experiences has never been examined as a commonality, nor have spatial and related tasks been examined as differences or compensatory variables in the literature that examines the relation between creativity and psychopathology. This study should be helpful in distinguishing factors that both draw together and differentiate these concepts.

Method

Participants

Five groups of participants were recruited for this study. Four constituted the core groups, and one was a preliminary student comparison group used to validate the manipulation of the negative priming task. The groups consisted of a student group, used to examine the variables in a normal population; an artist group, used to examine exceptional creativity in a group of people working in the creative field of visual arts; a schizophrenic group, used to examine people at the extreme end of the schizophrenia spectrum, and a comparison group, used to compare with the artist and schizophrenic groups. The entire sample size was 211, 70 men and 141 women. See Table 1 for separate group sizes, gender, and age breakdowns. The comparison group was matched with the artist group for gender and age.

Table 1. *Gender and Age of Participants*

	n	# Males	# Females	Mean Age	Age Range
Student Group	102	25	77	19.8	17-28
Student Comparison Group	37	12	25	20.3	18-50
Schizophrenic Group	10	7	3	37.7	25-60
Artist Group	31	14	17	43.1	21-78
Matched-Age Comparison Group	31	12	19	39.4	23-76

The student groups were recruited from the introductory psychology course at Brock University. One student fit the criteria of the working artist group, and was therefore added to the artist group. The patients with schizophrenia were recruited from various programs that provide aid to those with schizophrenia such as The Oak Center in Welland, Ontario, an alternative clubhouse for people with mental illness, and the Schizophrenia Society of Ontario, St. Catharines division. The comparatively small size of the patient group makes its inclusion here primarily suggestive and exploratory, although of potential theoretical importance. The high creative achievers were recruited by approaching working visual artists in the area. The criteria for choosing them was that they have had shows, sell their art, consider that art is, or is part of, the way they make their living,

and/or a way they spend a great deal of their time. This group was recruited through the Niagara Artists Company, the Niagara Gallery, the Kennedy Gallery, the Niagara Falls Gallery, an internet site providing free advertizing (www.kijiji.ca), the café Tu Tu Tango (a restaurant where visual artists painted in front of customers). The matched-age comparison group was recruited through an internet site providing free advertizing (www.kijiji.ca). This group was largely found by asking the researcher's neighbours and extended family members who fit the approximate ages of those in the artist group. They were only asked to participate if they did not make any part of their income in creative endeavors nor spend a great deal of time engaging in a creative endeavor (e.g. spend their days painting, but just not selling their work). Having a creative hobby was fine.

The two student groups were compensated with credit towards their psychology course, and the other three groups were given two $1 scratch tickets as a thank you for their time and effort. The tests took approximately one hour to administer.

Measures

Creativity was measured in two ways. The first was using the Barron-Welsh Art Scale (Barron & Welsh, 1952). This questionnaire consists of 86 figures drawn in black ink, some simple, and some complex, of which the participants must judge and respond with "like" or "don't like". See appendix A to view this scale. Scores on this test are referred to as a measure of "origence", which is unrelated to IQ, but related to real-life creativity and traits that are often associated with creative individuals (Welsh, 1975). Origence refers to a preference for perceiving and dealing with complexity over a preference for simplicity (Eysenck, 1995). Barron (1953a) found that high scores on the Barron-Welsh Art Scale were correlated .29 with verbal fluency, .35 with flexibility, and .30 with staff and faculty ratings of creativity. Validity was also obtained in several studies that differentiated creative versus non-creative groups of individuals in specific fields with high potentials for demonstrating creativity. Gough (1976) found a correlation of .41 between scores on the Barron-Welsh Art Scale and peer and supervisor ratings of creativity in a group of research scientists. Hall and MacKinnon (1969) found that creative architects scored

significantly higher than non-creative architects on the Barron-Welsh Art Scale. Reliability results were summarized by Welsh (1975) who reported test-retest correlations of up to .90, and Cronbach's alpha of .89.

This test was chosen over other tests of creativity because of its visual nature. It makes sense to have a visual test to compare students with working visual artists in creativity. Visual artists may not perform as well on verbal measures. Furthermore, in Eysenck's comprehensive survey, correlations among most creativity measures are quite low, and most do not predict creativity very well. Eysenck (1995) found the greatest validity in the Barron-Welsh Art Scale.

Creativity was also measured using a self-rated measure of creativity and creative hobbies devised for this study (see Table 2). Participants were asked to rate how creative they think they are compared to others on a five-point likert scale (ranging from 1 being definitely false to 5 being definitely true). Hocevar (1981) has argued that simply asking the individual is ultimately one of the most valid ways of measuring creativity. The question whether they had any hobbies was not scored so as not to be redundant with the last question. The list of hobbies was scored on a five-point scale (ranging from 1 being one hobby to 5 being five hobbies). The total score consisted of the mean of all of the questions.

Table 2. *Self-Rated Creativity Questionnaire*

THE FOLLOWING QUESTIONS ASK YOU ABOUT YOUR CREATIVITY AND YOUR CREATIVE HOBBIES. PLEASE USE THE FOLLOWING SCALE TO INDICATE HOW TRUE THESE STATEMENTS ARE FOR YOU.

1 = Definitely false 2 = Mostly false 3 = Neutral 4 = Mostly true 5 = Definitely true

___ 1. I am a very creative individual.
___ 2. Others think I am very creative.
___ 3. I often come up with new ideas that excite me.
___ 4. I can draw or paint quite well.
___ 5. I can often create new songs and melodies.
___ 6. I am a very creative writer (stories, poems, creative essays).

7. Do you have any creative hobbies? Yes___ No___

If yes, please list these creative hobbies. _____

Table 2. *Self-Rated Creativity Questionnaire (con't)*

7a. If you have listed any hobbies, how creative do you consider yourself at these hobbies?

___Not at all creative ___A little ___Average ___Better than average ___Very creative

7b. If you have listed any hobbies, how much time do you spend on these creative hobbies?

___Less than an hour per month ___About 3 hours per month ___About 1 hour per week
___About 3 hours per week ___More than 3 hours per week

Schizotypy was assessed using the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE; Mason, Claridge, & Jackson, 1995; see Appendix B), a multidimensional measure of schizotypal personality that is made up of positive schizotypy (unusual experiences), disorganized schizotypy/social anxiety (cognitive disorganization), asocial schizotypy (impulsive-nonconformity), and negative schizotypy (introvertive anhedonia). The O-LIFE, in which each question is answered with a yes or a no, was chosen over the Chapman scales, another widely used battery of schizotypy scales, due the O-LIFE's recent extended usage with schizotypal and creative participants. Burch, Steel, and Hemsley (1998) conducted a test-retest study with the O-LIFE and found that the scores for each subscale of the questionnaire were highly correlated with the score on the same subscale three to six months later ($r = .76$ to $.93$). Mason et al. (1995) reported good factorial validity of the four subscales.

Negative Priming and distractibility were tested using a paper-and-pencil task devised for this study by Professor Paul Tyson. This task was based on a widely used computer procedure reported by Tipper and Baylis (1987) with which consistent and significant results were found with people high in schizotypy. It was changed to a paper-and-pencil task for ease of administration, and so that several participants could be tested at the same time, given the number of participants required for this study. The test used a within-subject design that consisted of four pages of searching for target words amongst distractors. Each page represented a different condition. The first consisted of a control condition, in which there were both target and distractor words. The second condition, the same distractor condition, consisted of different target words, but the identical

distractor words as in the first condition. In the third condition, or negative priming condition, the target words were made up of distractor words from the previous two conditions, and the distractor words were all new words. In the fourth condition, or distractibility condition, the target words consisted of never-seen-before words, but the distractor words consisted of target words from the previous three conditions, and distractor words from the previous condition. This condition measured the amount participants were distracted by words from previous categories.

The four semantic categories were names of people, animals, articles of clothing, and body parts. Each page consisted of approximately 200 words and 20 target words. They were presented in 20 rows of ten words each, all in uppercase letters (see Appendix C for complete lists of all words in all conditions).

Participants were asked to cross out as many words as they could in one minute that fit into a given semantic category. The experimenter timed the participants for each condition by telling them when to turn the page, and when to stop writing. In order to prevent a ceiling effect, the experiment was adjusted so that not all targets were possible to find within the given time period. The participants were informed ahead of time that it is impossible to find all of the target words in the given time, but to try and find as many as they can.

The amount of negative priming was calculated by partialling out the amount of words found in the same distractor condition (the second trial) from the amount of words found in the negative priming condition in an analysis of covariance. Distractibility was measured by partialling the same distractor condition from the distractibility condition. The first distractor condition was not used in the calculations because it is assumed that the participants were still becoming accustomed to the task and may not have found as many words as in the second, or same, distractor condition. Difference scores will also be reported in the results for purposes of clarity. Negative priming difference scores will consist of the negative priming condition minus the same distractor condition and distractibility scores will consist of the distractibility condition minus the same distractor condition.

As a manipulation check of this task and to determine whether slowing effects across the conditions were due to more than simply fatigue, practice, or difficulty, a similar task was given to the smaller student comparison group. The task and the instructions were identical, but the negative priming and distractibility manipulations were omitted. The first and second trial no longer contained target words that appeared later in trial three, which eliminated the negative priming effect. Similarly, the fourth trial no longer contained words that were previously target words on the preceding three trials. These words were replaced with new but similar words.

Spatial Ability was measured using the Embedded-Figures Test (Thurstone, 1944). The figures used in this test were originally developed by Gottschaldt (1938), who used them to test the role of past experience on perception. Thurstone (1944) abstracted five simple and 27 complex forms from Gottschaldt's original test to devise a measure of spatial ability. The test consists of a series of 27 complex geometric designs divided over three pages, with a time limit of eight minutes. Embedded in each complex design is one of two simple figures on the top of each page which the subject must locate as quickly as possible and trace the outline of with a marker. The total score is the number of correct simple forms the participant locates in the 27 complex designs (see appendix D). This measure was chosen due to its face validity; in other words, it seems impossible to do well in this test without good spatial skills. This test shows a reasonable level of concurrent validity, as it correlates with various other measures of spatial ability such as the WAIS block design (Hunt, Gervais, Shearing-Johns, & Travis, 1992; MacLeod & Jackson, 1986) and Kohs block design test (Witkin, 1950). Witkin (1950) found high odd-even reliability (.87) for a slightly different version of the test using 24 figures.

Balance was assessed with a self-report questionnaire devised for this study, since direct balance beam testing was not practical. Participants were asked to rate themselves on a five-point Likert scale as to whether they think they have good physical balance, how skilled they think they are at several tasks that require good balance, and how well they think they can orient themselves spatially with regards to directions (see Table 3). The total score consisted of the mean of all of the

questions. In a study directly assessing balance (Ayers et al., 1999), balance beam performance was found to correlate .45 - .60 with proclivity to mystical experience and .44 with absorption, meaning that those who have more mystical experiences and who are higher in absorption, have better balance.

Table 3. *Balance Questionnaire*

THE FOLLOWING QUESTIONS ASK YOU ABOUT YOUR PHYSICAL BALANCE AND SPATIAL ORIENTATION. PLEASE USE THE FOLLOWING SCALE TO INDICATE HOW TRUE THESE STATEMENTS ARE FOR YOU.

1 = Definitely false 2 = Mostly false 3 = Neutral 4 = Mostly true 5 = Definitely true

___ 1. I have very good physical balance.
___ 2. I am very good at riding a bicycle.
___ 3. If I had to walk on a balance beam, I would do quite well.
___ 4. I have never experienced sudden vertigo either spontaneously or in response to mild heights.
___ 5. I have a very good sense of direction, in that I can find my way around unfamiliar cites quite well.

Positive and negative presence was assessed using the Existential Presence Questionnaire (Hunt & Michalica, 2008) devised for the purpose of this study (see Table 4). A list was constructed of 38 words (19 positive and 19 negative) that are believed to represent distinct states of our inner most sense of presence or being. These words are metaphors that describe basic felt experiences (e.g. empty, grounded, dynamic, and unreal). They were derived partly from Barron's ego-strength questionnaire (Barron, 1953b), from the writings of phenomenologists and psychotherapists who study both integrative and disintegrative states of felt presence (Almaas, 1986; Guntrip, 1968; Malsow, 1968), and finally, from Binswanger (1963), who provided rich descriptions of the inner world of schizophrenia. Damasio (1999) has termed such states "background feelings" and Heidegger (1927) "primordial being experiences". A master list of all these state-describing words was first collected, after which obvious redundancies and ambiguous words were eliminated.

Table 4. *Existential Presence Questionnaire (Measures Positive and Negative Presence)*

THE FOLLOWING WORDS COULD DESCRIBE YOUR MOST FUNDAMENTAL SENSE OF YOURSELF – AS IN THE STATE OF YOUR INNER MOST BEING. PLEASE USE THE FOLLOWING SCALE TO RATE WORDS THAT TRULY DESCRIBE THE MOST BASIC QUALITY AND ATMOSPHERE OF YOUR EXPERIENCE OVER THE PAST MONTH.

1 = None at all 2 = Slightly 3 = Moderately 4 = Quite a bit 5 = Completely

In the last month, I felt like I was…

___ 1. Complete
___ 2. Falling
___ 3. Boundless
___ 4. Empty
___ 5. Grounded
___ 6. Constricted
___ 7. Soaring
___ 8. Disconnected
___ 9. Vital
___ 10. Disintegrating
___ 11. Free
___ 12. Dead
___ 13. Flowing
___ 14. Unreal
___ 15. Solid
___ 16. Out of it
___ 17. Clear (Clarity)
___ 18. Decomposing
___ 19. Centered
___ 20. Stuck
___ 21. Rising
___ 22. Pointless
___ 23. Deep
___ 24. Fragmented
___ 25. Natural
___ 26. Mechanical
___ 27. Expanding
___ 28. Deficient
___ 29. Balanced
___ 30. Contaminated
___ 31. Fulfilled
___ 32. Hollow
___ 33. Radiating
___ 34. Flat
___ 35. Dynamic
___ 36. Disoriented
___ 37. Perfection
___ 38. Drifting

Participants were asked to rate the degree to which each word describes their experience during the past month on a five-point Likert scale (ranging from 1 being none at all to 5 being completely). High scores on the positive words signify high positive presence, and high scores on the negative words signify higher negative presence. High scores on both may represent the creative struggle while low scores on both may signify either lower absorption, or lack of awareness of one's core sense of self.

Absorption was measured using Tellegen and Atkinson's (1974) widely used Tellegen Absorption Scale (TAS). This scale contains 34 true/false items that inquire about individual differences in responding to engaging stimuli, vividness of imagery, cross-modal experiences, and

experiences in altered states of consciousness. To increase the range of responses, the true/false rating was switched to a five-point Likert scale (ranging from 1 being definitely false to 5 being definitely true). According to Tellegen (1982), the TAS with the true/false rating has an internal reliability of $r = .88$, and a 30-day test-retest reliability of $r = .91$ (see Appendix E).

The Hood Questionnaire of Mystical Experiences (Hood, 1975) was employed in this study to measure the amount of mystical experience experienced by the participants. This measure was chosen because it measures explicit mystical experiences and because it was hoped that this study would replicate Ayers et al.'s (1999) finding of a correlation between the propensity for mystical experiences and creativity. The 32 items on this questionnaire measure states such as feelings of unity, bliss, eternity, and subjective perspectives of time (see Appendix F). It was rated on a five-point Likert scale (ranging from 1 being definitely false to 5 being definitely true). Hood (1975) reported that the scale had adequate item-total correlation coefficients and concurrent validity. In another study, Hood et al. (2001) found the reliability of this scale to be very good ($\alpha = .91$).

Degree and severity of childhood stressors and maltreatment was assessed using a shortened version of Bernstein et al's (1994) Childhood Trauma Questionnaire. This new scale, devised by Bernstein et al. (2003) has 28 items, and measures five factors of childhood maltreatment: physical abuse, emotional abuse, physical neglect, emotional neglect, and sexual abuse. Each subscale has five items, with three items measuring minimization and denial. Items are rated on a five-point Likert scale (ranging from 1 = never true to 5 = very often true). The shortened version was used to reduce the effects of fatigue, given the number of questionnaires in this study. Bernstein et al. (2003) found that the original questionnaire had Cronbach's alphas ranging from .61 to .95 for the five factors. They also found that the shortened version had good criterion-related validity in a subgroup of psychiatrically referred adolescents (see Appendix G).

Neuroticism was measured with the neuroticism component of the NEO-Five-Factor Inventory (FFI) (Costa and McCrae, 1992), one of the most widely used measures of personality.

The neuroticism facet has 12 items, rated on a five-point Likert scale ranging (ranging from 1 being definitely false to 5 being definitely true). McCrae and Costa (2007) found this scale to have good reliability ($\alpha = .86$). Validity was confirmed by Kanning and Holling (2001), who reported that the scales correlated with biographical data in a personnel selection process (see Appendix H).

Information regarding gender and age was gathered by a demographics questionnaire (see Appendix I). Participants also completed Bernstein and Putnam's (1986) Dissociation Scale for the purposes of another study.

Procedure

In order to maximize the sample size, testing took place at locations convenient for the participants (in their cities). Locations were chosen based on the comfort level of each participant. The students were tested in small seminar rooms at Brock University, while the community groups were tested in their homes, or at a community support clubhouse, and on occasion in coffee shops.

Participants completed the questionnaires in groups varying from one to forty, depending on the size of the room that was available and the convenience of the participant. The researcher was present in all the sessions. The principal researcher conducted all of the research, with the exception of the student comparison group, assessing the validity of the negative priming measure, which was completed by a research associate. The various tests were administered in order of the importance of the hypotheses so that the tests that affect the main hypotheses (negative priming and schizotypy) were less likely to be affected by fatigue. Prior to filling out the questionnaires, the participants were each asked to sign a letter of informed consent. The participants were asked to provide their e-mail address or residential address so that they could receive a debriefing letter when the study was completed (see Appendix J). After completing the letter of informed consent, the participants were administered the negative priming task so that if there were more than one participant present, they could be timed simultaneously. The negative priming task was followed by the Barron-Welsh Art Scale, which they were told to complete at

their own pace. When everyone present was finished, instructions were given for the hidden figure task, and they completed it while being timed together. Finally, they were asked to complete the questionnaires as honestly and accurately as possible. The questionnaires were given in the following order: creativity, balance, schizotypy, positive and negative presence, absorption, mystical experiences, dissociation, childhood trauma, and neuroticism. Most of the questionnaires used a five-point Likert scale (ranging from 1 = definitely false to 5 = definitely true), with the exception of the four schizotypy scales which used yes or no answers (entered into SPSS as 0 = no and 1 = yes). No time limit was given for the questionnaires and questions were addressed during the session. The anonymity of all participants' responses was ensured throughout the procedure. The entire procedure took approximately one hour. The participants had the option to terminate the study at any time if they did not feel comfortable; however, none did so.

Plan for Analyses

The following analyses were done to check the data and to test the hypotheses. Preliminary analyses were examined first. The data was checked for missing cases, distributions were checked for normality, and the reliability of each questionnaire was calculated.

ANOVAs were then calculated for the three community groups and these were examined first within each hypothesis. More specifically, the means of the artist group, the schizophrenic group, and the matched-age comparison group were compared for each variable. Full ANOVA tables can be viewed in Appendix K. When the ANOVAs were first calculated, the student group was included in the analysis. Some significant differences, however, were noted between the student group and the matched-age comparison group which should not have happened since they were both comparison groups (see Appendix L). These differences could be due to age (the mean age of the students was 19.8, while the mean age of the matched-age comparison group was 39.4) or with student status. Due to these potentially confounding variables, it was decided that the ANOVAs should include only the three community groups. However, there were a few

interesting findings in the results of the ANOVAs that included the student group, and these analyses can be seen in Appendix L. For post hoc comparisons, the least significant difference (LSD) multiple comparison test was used due to its increased power and because it works very well for the comparison of three means since it keeps the familywise error rate equal to the alpha level (Howell, 2007).

A full factorial ANOVA was done to check for interactions between the groups and the various trials of the negative priming and distractibility tasks. An ANOVA including the student comparison group was also done to check for fatigue, practice, or level of difficulty of the various trials. These were followed by covariance analyses used to check the face validity of these cognitive tasks. To see if the negative priming manipulation worked, the covariance analysis partialled the second trial (the distractor trial) out of the third trial (the negative priming trial) and to see if the distractibility manipulation worked, the covariance analysis partialled the second trial (the distractor trial) out the fourth (the distractibility trial). The face validity check for both negative priming and distractibility was done by comparing the partialled scores of the student group and the student comparison group.

In order to examine group differences in the negative priming and distractibility tasks, regressions using dummy coding were utilized. Two new dummy variables were first coded, one to examine the differences between the artists and the comparison, and one to examine the differences between the artists and the schizophrenics. To partial out the second trial (the distractor trial), it was entered on the first step, followed by the group comparisons. Interactions between the second trial and the group comparisons were entered on the third step to rule out the possibility that the differences were related to the second trial.

For each hypothesis, the ANOVAs or regressions were then followed by the correlations within the student group, which can be seen as an alternative test for the group ANOVAs. These correlations test the same core hypotheses as the ANOVAs and were predicted to echo their results. Correlations within the three community groups were also calculated to see if the

correlations differed within the various groups. Due to the large number of variables in this study, the correlations that were not predicted should be interpreted with extreme caution. To examine correlations with negative priming and distractibility, partials (again, with trial 2 partialled out) were used. All correlations can be found in Appendix M.

To sum this up, the results will generally be presented with the ANOVAs or regressions for the community groups first, followed by the correlations for the given variable within the student group.

Results

Preliminary Analyses

The data for all the paper-and-pencil tasks and questionnaires were entered into SPSS, version 13.0 for Windows. Preliminary analyses were conducted in order to check for missing data, and to obtain the internal consistency of each questionnaire. One participant in the student group skipped two pages, thereby missing 24 questions on the unusual experiences subscale and 17 questions on the cognitive disorganization subscale, while another skipped the entire presence questionnaire. Missing cases were deleted listwise for all of the analyses.

Initially, it was planned that with the exception of the negative priming and distractibility validity checks, the student group and the student comparison group would be combined. However, some unexpected differences were found between the two groups. The greatest differences were found in the Barron-Welsh Art Scale and the Embedded-Figures Task (see Table 7). There is a chance that these differences occurred because the data of the student control group was obtained by a different researcher. For this reason, the data collected from the student comparison group was kept only for the purposes of checking the validity of the negative priming and distractibility tasks, including the full factorial ANOVA checking for interactions and an ANOVA to view the effects of the manipulations by comparing all of the groups to a comparison group that had not been presented these manipulations.

Distributions for Normality

Most of the distributions of the variables were relatively normal with a few exceptions (see Table 7). Skewness is considered excellent if it falls within the range of -1 to +1 (Georgee & Mallery, 2003). Unsurprisingly, the Childhood Trauma Questionnaire was positively skewed for all groups. Negative presence was positively skewed in all groups except the schizophrenic group. The introvertive anhedonia subcale of the O-Life schizotypy measure and the negative priming task were slightly positively skewed in the matched-age comparison group. The impulsive nonconformity subscale of schizotypy was also slightly positively skewed in the artist

and schizophrenic groups. Finally, the Hood Questionnaire of mystical experiences was slightly negatively skewed in the schizophrenic group. The levels of child abuse, negative presence, and introvertive anhedonia are generally lower in normal samples, thus producing these distributions. The results including these measures, therefore, should be interpreted carefully, although community group research must be expected to feature some skewness as part of its logic.

Preliminary ANOVAs for the Cognitive Task

Prior to checking the validity of the cognitive tasks, a full factorial ANOVA was done on the three trials and the two student groups to check for interactions between the groups and the trials (see Table 5). It was found that there was a significant main effect for the trials, no main effect for the groups, and a significant interaction between the trials and the groups. Because of the significant interaction found in this ANOVA, a follow up ANOVA and t-test were done to see exactly where the significant differences lied.

Table 5. ANOVA Results for the Student Groups on the Cognitive Task

		Trial 2	Trial 3	Trial 4	*df*	*F*	*p*
Trials	*M*	17.31	13.67	13.23	1	281.40	.000**
	SE	.19	.23	.25			

		Student Group (N = 102)	Student Comparison Group (N = 37)	*df*	*F*	*p*
Groups	*M*	14.72	14.76	1	.011	.917
	SE	.19	.31			

		Student Group			Student Comparison Group					
	Trials	2	3	4	2	3	4	*df*	*F*	*p*
Trial * Groups	*M*	17.67	14.07	12.41	16.95	13.27	14.05	1	23.81	.000**
	SE	.19	.24	.26	.32	.39	.43			

*$p < .05$; **$p < .01$, two-tailed

A second and similar ANOVA was done that split the results into the separate student groups. It was found that the main effect for trials was equally significant for both of the two

groups (student group: $F(1, 101) = 382.84, p = .000$; student comparison group: $F(1, 36) = 83.40$, $p = .000$). A follow up T-test revealed that it was the distractibility trial in which the significant differences lie, $T(137) = -3.31, p = .001$. So to describe the interaction, it can be said that the two student groups differed significantly, but only on the fourth, or distractibility trial.

Another ANOVA was conducted to compare the student comparison group from the other groups in order to check for practice, fatigue, and trial difficulty effects (see Table 6). This analysis revealed that the groups significantly differed on all of the trials. To examine the differences more closely, the post hoc tests were examined. These tests revealed that the student comparison group only differed from the schizophrenic group; however, the schizophrenic group seemed to perform worse on each trial, so the effect may not be contributable to negative priming. The test also revealed that the student comparison group differed significantly from each one of the other groups on the fourth, or distractibility trial. This signifies that the distractor words in the distractibility task had a significant effect on the performance of all of the groups for whom they were present. In other words, the distractibility effects were present despite fatigue or practice effects. As a post hoc exploration, the analyses were redone without the schizophrenic group. In this case, no group differences were found, $F(3, 197) = .35, p = .788$.

Table 6. ANOVA Results for all of the Groups on the Cognitive Task

		Student Group (N = 102)	Student Comparison Group (N = 37)	Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Trial 2	*M*	17.68	16.95	13.80	17.06	17.32	4, 206	6.57	.000**
	SD	1.97	1.93	3.82	3.17	2.26			
Trial 3	*M*	14.07	13.27	9.40	14.19	13.55	4, 206	7.71	.000**
	SD	2.26	2.75	3.75	2.95	2.90			
Trial 4	*M*	12.41	14.05	9.80	12.35	12.10	4, 206	5.71	.000**
	SD	2.73	2.12	3.36	3.30	2.43			

*$p < .05$; **$p < .01$, two-tailed

Negative Priming Manipulation Check

To check the face validity of the negative priming task, the student group (adjusted mean: 13.97) was compared to the student comparison group (adjusted mean: 13.55) by analysis of covariance (ANCOVA). The covariance was then done by partialling the score of the same distractor trial (second trial) from the score of the negative priming trial. The difference between the two groups was significant, $F(2) = 4.21$, $p = .017$; however the result was in the opposite direction than predicted, meaning the negative priming manipulation was not successful.

Distractibility Manipulation Check

In the case of distractibility (trial 4 with trial 2 partialled out), the ANCOVA revealed that the difference between the student experimental group (adjusted mean: 12.31) and the student comparison group (adjusted mean: 14.34) was significantly different $F(2) = 13.32$, $p < .000$, meaning that the distractibility manipulation was successful.

Reliability Analyses.

The Cronbach's alpha values and the descriptive statistics (mean and standard deviation) of all the measures for all groups together and separately can be found in Table 7. Although means were used in the analyses, Table 7 reports totals for the schizotypy questionnaires, the mystical experiences questionnaire, and the neuroticism questionnaire so that results can be compared across their studies. Of these, the Hood mysticism scores were considerably higher than the norms for previous high creativity/absorption samples in Ayers et al (1999). The schizotypy scores were comparable to norms found by Mason and Claridge (2006), with the exception of the unusual experiences scores, which were slightly higher in this study. The reliability for all of the variables in all the groups together was adequate with the exception of the balance questionnaire and the impulsive nonconformity subscale of the O-Life measure of schizotypy, both with a Cronbach's Alpha level of .69. The alphas were also problematic for these measures for the separate groups, especially for the schizophrenic group.

Table 7. *Descriptive Statistics, Reliability, and Normality of the Tasks and Questionnaires.*

		Means						*Standard Deviations*					
Variables	n (# Items)	All Groups	Student Group	Student Comparison Group	Schiz Group	Artist Group	Matched-Age Comparison Group	All Groups	Student Group	Student Comparison Group	Schiz Group	Artist Group	Matched-Age Comparison Group
Barron-Welsh Art Scale*	211(86)	29.76	32.36	27.89	28.20	30.00	23.68	13.19	12.62	12.15	12.00	12.70	15.32
Embedded-Figures Task*	211(27)	15.72	16.11	14.73	11.70	18.26	14.35	7.08	6.41	5.92	8.79	8.14	8.09
Self-Rated Creativity	211(9)	2.91	2.68	2.61	3.14	4.22	2.64	1.04	.96	.90	.90	.51	.89
Balance	211(5)	3.60	3.59	3.70	2.82	3.76	3.64	.81	.77	.73	.93	.78	.91
Unusual Experiences*	211(30)	11.93	11.65	11.78	12.00	14.19	10.71	5.64	5.15	4.35	6.78	6.71	6.69
Cognitive Disorganization*	211(24)	11.63	12.47	11.57	12.50	9.23	11.10	5.53	5.42	5.06	3.69	5.92	6.05
Introvertive Anhedonia*	211(27)	5.32	5.16	4.41	9.40	4.74	6.19	4.22	4.15	3.78	5.19	3.83	4.35
Impulsive Nonconformity*	211(23)	8.35	8.76	8.16	8.70	8.81	6.65	3.71	3.69	3.38	2.98	4.42	3.27
Positive Presence	210(19)	3.02	2.94	2.97	2.71	3.72	2.76	.74	.65	.57	.86	.74	.77
Negative Presence	210(19)	1.88	1.89	1.85	2.34	1.86	1.75	.72	.73	.65	1.00	.83	.55
Absorption	211(34)	2.96	2.83	2.81	2.86	3.72	2.83	.73	.69	.55	.89	.56	.70
Mystical Experiences*	211(32)	108.47	103.93	103.19	124.90	130.70	102.16	26.42	16.19	19.16	31.89	24.00	22.53
Child Abuse	211(27)	1.56	1.41	1.30	2.02	1.98	1.81	.64	.46	.35	.77	.85	.78
Neuroticism*	211(8)	33.55	35.07	32.46	36.70	29.45	32.90	9.25	9.15	9.55	2.63	9.25	9.46
Trial 1 (First Names)	211(20)	17.22	17.58	17.27	13.80	16.97	17.32	2.90	2.81	2.50	2.30	3.18	2.95
Trial 2 (Animals)	211(20)	17.22	17.68	16.95	13.80	17.06	17.32	2.44	1.97	1.93	3.82	3.17	2.26
Trial 3 (Clothing)	211(20)	13.65	14.07	13.27	9.40	14.19	13.55	2.79	2.26	2.75	3.75	2.95	2.90
Trial 4 (Body Parts)	211(20)	12.52	12.41	14.05	9.80	12.35	12.10	2.83	2.73	2.12	3.36	3.30	2.43
Negative Priming†	211(1)	-3.57	-3.61	-3.68	-4.40	-2.87	-3.77	2.32	2.32	2.48	2.84	2.29	1.93
Distractibility†	211(1)	-4.70	-5.26	-2.89	-4.00	-4.71	-5.23	2.71	2.71	1.93	1.89	3.31	2.11

*Based on total scores not individual mean scores; †Reported as Difference Scores of Totals

Table 7. *Descriptive Statistics, Reliability, and Normality of the Tasks and Questionnaires (Cont'd).*

	Cronbach's Alpha						*Skewness*					
Variables	Total	Student Group	Student Comparison Group	Schiz Group	Artist Group	Matched-Age Comparison Group	Total	Student Group	Student Comparison Group	Schiz Group	Artist Group	Matched-Age Comparison Group
Barron-Welsh Art Scale	.89	.87	.79	.95	.89	.90	-.23	.01	-.49	.25	-.11	.28
Hidden Figure Task	.91	.89	.87	.96	.90	.92	.06	-.19	.04	.59	-.06	.22
Self-Rated Creativity	.88	.86	.85	.78	.76	.85	-.09	.13	-.03	-.60	-.52	-.50
Balance	.69	.69	.74	.56	.51	.77	-.55	-.46	-.66	-.16	-.11	-.59
Unusual Experiences	.83	.80	.70	.88	.89	.89	.30	.39	.34	.55	.11	.20
Cognitive Disorganization	.85	.84	.82	.62	.89	.89	.04	-.00	.08	-.33	.29	.11
Introvertive Anhedonia	.80	.80	.75	.81	.76	.79	.91	1.21	.94	-.62	.88	1.08
Impulsive Nonconformity	.69	.69	.65	.48	.79	.65	.37	.29	-.09	1.24	1.12	.42
Positive Presence	.91	.88	.86	.92	.94	.92	.00	-.25	-.18	.64	-.52	-.13
Negative Presence	.93	.93	.91	.96	.94	.88	1.49	1.50	1.68	.10	1.44	1.51
Absorption	.94	.93	.89	.95	.91	.93	-.05	.04	-.23	-.26	-.08	.14
Mystical Experiences	.94	.94	.88	.97	.94	.92	-.15	.30	-.39	-1.17	-.76	.33
Child Abuse	.90	.91	.65	.95	.95	.94	2.21	2.09	2.29	.45	1.70	1.90
Neuroticism	.85	.86	.88	.79	.87	.87	.43	.54	.49	-.01	.79	.41
Trial 1 (First Names)	N/A	N/A	N/A	N/A	N/A	N/A	-.82	-.87	-1.03	1.26	-.83	-.97
Trial 2 (Animals)	N/A	N/A	N/A	N/A	N/A	N/A	-1.45	-.98	-1.16	.67	-2.15	-.60
Trial 3 (Clothing)	N/A	N/A	N/A	N/A	N/A	N/A	-.53	-.30	.14	.10	-.64	-.36
Trial 4 (Body Parts)	N/A	N/A	N/A	N/A	N/A	N/A	-.30	-.04	-.37	1.14	-.01	-.39
Negative Priming	N/A	N/A	N/A	N/A	N/A	N/A	-.07	.46	-.41	-.33	-.31	1.03
Distractibility	N/A	N/A	N/A	N/A	N/A	N/A	.11	-.21	.52	-.37	-.31	-.34

Hypothesis 1: The Creativity Measures, Creativity, and Schizotypy.

Creativity Measures in the Community Groups

ANOVA results, group means, and standard deviations for the two creativity measures can be found in Table 8. The ANOVA for self-rated creativity was highly significant. The working artists were significantly higher than the other two groups ($p = .000$) on self-rated creativity and hobbies, which helps demonstrate the validity of the measure and also demonstrates that people on the extreme end of the schizophrenia spectrum are less creative than artists. There was no significant difference between the schizophrenic group and the matched-age comparison group ($p = .069$).

Table 8. *ANOVA Results for Creativity*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Self-Rated Creativity	*M*	3.14	4.22	2.64	2, 69	34.93	.000**
	SD	.90	.51	.89			
Barron-Welsh Art Scale	*M*	28.20	30.00	23.68	2, 69	1.67	.197
	SD	12.00	12.70	15.32			

*$p < .05$; **$p < .01$, two-tailed

The ANOVA for the Barron-Welsh Art Scale (figure preference task) was not significant and the mean of the working artist group was not significantly higher than that of the other two groups ($p = .076$), which diminishes its validity as an overall measure of creativity for the purposes of this study. In addition, there was no correlation ($r = .02$) between the Barron-Welsh Art Scale and the self-rated measure of creativity in the student group, suggesting that they are not measuring the same concept. For these reasons, only the self-rated creativity measure will be reported when discussing creativity. However, there are some interesting correlations with the Barron-Welsh Art Scale that may give some insight into what this task is measuring. For exploratory reasons, therefore, significant findings with the Barron-Welsh Art Scale will be reported below.

Schizotypy in the Community Groups

See Table 9 for ANOVA values for the schizotypy measures across the groups. The entire ANOVA was not significant for unusual experiences (positive schizotypy). As had been predicted, however, the mean of the working artist group was significantly higher than the matched-age comparison group ($p = .045$), demonstrating a relation between creativity and unusual experiences. The artist group did not differ from the schizophrenic group ($p = .372$), and the schizophrenic group did not differ from the matched-age comparison group ($p = .599$).

Table 9. *ANOVA Results for Schizotypy*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Unusual Experiences	*M*	.40	.47	.36	2, 69	2.11	.129
	SD	.23	.22	.22			
Cognitive Disorganization	*M*	.52	.38	.46	2, 69	2.88	.222
	SD	.15	.25	.25			
Introvertive Anhedonia	*M*	.35	.18	.23	2, 69	4.57	.014*
	SD	.19	.14	.16			
Impulsive Nonconformity	*M*	.38	.38	.29	2, 69	2.81	.067
	SD	.13	.19	.14			

*$p < .05$; **$p < .01$, two-tailed

The ANOVA for cognitive disorganization was not significant, and no predicted differences were found between the three community groups.

The ANOVA was significant for introvertive anhedonia (negative schizotypy). As predicted, the schizophrenic group scored significantly higher than the artist group ($p = .004$) and the matched-age comparison group ($p = .042$). In other words, people on the extreme end of the schizophrenia spectrum are very high in negative schizotypy. The working artist group did not differ from the matched-age comparison group in introvertive anhedonia ($p = .184$).

Lastly, the ANOVA for impulsive nonconformity was not significant. However, as predicted, the working artist group was significantly higher than the matched-age comparison group ($p = .028$), demonstrating that artists are high in the behavioural component of schizotypy.

Creativity and Schizotypy in the Student Group

The correlations within the student experimental group are largely in line with the comparisons between the three community groups (see Table 10). Self-rated creativity was significantly correlated with the unusual experiences subscale (positive schizotypy) and impulsive nonconformity, confirming the creativity and schizophrenia spectrum relation. By contrast, and as expected, self-rated creativity was not related to introvertive anhedonia (negative schizotypy) or cognitive disorganization.

Table 10. *Correlations Between Creativity and Schizotypy in the Student Group*

	Self-Rated Creativity	Barron-Welsh Art Scale
Unusual Experiences	.30**	.20*
Cognitive Disorganization	-.04	.18
Introvertive Anhedonia	-.00	.05
Impulsive Nonconformity	.36**	.30**

*$p < .05$; **$p < .01$, two-tailed

A regression for each subscale of schizotypy was conducted to check the possibility of a curvilinear relation between that subscale of schizotypy and creativity. For each regression, a subscale of schizotypy was entered on the first step, followed by that subscale of schizotypy squared. In each case, creativity was the dependant variable. The regressions were not significant, demonstrating that there is no curvilinear relation between any facet of schizotypy and creativity.

The Barron-Welsh Art Scale

To obtain a better idea as to what the Barron-Welsh Art Scale is measuring, the following observations were made. Interestingly, although it did not successfully distinguish between the artists and the matched-age comparison group, the Barron-Welsh Art Scale revealed identical

patterns of correlations to the four schizotypy measures as the self-rated measure of creativity. More specifically, the Barron-Welsh Art Scale was positively correlated with unusual experiences and impulsive nonconformity and not related to cognitive disorganization and introvertive anhedonia. However, it was also correlated with two negative variables, namely childhood abuse ($r = .35$; $p = .001$) and neuroticism ($r = .26$; $p = .008$). It was also correlated with the introvertive subscale of mystical experiences ($r = .26$; $p = .008$), which will be discussed below.

Also of interest was that within the artist group, self-rated creativity was significantly negatively related to the Barron-Welsh Art Scale ($r = -.42$; $p = .020$), in contrast to their nonsignificance (above) in the student experimental group.

Hypothesis 2: Cognitive Similarities between Creativity and the Schizophrenia Spectrum

Creativity, Schizophrenia and Negative Priming in the Community Groups

Since the negative priming manipulation did not work out, the variable measured cannot be called 'negative priming'; however, group differences will still be checked for exploratory reasons. Hierarchical multiple regressions were done to check for group differences in the negative priming task. The same distractor trial (second trial) was entered on the first step of the regression to partial out its variance. The second step included dummy coded variables representing the comparison between the artist group versus the schizophrenic group, and the artist group versus the matched-age comparison group. It was predicted that the artist and the schizophrenic group (people at the extreme end of the schizophrenia spectrum) would score higher than the matched-age comparison group; however, the artist group (estimated M of third trial = 13.94) scored significantly higher than the schizophrenic group (estimated $M = 11.60$; see Table 11). The artist group and the matched-age comparison group (estimated $M = 13.10$) did not differ significantly from each other.

Table 11. *Hierarchical Regression Analysis for Negative Priming Group Comparisons*

Variable	*df*	$R^2\Delta$	*F*	*p*	*B*	sp^2	*t*	*p*
Step 1	1, 70	.579	96.26	.000**				
Trial 2					.761	.761	9.81	.000**
Step 2	3, 68	.047	37.93	.000**				
Trial 2					.691	.638	8.61	.000**
Artists vs Schizophrenics					.343	.210	2.84	.006**
Artists vs Comparisons					.219	.133	1.80	.077

*$p < .05$; **$p < .01$, two-tailed

Creativity, Schizotypy and Negative Priming in the Student Group

Partial correlations (with trial 2 partialled out) were used to calculate correlations with the negative priming task in the student group. Nothing was found to be significant between creativity or schizotypy and the negative priming trial. Not surprisingly, the partial of negative priming, however, was correlated with the partial of distractibility ($r = .55$), meaning people who found more words on the third trial (negative priming trial) also found more on the fourth trial (distractibility trial).

Creativity, Schizophrenia, and Distractibility in the Community Groups

The three community groups were compared using a similar regression that was used in negative priming, however, no differences were found (see Table 12).

Table 12. *Hierarchical Regression Analysis for Distractibility Group Comparisons*

Variable	*df*	$R\Delta^2$	*F*	*p*	*B*	sp^2	*t*	*p*
Step 1	1, 70	.389	44.53	.000**				
Trial 2					.624	.624	6.67	.000**
Step 2	3, 68	.006	14.78	.000**				
Trial 2					.608	.562	5.96	.000**
Artists vs Schizophrenics					.100	.062	.65	.516
Artists vs Comparisons					.033	.020	.21	.833

*$p < .05$; **$p < .01$, two-tailed

Post Hoc Exploration on Negative Priming and Distractibility Task

Apart from doing a covariance analysis to obtain scores for negative priming and distractibility, ANOVAs were also conducted on the totals for each trial (see Table 13). It was

found that the schizophrenic group performed worse than both the artist group and the matched-age comparison group on the second and the third trials of the cognitive task, confirming a general slowing down of cognition in the extreme end of the schizophrenia spectrum. The results went in the same direction for the fourth trial, but did not reach significance. Within the student group, these three trials were highly correlated (correlations ranging from $r = .37$ to $r = .61$; $p = .000$), demonstrating that those who found more words on a given trial also found more words on every other trial.

Table 13. *ANOVA Results for Each Trial of the Cognitive Task*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Trial 2	*M*	13.80	17.06	17.32	2, 69	5.90	.004**
	SD	3.82	3.17	2.26			
Trial 3	*M*	9.40	14.19	13.55	2, 69	9.64	.000**
	SD	3.75	2.95	2.90			
Trial 4	*M*	9.80	12.35	12.10	2, 69	2.95	.059
	SD	3.36	3.30	2.43			

*$p < .05$; **$p < .01$, two-tailed

Hypothesis 3: Relations of Creativity and Schizophrenia to Spatial and Related Tasks

Spatial Ability

Although the entire ANOVA was not significant for spatial ability (see Table 14), as predicted, the artists scored significantly higher than the schizophrenic group (people at the extreme end of the schizophrenia spectrum; $p = .031$) and had a higher mean than the matched-age comparison group although this finding was not significant ($p = .065$).

Table 14. *ANOVA Results for Spatial and Related Tasks*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Spatial Ability	*M*	.43	.69	.49	2, 69	3.11	.051
	SD	.32	.29	.27			
Balance	*M*	2.82	3.76	3.64	2, 69	4.69	.012*
	SD	.93	.78	.91			
Positive Presence	*M*	2.71	3.72	2.76	2, 69	14.21	.000**
	SD	.86	.74	.77			
Negative Presence	*M*	2.34	1.86	1.75	2, 69	2.37	.101
	SD	1.00	.83	.55			

*$p < .05$; **$p < .01$, two-tailed

Within the student group, spatial ability was significantly related to self-rated creativity and to the impulsive nonconformity subscale of schizotypy. These results were not predicted, but also not surprising given that artists also scored higher on spatial ability. Spatial ability was also correlated with mystical experiences, and the second and third trials of the cognitive task (see Table 15).

Table 15. *Correlations Among Spatial and Related Tasks in the Student Group*

	Spatial Ability	Balance	Positive Presence	Negative Presence
Self-rated Creativity	.35**	.02	.22*	.08
Unusual Experiences	.05	-.03	-.11	.21*
Cognitive Disorganization	-.11	-.44**	-.52**	.60**
Introvertive Anhedonia	-.06	-.12	-.35**	.42**
Impulsive Nonconformity	.23*	-.01	-.05	.29**
Absorption	.13	.16	.10	.12
Mystical Experiences	.21*	.21*	.27**	.04
Neuroticism	-.07	-.33**	-.45**	.69**
Trial 2 (Cognitive Task)	.25*	-.08	.04	-.11
Trial 3 (Cognitive Task)	.28*	-.02	.12	-.01
Spatial Ability	---	-.02	.21*	-.08
Balance	---	---	.22*	-.32**
Positive Presence	---	---	---	-.47**

*$p < .05$; **$p < .01$, two-tailed

Balance

Previous research has found that balance beam performance was positively correlated with the propensity to mystical experiences (Ayers et al., 1999). Since balance was positively correlated with mystical experiences in the student group, this can be seen as a partial validity check for the self-rated balance measure.

ANOVAs revealed that group differences in balance were significant (see Table 14). More specifically, and as predicted, the mean of the schizophrenic group (the group at the extreme end of the schizophrenia spectrum) was significantly lower than that of the artist group ($p = .004$) and the matched-age comparison group ($p = .011$).

Within the student group, the only significant finding with balance and schizotypy was a negative correlation between balance and cognitive disorganization (meaning having worse balance is related to higher cognitive disorganization; see Table 15). Balance, as predicted, was also negatively correlated with neuroticism, and positively correlated with mystical experience.

Positive and Negative Presence

Significant group differences were also found for positive presence (see Table 14). The working artists' mean in positive presence was significantly higher than that of the schizophrenic group (or those at the extreme end of the schizophrenia spectrum; $p = .001$) and the matched-age comparison group ($p = .000$).

Within the student group, positive presence was significantly correlated with self-rated creativity, as well as with spatial ability and balance (see Table 15). Although the ANOVAs did not find that the schizophrenic group was significantly lower in positive presence than the matched-age comparison group, positive presence was negatively correlated in the student group with cognitive disorganization and introvertive anhedonia. It was also strongly negatively correlated with negative presence and neuroticism, and positively correlated with mystical experiences.

Group differences were not significant for negative presence (see Table 14), although, as predicted, the schizophrenic group (people on the extreme end of the schizophrenia spectrum) scored significantly higher than the matched-age comparison group ($p = .034$).

Within the student group, negative presence was positively correlated with every subtype of the schizotypy scale (see Table 15). It was correlated with unusual experiences, with cognitive disorganization, as predicted with introvertive anhedonia, and with impulsive nonconformity. It was also correlated positively with neuroticism and negatively with balance.

Hypothesis 4(a): Absorption and Mystical Experiences

The ANOVA for absorption was significant (see Table 16). As predicted, the artist group scored significantly higher than the matched-age comparison group ($p = .000$). Surprisingly, the artist group also scored significantly higher than the schizophrenic group (or people on the extreme end of the schizophrenia spectrum; $p = .000$). Contrary to the predictions, the mean of the schizophrenic group did not differ from that of the matched-age comparison group ($p = .886$).

Table 16. *ANOVA Results for Absorption and Mystical Experiences*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Absorption	*M*	2.86	3.72	2.83	2, 69	15.29	.000**
	SD	.89	.56	.70			
Mystical Experiences	*M*	124.90	130.70	102.16	2, 69	10.97	.000**
	SD	31.89	24.00	22.53			

*$p < .05$; **$p < .01$, two-tailed

The ANOVA for mystical experiences was also significant. As predicted, the artist group scored significantly higher than the matched-age comparison group ($p = .000$), as did the schizophrenic group (people on the extreme end of the schizophrenia spectrum; $p = .013$). Furthermore, the artist group did not differ significantly from the schizophrenic group ($p = .518$).

Three Subsets of Mystical Experiences

As a post hoc exploration, the mystical experience questionnaire was subdivided into the three factors found by Hood et al. (2001) to provide a superior solution to the unidimensional model in both an American and Iranian sample. The three factors are introvertive experiences, in which the self is lost into a greater unity; extrovertive experiences, in which one experiences that all is one; and the interpretive factor, in which one interprets the experiences as holy, noetic, or producing positive affect. Interestingly, Hood et al. (2001) found that the interpretive factor was associated with a stronger intrinsic religious orientation, while the introvertive factor was positively correlated with more psychological dysfunction such as somatization, depression, and obsessive-compulsiveness. Since both the artists and people high on the schizophrenia spectrum scored high on the mystical experiences questionnaire, an ANOVA was conducted to see if they differed on these three factors. The ANOVA was significant (see Table 17), but the post hoc analyses only demonstrated that the artist and schizophrenic groups scored higher then the matched-age comparison group in all three factors, which is the same information obtained from the full-scale ANOVA. The artist and the schizophrenic groups did not differ significantly on the introvertive factor ($p = .351$), the extrovertive factor ($p = .535$), or the interpretive factor ($p = .912$).

Table 17. *ANOVA Results for the Three Subsets of Mystical Experiences*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Introvertive	*M*	3.73	4.03	3.01	2, 69	9.41	.000**
	SD	1.23	.77	.86			
Extrovertive	*M*	3.61	3.84	2.72	2, 69	8.67	.000**
	SD	1.24	1.12	.93			
Interpretive	*M*	4.27	4.30	3.69	2, 69	8.49	.000**
	SD	.71	.72	.74			

*$p < .05$; **$p < .01$, two-tailed

Correlations within the student group, however, did reveal some differences between the factors. More specifically, the introvertive experiences subscale was correlated with cognitive disorganization and neuroticism. The extrovertive experiences subscale was correlated with balance, positive presence, and neuroticism. And finally, the interpretive subscale was correlated with positive presence and negatively correlated with introvertive anhedonia. The three factors were also highly intercorrelated (see Table 18).

Table 18. *Correlations with the Three Subsets of Mystical Experiences in the Student Group*

	Introvertive	Extrovertive	Interpretive
Balance	.10	.33**	.16
Cognitive Disorganization	.28**	.04	-.02
Introvertive Anhedonia	-.09	-.18	-.30**
Positive presence	.11	.21*	.38**
Neuroticism	.28**	.21*	.04
Introvertive Experiences	---	.69**	.67**
Extrovertive Experiences	---	---	.68**
Interpretive Factor	---	---	---

*$p < .05$; **$p < .01$, two-tailed

In the student group, as evident in Table 19, absorption was positively correlated with self-rated creativity. It was also positively correlated with several facets of schizotypy: unusual experiences, cognitive disorganization, and impulsive nonconformity. It was also highly correlated with mystical experiences and to a lesser extent with childhood abuse.

The propensity to mystical experiences in the student group was correlated with self-rated creativity. In terms of schizotypy, it was positively correlated with unusual experiences, impulsive nonconformity, and negatively correlated with introvertive anhedonia.

Table 19. *Correlations With Absorption and Mystical Experiences in the Student Group*

	Absorption	Mystical Experiences
Self-Rated Creativity	.44**	.29**
Unusual Experiences	.64**	.36**
Cognitive Disorganization	.24*	.12
Introvertive Anhedonia	.03	-.22*
Impulsive Nonconformity	.48**	.40**
Childhood Abuse	.30**	.18
Absorption	---	.69**

*$p < .05$; **$p < .01$, two-tailed

Hypothesis 4(b): Correlations with Mystical Experiences in the Artist and Schizophrenic Groups

Some interesting differences were noted in the correlations within the community groups (see Table 20). It was predicted that mystical experiences would correlate with negative states within the schizophrenic group and positive states within the artist group. However, mystical experiences only correlated with positive variables, specifically spatial ability, self-rated creativity, and absorption. Within the artist group, mystical experiences correlated surprisingly negatively with spatial ability (given the relation is positive in the student group and in the group comparisons), and positively with unusual experiences, positive presence, and absorption.

Table 20. *Correlations with Mystical Experiences within the Schizophrenic and Artist Groups*

	Spatial Ability	Self-Rated Creativity	Unusual Experiences	Positive Presence	Absorption
			Schizophrenic Group		
Mystical Experiences	.74*	.72*	.49	-.28	.71*
			Artist Group		
Mystical Experiences	-.41*	.33	.44*	.38*	.65**

*$p < .05$; **$p < .01$, two-tailed

Hypothesis 4(c): The Mediation of Absorption

Absorption was tested to see if it mediated the relations between creativity, and both mystical experiences and schizotypy. First, regressions were conducted to make sure creativity was related to absorption and to mystical experiences or schizotypy. If so, then it was checked whether Baron and Kenny's (1986) assumptions for mediation were met. In the cases where absorption was significantly related to both creativity and to mystical experiences or one of the schizotypy measures, absorption was partialled out to see if the correlations between creativity and mystical experiences or schizotypy remained. To do this, multiple regressions were calculated with either mystical experience or the relevant schizotypy subscale as the criterion, and creativity and absorption as the predictors. This analysis provided the partial correlation (see Appendix O). If the partial correlation was significant, then a Sobel test (Preacher& Leonardelli, 2001) was calculated to see if absorption partially or fully mediated the relation. In the student group, it was found that the partial correlation was not significant between creativity and mystical experiences (pr = .02), meaning that this relation was completely mediated by absorption. Similarly, the partial correlation between creativity and unusual experiences was also not significant (pr = .03). Finally, the partial correlation between creativity and impulsive nonconformity was not significant (pr = .19).

The only other full mediation was seen in the schizophrenic group between creativity and mystical experiences. The partial here was not significant (pr = -.25). In the artists group, where mysticism was highest, the relation between mystical experiences and self-rated creativity could not be accounted for by absorption because self-rated creativity was neither significantly related to absorption or mystical experiences. In other words, according to Baron and Kenny, the assumptions for mediation were not met in this case.

Hypothesis 5: Measures of Conflictedness: Childhood Trauma and Neuroticism

The ANOVA for childhood trauma was not significant, and no predicted differences were found between the three community groups (see Table 21). Due to the skewed distribution, these findings must be interpreted with caution.

Table 21. *ANOVA Results for Childhood Trauma and Neuroticism*

		Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Childhood Trauma	*M*	2.02	1.98	1.81	2, 69	.42	.656
	SD	.77	.85	.78			
Neuroticism	*M*	3.06	2.45	2.74	2, 69	2.91	.061
	SD	.22	.77	.79			

*$p < .05$; **$p < .01$, two-tailed

As predicted, childhood trauma was not related to self-rated creativity in the student group, but was significantly related to absorption. It was also related to the impulsive nonconformity subscale of schizotypy, neuroticism, and all trials of the cognitive task (see Table 22).

Table 22. *Correlations with Childhood Trauma and Neuroticism in the Student Group*

	Childhood Trauma	Neuroticism
Self-Rated Creativity	.14	.04
Balance	-.05	-.33**
Unusual Experiences	.19	.21*
Cognitive Disorganization	.16	.77**
Introvertive Anhedonia	.13	.27**
Impulsive Nonconformity	.27**	.41**
Positive Presence	.05	-.45**
Negative Presence	.15	.69**
Absorption	.30**	.18
Trial 2 (Cognitive Task)	-.23*	-.02
Trial 3 (Cognitive Task)	-.27**	-.02
Trial 4 (Cognitive Task)	-.25*	-.10
Neuroticism	.34**	---

*$p < .05$; **$p < .01$, two-tailed

The ANOVA for neuroticism was also not significant (see Table 21). Although this result was not predicted, it is interesting to note that the artist group scored significantly lower on neuroticism than the schizophrenic group ($p = .028$).

As predicted, neuroticism was positively correlated with childhood abuse in the student group (see Table 22). It was also positively correlated with negative presence and all facets of the schizotypy measure, namely with unusual experiences, cognitive disorganization, introvertive anhedonia, and impulsive nonconformity. Neuroticism was negatively correlated with balance and positive presence.

Discussion

This study examined the commonalities and the differences between creativity and the schizophrenia spectrum. Several interesting commonalities and differences were found between these two categories, some that are consistent with and some that extend the current literature. In particular, the propensity to mystical experiences was associated with both creativity and the schizophrenia spectrum. That creativity and the schizophrenia spectrum are not synonymous, however, was demonstrated by several traits, such as spatial ability, balance, and sense of presence, on which they differed. Given the small size of the schizophrenic group, caution should be taken in interpreting its results.

The Creativity Measures

In addition to the examination of similarities and differences between creativity and the schizophrenia spectrum, some interesting observations were made regarding the measurement of creativity, a topic on which there is currently much debate. This study employed two measures of creativity: the Barron-Welsh Art Scale and a self-rated creativity measure. This study had the extra advantage of having a highly creative group of working visual artists that acted as its own index of creativity, independently of the creativity measures. This group also made it possible to check the validity of the creativity measures by seeing if the artists scored higher than the matched-age comparison group. The results revealed that the artist group scored higher than the matched-age comparison group on the measure of self-rated creativity devised for this study. Furthermore, the self-rated creativity measure correlated with other variables that tended to be higher in artists (i.e. spatial ability, unusual experiences, impulsive nonconformity, positive presence, absorption, and mystical experiences). These findings provide validity for the self-rated measure as a measure of creativity. The artists, however, did not score higher than the matched-age comparison group on the Barron-Welsh Art Scale, although the student group did (see Appendix L). However, the self-rated creativity measure and the Barron-Welsh Art Scale

did not correlate together in the student group. These findings appear to diminish the validity of the Barron-Welsh Art Scale as a measure of creativity.

Examining these measures within the student group, however, revealed that The Barron-Welsh Art Scale correlated with the same subsets of schizotypy that were higher in artists, namely, with unusual experiences and impulsive nonconformity. The Barron Welsh, however, also correlated positively with neuroticism, a variable on which artists scored lower than the other groups. It seemed, therefore, that the Barron-Welsh Art Scale may have been measuring a related construct to creativity, but one with more negative qualities. Moreover, it was noted during the administration of the measures that realism artists seemed to score lower on the Barron-Welsh Art Scale than non-realism artists, so perhaps the Barron-Welsh Art Scale is picking up more on the novelty aspect of creativity, and the number of realism artists may have lowered the scores in the working artist group. Future research could separate realism from non-realism artists to verify these observations. Also it is possible that since the artists in this study were largely volunteers, they were perhaps generally more positive in outlook than the average artist, making them not relate as much to the Barron-Welsh Art Scale, which picked up on more negative qualities of creativity.

Also interesting was that within the artist group, self-rated creativity was significantly negatively related to the Barron-Welsh Art Scale as well as the spatial abilities measure. This seems counterintuitive since both in this study and in the literature, creativity is found to be correlated with spatial ability (Moreno and Morales, 2008). Since the working artists are by definition already highly creative, they may have viewed the self-rated creativity measure differently than the other groups. In their case, rating themselves on creativity may have had more to do with their self-image as artists; in other words, the more confident they were in their art and/or in themselves as artists, the higher they rated themselves. Participants in the non-artist groups may have viewed the self-rated creativity question in a more general sense, and answered based on estimates of their normative level of creativity. For example, there were some cases in

the non-artist group in which people rated themselves as very creative, and when asked in which hobbies they are very creative, answered 'decorating my room' or 'editing photos on the computer'. The artists may have been thinking more in terms of the self perceived originality of their artistic creations as compared to other artists, as in some artists who have actually had many art shows saying "I'm mostly a creative individual".

Creativity and the Schizophrenia Spectrum

As predicted, artists were higher in self-rated creativity than people with schizophrenia, which replicates previous research that people on the higher end of the schizophrenia spectrum are not necessarily creative (e.g. Rubinstein, 2008). There was, however, a negative correlation between age and creativity within the schizophrenic group, which may suggest that people in the beginning stages of the disorder are more creative than those in the later stages. Due to the small sample size in the schizophrenic group, however, this result should be interpreted with caution and would need to be replicated.

Support was found for the main hypothesis positing a correlation between creativity and schizotypy. More specifically, people who scored high on the schizotypy facets of unusual experiences (positive schizotypy) and impulsive nonconformity were found to be more creative. Similarly, working artists were found to be higher than the matched-age comparison group in unusual experiences and impulsive nonconformity. These results replicate the findings of previous research (e.g. Schuldberg, 2001). Unusual experiences consist of magical or unusual beliefs, perceptual aberration, paranoia, and suspiciousness. All of these expand everyday experience, perhaps making one more likely to sample more types of experiences that may facilitate potentially creative connections. Impulsive nonconformity consists of asocial behaviour and disinhibition. Such behaviour is potentially important for creativity because it takes a certain level of disinhibition to make public ideas that are different and original. Original ideas are often initially met with opposition, so revealing them would be facilitated by nonconformity and a lack

of fear of what others think. Furthermore, nonconformity would also be needed to come up with original ideas in the first place.

Also replicating previous research (e.g. Schuldberg, 2001), working artists were not higher in cognitive disorganization or in introvertive anhedonia (negative schizotypy) and there were no correlations among these facets of schizotypy with creativity in the student group. This finding was also consistent with the notion that people on the extreme end of the schizophrenia spectrum are not more creative, since the people with schizophrenia in this study scored higher in introvertive anhedonia (negative schizotypy). This was not surprising given that negative symptoms predominate in people diagnosed with schizophrenia (Bleuler, 1924). Negative symptoms such as flat affect would likely impede the richness of experiences needed to generate art.

Negative Priming and Distractibility

The paper-and-pencil negative priming task devised for this study proved to not have good face validity as a measure of negative priming. More specifically the participants in the student experimental group, who were presented target words that were previously distractors, were not slower in identifying these target words than a student comparison group that did not have the distractor words presented earlier. Perhaps the presentation of many words simultaneously, as opposed to one trial at a time such as on computer tasks used to measure negative priming, might have prevented this task from picking up the negative priming effect. There is, however, another way to interpret the failure of the manipulation test that could call for a reassessment of the results for the cognitive task. Due to the post hoc nature of these findings, however, they are added as an appendix (see Appendix N).

In terms of distractibility, the face validity of the measure was confirmed by the results of the student experimental versus the student comparison group. No significant differences, however, existed between the community groups.

To investigate further into this measure, means for each trial were calculated apart from the covariation of the negative priming and distractibility trials from the baseline trial. It was found that the schizophrenic group did worse on two of the trials and in the same direction for the third trial, replicating findings of a general slowing down of cognition in schizophrenia (e.g. Morrens, Hulstijn, Van Hecke, Peuskens, & Sabbe, 2006). Perhaps the way in which the stimuli were presented in our task could have posed some problems to the individuals with schizophrenia. As mentioned above, it has been known for nearly a century that people with schizophrenia have impaired attention, especially in the form of distractibility and the inability to sustain attention, which makes them difficult to assess using cognitive tasks (Bleuler, 1924). Moreover, studies found that distractibility increases with the chronicity of the schizophrenic illness (McGhie, Chapman, & Lawson, 1965), making it very likely to affect the patients in this study. Each page in our paper-and-pencil task contained 200 words. This presentation might have overwhelmed them and revealed their more "molar" level of general distractibility and, therefore, incapacity. Perhaps instead of inhibiting certain words, the patients doing this task were so overwhelmed that they perseverated, or repeated their response after the cessation of the original stimulus. In other words, perhaps the people with schizophrenia were simply distracted by the fact that there were so many words surrounding the target words.

Spatial and Related Tasks

In terms of spatial and related tasks, results showed that the artists performed better than the people on the extreme end of the schizophrenia spectrum in spatial ability, thus showing support for the hypothesis that artists have better spatial skills than people with schizophrenia. A more general relation between spatial ability and creativity was found in the student group where spatial ability was significantly related to self-rated creativity. Spatial ability was also positively related to the impulsive nonconformity subscale of the schizotypy measure in the student group, itself also correlated with self-rated creativity and highest in the artist group.

Finally, spatial ability was correlated with mystical experiences, itself a strong correlate of creativity. This is consistent with Swartz and Seginer's (1981) study, which found that a spatial orientation task was related to mystical experience, and Hunt et al.'s (1992) study, which found that mystical experiences was related to scores on the Wechsler Scale of block designs. This result provides support for the notion that mystical experiences are both "carried and evoked by the felt embodiment of still more general spatial dimensions drawn from the ecological array, such as light, darkness, flow, density, expansive force, and the openness of spaciousness itself" (Hunt, 2007, p. 212). In other words, mystical experiences cannot be separated from basic spatial metaphors drawn out of perception in ways also reflected in measures of spatial intelligence.

Similar results were found for balance as for spatial ability, in that the artists and the matched-age comparisons had better balance than people on the extreme end of the schizophrenia spectrum. This replicates the results of Sullivan, Rosenbloom, and Pfefferbaum (2002) who found that people with schizophrenia had poorer balance than people without schizophrenia. Balance was also lower in people who scored high on cognitive disorganization, neuroticism, and negative presence. Interestingly, Ayers et al., (1999) found that mystical experiences and archetypal dreams correlated with balance beam performance. These results support the view that good balance tends to be associated with more integrated states of consciousness while poor balance tends to be associated with more disintegrative states. As predicted, balance was also positively correlated with another integrating state, namely, positive presence.

In terms of positive presence, the artists scored higher than all of the other groups. This indicates that they had more positive states of presence and identified more with metaphors that depict positive states of being. Positive presence was also significantly correlated with self-rated creativity in the student group. Creativity can be fueled by several negative states such as trauma (e.g. Simonton, 1975), conflict such as social rejection (Akinola & Mendes, 2008), and the facing of life's existential concerns more directly (Rank, 1932). However, this relation and the relation between creativity and the propensity to mystical experiences that will be elaborated on below

suggest that it is not only negative states that stimulate creativity. It is likely, given their sensitivity and openness, that artists experience a larger variety of states, both positive and negative, more intensely which demonstrates their enhanced sense of self-presence. Accordingly, it is these intense states from which they derive much of their inspiration.

Positive presence was negatively correlated with the cognitive disorganization and introvertive anhedonia facets of schizotypy in the student group, and these two facets of schizotypy were not related to creativity. Positive presence was also strongly negatively correlated with negative presence and neuroticism. Finally, positive presence was positively correlated with the propensity to mystical experiences in the student group. This also fits with the predictions since the metaphors chosen for the positive presence scale describe states than can lead to mystical experiences (Hunt, 2007).

As expected, people on the extreme end of the schizophrenia spectrum scored significantly higher than the matched-age comparison group in negative presence. In the student group, negative presence was positively correlated with all schizotypal subtypes: unusual experiences, cognitive disorganization, introvertive anhedonia, and impulsive nonconformity. It was also correlated positively with neuroticism. This finding helps to validate the measure as having the ability to detect negative states of presence. In addition, it provides support for Sass and Parnas' (2003) theory that the sense of presence is diminished in schizophrenia. According to Sass and Parnas (2003), this diminished sense of presence is often felt as a detachment from the self or the body, or a diminished sense of existing as an autonomous source of awareness and action. The measure of negative presence included many words that can describe such a detachment, such as the following: disconnected, unreal, and mechanical.

The finding that spatial ability was not correlated with balance is surprising given the notion that they are both aspects of the core sense of self (Hunt, 1995; 2007); however, not finding such a correlation has been common in past research (e.g. Ayers et al., 1999; Spafadora & Hunt, 1990). Given that these and other spatially-related variables cover such a wide array of

phenomena, a direct correlation may not exist. Both spatial ability and balance, however, were found to be positively correlated with positive presence, while balance was also negatively correlated with negative presence. This provides support that the sense of presence is at least partially rooted in physical balance and spatial orientation, in other words, a general state of embodiment (Hunt, 2007).

Absorption and the Propensity to Mystical Experiences

It was predicted that the artists and people at the extreme end of the schizophrenic spectrum, or the schizophrenic group, would score higher than the matched-age comparison group in absorption; however, this prediction was only partially supported. The artists were higher in absorption than the matched-age comparison group, but they were also higher than the schizophrenic group. The relation between creativity and absorption was also found in the student group since absorption was correlated with creativity. This finding was not surprising given that the correlation between creativity and absorption is widely known (e.g. Manmiller et al., 2005). According to Tellegen and Atkinson (1974), absorption involves experiencing episodes of having one's attention completely engaged. Most activities requiring creativity would require such an absorbing state of attention.

Although absorption was not significantly higher in the people on the extreme end of the schizophrenia spectrum than in the matched-age comparison group, it was positively correlated in the student group with several facets of schizotypy: unusual experiences, cognitive disorganization, and impulsive nonconformity. This suggests that artists and people high in schizotypy are higher in absorption, but not people at the extreme end of the spectrum. Of course, due to the small sample size of this group, these results would need replication.

Absorption's relation to both creativity and schizotypy can be explicated by the theory mentioned above that absorption has two sides, an integrative side and a more negative or disintegrative side (e.g. Hunt et al., 2002; Roche & McConkey, 1990). Besides being correlated with schizotypy and childhood abuse, it was also highly correlated with mystical experiences and

creativity. Perhaps the intense absorbing attention that Tellegan and Atkinson (1974) speak of in regards to absorption also increases the chances of absorbing oneself in extreme self-altering experiences.

The most striking finding in the study was that both working artists and people on the high end of the schizophrenia spectrum scored significantly higher than the matched-age comparison group in the propensity to mystical experiences. This suggests that this is a propensity that unites the two groups. Previous research has found that people with schizophrenia had equal mysticism scores as had long term meditators (Stifler, Greer, Sneck, & Dovenmuehle, 1993), while Ayers et al. (1999) found that productive creatives had significantly more mystical experiences than imaginative comparisons. The Hood Questionnaire of Mystical Experiences describes experiences that transcend space and time, in contrast to the more common altered states of consciousness measured by the absorption and schizotypy measures. Many of the non-realist artists who spontaneously described where they found their inspiration mentioned their spirituality. Similarly, Ayers et al. (1999) concluded that these intense states of consciousness may be part of the creativeness of artists.

The mystical experiences, however, may have different consequences in the lives of the artists and the people with schizophrenia. For example, perhaps artists are best able to integrate these potentially identity dissolving mystical experiences, using them in their art, while people with schizophrenia might instead find that these experiences destabilize their identity and are accordingly more frightening. For instance, in contrast to the artist group, the schizophrenic group in this study was significantly higher in introvertive anhedonia and neuroticism, lower in positive presence (positive states of being), balance, and lower in spatial abilities. These findings suggest that the supportive context such as a positive sense of presence needed to make mystical experiences more safe and integrative were lacking in the patient group.

There were also some interesting correlations with mystical experiences within both the artist group and the schizophrenic group, representing the extreme end of the schizophrenia

spectrum. The Hood Scale of Mystical Experiences correlated with absorption within both the artist and schizophrenic groups, with creativity within the schizophrenic group, with unusual experiences and positive presence within the artist group, and with relative spatial ability within both groups. The latter unexpectedly went in opposite directions: positive with mystical experiences within the schizophrenic group and negative with them within the artist group. As can be seen, the propensity to mystical experiences itself was not correlated with any negative variables within the schizophrenic group, it was only correlated with positive ones. It is the additional context of higher psychopathology scores and lower spatial orientation however, that could entail a destabilizing impact for an inherently positive state. As for the opposite direction of the correlation between mystical experiences and spatial ability in the two groups, it may have to do with the base level of spatial ability within each group. Spatial ability, which is also normally correlated with general intelligence, is generally lower in people with schizophrenia (e.g. Heinrichs & Zakzanis, 1998). However, the participants who scored high in it also scored high in mystical experiences, both of which could facilitate their higher scores on creativity. Conversely, artists generally have better spatial ability. As mentioned earlier, however, artists are a very diverse group, as reflected in varying degrees of realism in their art. For example, perhaps some move towards art through naturally higher spatial ability whereas others, who are higher in mystical experiences, gain their inspiration more from their altered states. Naturally, this would have to be replicated due to the small sample size of the groups to make sure it was not simply a spurious correlation.

Absorption was also found to mediate several of the above relations. In the student group, absorption was found to mediate the relation between creativity and mystical experiences, creativity and unusual experiences, and creativity and impulsive nonconformity. This suggests that it is absorption in the more creative individuals of the student group that leads them to have more mystical experiences, more unusual experiences and score higher on impulsive nonconformity. Absorption also mediated the relation between creativity and mystical

experiences in the schizophrenic group. It seems, perhaps, that the capacity to become completely absorbed in attentional stimuli may be a necessary precursor to various other altered states, both positive and negative. As for absorption mediating the relation between creativity and impulsive nonconformity, perhaps being more absorbed in something favours immediate responsivity. Interestingly, absorption was not found to be a precursor to altered states in the artist group. The absence of mediation within the artist group, highest in mystical experiences in the present study and significantly higher in artists over comparisons matched for high absorption in Ayers et al. (1999), suggests a more intrinsic relation between creativity and mystical experiences for many artists. Although absorption may facilitate mystical experiences in most people, they may come more spontaneously to highly creative individuals. In addition, the highest levels of creativity can trigger states of felt clarity and brilliancy that are phenomenologically identical to accounts of classical mystical experience (Almaas, 1986; Laski, 1961).

Childhood Abuse

Although no differences were found between the community groups in terms of childhood abuse, it was interesting to note in Appendix L that the artist group, the schizophrenic group, representing the extreme end of the schizophrenia spectrum, and the matched-age comparison group all scored higher than the student group. This suggests that the older the participant, the more likely they are to have experienced childhood abuse. Several things could account for this finding. First, perhaps the older people are, the more likely they are to report childhood abuse, either from greater honesty or more time to recover hazy recollections, or both. Second, perhaps there are historical differences in child-rearing practices and the amount that is reported about them. Third, perhaps there are other differences between the matched-age comparison group and the student group such as the status of being a student in a university. This finding was not predicted, and incidentally the childhood abuse measure was quite positively skewed, meaning this result must be interpreted with caution.

Artists were not higher in childhood abuse than the matched-age comparison group, nor was creativity related to abuse in the student group, replicating the results of Ayers et al. (1999) who also did not find a correlation between creativity and abuse. This study, however, replicated the established relation between childhood abuse and absorption (e.g. Eisen, & Carlson, 1998).

It was hypothesized that the people on the extreme end of the schizophrenia spectrum would be significantly higher in childhood abuse than those in the matched-age comparison group; however, this was not the case. Childhood abuse was, however, significantly related to the impulsive nonconformity subscale of schizotypy and to neuroticism in the student group. It seems as if people with a history of abuse tend to exhibit more antisocial behavior and are more neurotic than people with no history of abuse. Alternatively, it could also be that people who are more asocial or neurotic may be more willing to acknowledge childhood abuse. Childhood abuse was also negatively related to finding more words on the second, third, and fourth trials of the negative priming and distractibility tasks. Although much caution needs to be taken in interpreting this finding, due to the skewed distribution and the fact that this was not a predicted finding, this could suggest that a history of childhood abuse may lead to later cognitive deficits, specifically in searching for target words in lists of words. This finding is, in fact, consistent with other studies (e.g. Perez & Widom, 1994).

Neuroticism

The artist group scored significantly lower on neuroticism than the student group and the people on the extreme end of the schizophrenia spectrum. This is contrary to some creativity theory and research, but in accordance with most studies. For example, Ayers et al. (1999) found that high creatives were not more neurotic than high absorption comparisons. Nevertheless, this finding is somewhat contrary to what may be expected given earlier theories that creative people are more prone to mood disturbances (e.g. Barron, 1969; Eysenck, 1993) and given the results of Burch et al. (2006), who found higher neuroticism scores in visual arts students than students in other departments. There is the possibility that the method of recruiting artists for this study could have

impacted variables such as neuroticism. The artists in this study were recruited largely by e-mail advertisements to members of artist coalitions and galleries, and were promised only a small compensation (two bingo scratch tickets). People that responded were likely generally helpful people who are interested in psychology, which could be consistent with lower neuroticism. By contrast, Burch et al. (2006) recruited art students and paid them £10 for their participation. Perhaps this resulted in a slightly more random sample of artists than the one found in this study, which found more established artists who were kind enough to volunteer their time for research.

In the student group, neuroticism was positively correlated with all facets of the schizotypy measure, namely with unusual experiences, cognitive disorganization, introvertive anhedonia, and impulsive nonconformity. The interrelation of characteristics that predispose one to schizophrenia and negative emotionality has been documented in other studies (e.g. Ettinger, 2005). Claridge and Davis (2001) suggested that neuroticism could be a non-specific predictor of many different types of psychopathology.

Conclusions, Limitations, and Future Research

The results of this study revealed some interesting details about the measurement of creativity. Simply asking people how creative they think they seemed to be a better way of distinguishing between artist and non-artists than examining whether people prefer complex to simple forms. Despite these results, the self-rated measure has its limitations. First, because this measure was devised for this study, it was not validated in other research, or against other measures of creativity. The working artists, however, are by definition already creative, so they acted as their own criterion of creativity above and beyond any creativity measure used. Second, there is evidence from the results that the measure may tap into one's level of confidence, especially within the artists. For example, artists and non-artists may have very different notions concerning the definition of creativity while rating a question such as "I am a very creative individual". Some may be thinking of everyday creativity, such as cooking dinner, while others may be thinking of the originality of their own writing or drawing. In future research, it may be

beneficial to specify that one's level of creativity should be compared to the average person rather than to others in one's field. Finally, there was much discrepancy between the various items in the self-rated creativity measure. For example, some people may see themselves as very creative at drawing but not creative at all in coming up with melodies. Much work remains to be done on the measurement of creativity; and particularly, the question needs to be posed whether a general "creativity" exists or whether people may be more creative in some areas than in others.

Due to the extensive variability in the artist group on several of the variables and the observations that certain types of artists relate more to certain measures, it would be interesting in future research to separate realist from abstract artists. Substantial differences would likely be found between them on certain variables, such as schizotypy. Creativity is defined by many as the creation of something that is both novel and relevant. Artists who paint only realism most definitely paint images that are relevant to society, but the question remains whether their works can be considered as novel. A study separating different types of visual artists may find very different characteristics in these types of artists. Likewise, Nettle (2006) found differences in schizotypy amongst hobbyist, serious, and professional artists. Future research should not overlook these distinctions.

Another limitation of this study was the use of a self-report measure of balance. Again, since this measure was devised for this study, it was not validated in other research or against other measures of balance. Correlations among different balance measures, however, have generally been found to be poor (Hunt, 2007). This is likely due to the fact that only a component of all them entails the sense of embodiment of interest in this study. Furthermore, many of the predicted results with the self-report measure, such as its positive relation to mystical experiences and its negative relation to more disintegrative states such as cognitive disorganization and neuroticism, were found to be significant.

The way of recruiting the artist, the schizophrenic, and the matched-age comparison groups may also constitute a limitation to this study. These were largely convenience samples

chosen because of ease of access, rather than random samples. Due to the small compensation, they were basically volunteers who were kind enough to offer their time. Many clinical studies, including sleep studies face this problem. While many of the predicted hypotheses, such as the artists being higher than the schizophrenic group in creativity, spatial ability, balance, and positive presence, were confirmed, replication would be helpful to make more definite conclusions.

One of the most significant limitations of this study was the small size of the schizophrenic group, representing the extreme end of the schizophrenia spectrum. Again, this is a limitation seen in many clinical studies, one that largely affects the power of the study and the ability to make definite conclusions about smaller groups. There is much variability among patients with schizophrenia, which would further add to the inconclusiveness of the results regarding that group. The schizophrenic spectrum, of which the schizophrenic group represents the extreme end, however, was measured in this study in two ways. Apart from the smaller clinical group, schizotypy, which is believed to represent a predisposition to schizophrenia, was assessed in a relatively large normative university group. This gave the study the advantage of considering the full range of the schizophrenic spectrum, including both the personality and disease components, and of measuring it in two ways, both within a clinical and normative student sample.

This study replicated previous findings that people on the extreme end of the schizophrenia spectrum, who have been diagnosed with schizophrenia, are not as creative as working artists. This study is also consistent with other studies in finding that creativity is related to positive schizotypy (unusual experiences) and asocial behaviour (impulsive nonconformity). This suggests that if a continuum between low schizotypy and schizophrenia does exist, then those in the mid range of the continuum are the most creative.

Carson et al.'s (2003) finding that artists have the tendency to be overinclusive in their perception was not replicated in this study because the manipulation test for the negative priming

section of the cognitive task did not work out. There were some potential problems with the cognitive measure, however, that may have accounted for its failure to demonstrate negative priming, the details of which are presented in Appendix N. This study did, however, demonstrate that people with schizophrenia have a general slowing of cognition, as seen in performance on timed tasks.

This study extended findings of previous research that found similarities between creativity and mental illness or characteristics that may predispose people to mental illness, represented in this study by the schizophrenia spectrum. As predicted, spatial ability and related tasks, namely balance and sense of presence, were the variables that provided the greatest separation between artists and people on the extreme end of the schizophrenia spectrum, and between creativity and schizotypy. These variables may be compensatory qualities, related to traditional concepts of ego strength (Barron, 1969) for the more vulnerable characteristics that artists share with the schizophrenia spectrum. In other words, because creative individuals are high in spatial and related tasks, they are protected from the ego fragmentation or disintegrative states found in schizophrenia. It would be interesting to see if these and related variables explain the separation between creativity and mental illness to a greater extent than general intelligence, the theory put forward by a number of researchers (e.g. Carson et al., 2003). The present results provide support for Hunt's (2007) phenomenologically based theory that an expanded versus deleted sense of self presence, which can be at least partially detected by measures of physical balance and spatial abilities, is the general dimension underlying more integrative versus more disintegrative transformations of consciousness.

The propensity to mystical experiences was the variable that most strongly connected creativity and the schizophrenia spectrum, both with the extreme end of the spectrum and with the positive symptoms of schizotypy. The mediation of absorption suggested that it is the capacity to become intensely absorbed in both inner and outer experiences in patients and students that allows them to have classical mystical experiences. The relation was more direct and unmediated

in the artists. It is these extreme experiences that then may become either integrative with a more positive sense of self presence, and help with the creative process, or disintegrative, feeding the fear and confusion experienced in schizophrenia.

This study taught us that creative individuals have more unusual beliefs and experiences than most others. And although these experiences share some commonalities with those of people with milder psychoses, they are not necessarily synonymous with those with full blown psychosis. The unusual experiences of creative individuals can show themselves in many forms, from greater absorption to everyday experiences to self-altering mystical experiences; and, it is these experiences that help inspire their creativity. Creative individuals are also more impulsive and nonconforming, but are not necessarily disorganized or antisocial like some believe them to be. People with full blown psychosis, such as schizophrenia, may have similarly altered experiences as highly creative individuals. However, perhaps due to their diminished sense of presence and lack of spatial abilities, and balance, they are not able to use these experiences in constructive ways and alternatively become more frightened as a result.

This study further extended what is known about the relation between creativity and psychopathology by being the first study to include the propensity to mystical experiences, absorption, and spatial and related tasks to the knowledge of the similarities and differences between creativity and psychopathology. Additional research could expand this knowledge base by examining different types of artists, recruiting a larger schizophrenic group so that subtypes could be compared, and examining different subtypes of mental disorders, such as bipolar psychosis. Exploring different measures of overinclusiveness could prove to be helpful, as well as examining other potentially separating or compensatory variables such as intelligence.

Such results could ultimately be beneficial in reducing stigma in schizophrenia by focusing on variables that are shared with highly creative individuals. It could also be used to help people with schizophrenia by focusing on self presence, spatial tasks, and cognitive tasks such as overinclusiveness in therapy. More specifically, there could be great potential in using

balance and spatial tasks for the diagnosis, the prevention in the form of training, and or the treatment of schizophrenic children. Using creativity could also be beneficial in therapy for people with schizophrenia, and could potentially be used as an outlet for their potentially damaging self-altering states.

Finally, the role of classical mystical experience in creativity has not been appreciated other than in anecdotal and phenomenological accounts. It's presence in schizophrenia, apart from the well known wider range of altered states, may promise an important integrative factor at the heart of a major disintegrative dimension of human existence.

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Appendices

Appendix A. *Barron-Welsh Art Scale (Figure Preference Task)*

FIGURE PREFERENCES

YOU ARE ASKED IF YOU LIKE OR DON'T LIKE EACH OF THE DRAWINGS ON THE FOLLOWING PAGES.

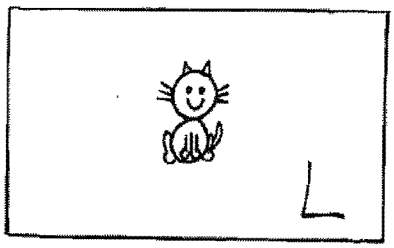
PLEASE PUT AN "L" ANYWERE ON EACH DRAWING YOU LIKE AND A "D" ANYWERE ON EACH DRAWING YOU DON'T LIKE.

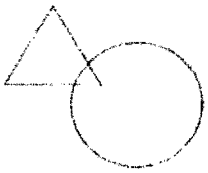
RATE EACH DRAWING IN ORDER, DON'T SKIP ANY DRAWINGS.

IF YOU CAN'T DECIDE, GUESS. IF YOU LIKE THEM ALL, TRY TO DIFFERENTIATE THE ONES YOU LIKE A LOT MORE THAN THE REST, AND IF YOU DON'T LIKE ANY, TRY TO DIFFERENTIATE THOSE YOU TRULY DISLIKE FROM THE REST.

TRY TO WORK AS FAST AS YOU CAN.

EXAMPLE:





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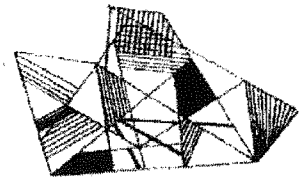

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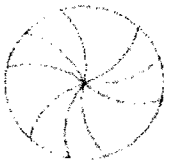

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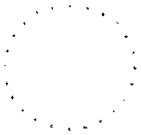

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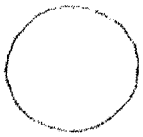

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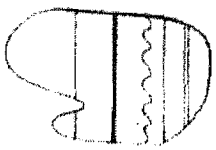

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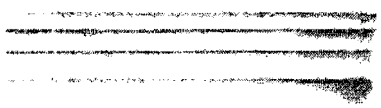

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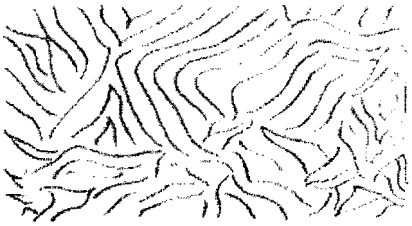

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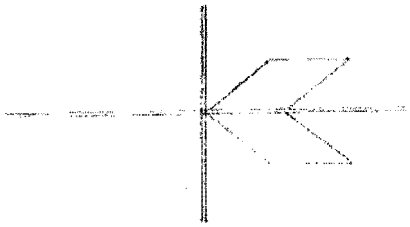

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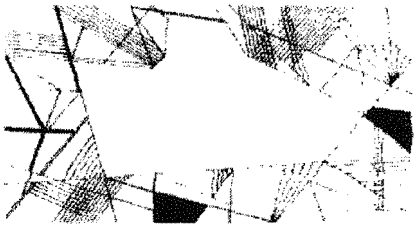

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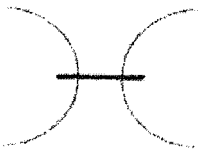

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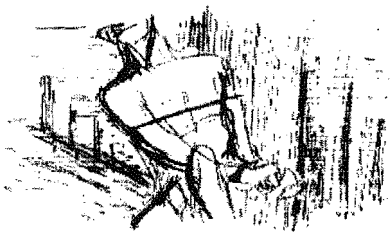

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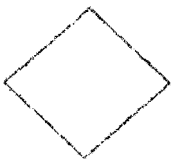

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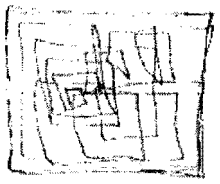

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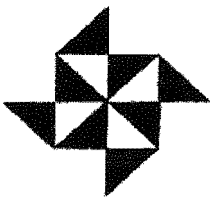

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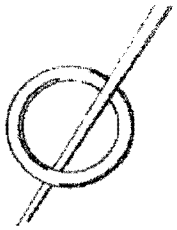

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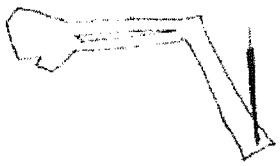

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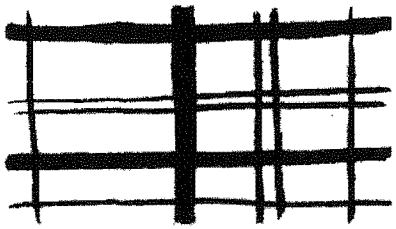

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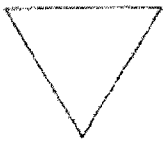

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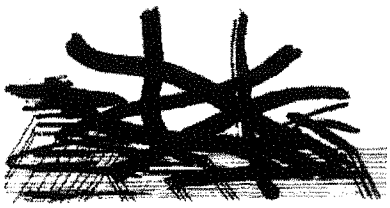

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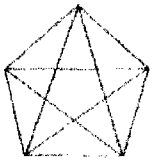

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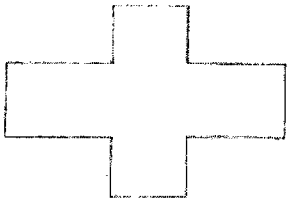

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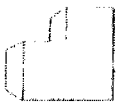

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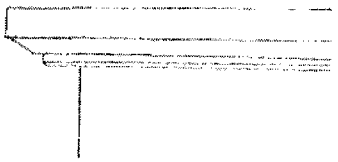

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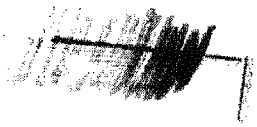

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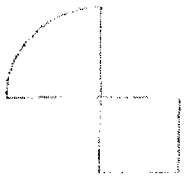

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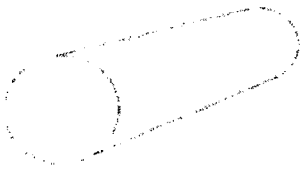

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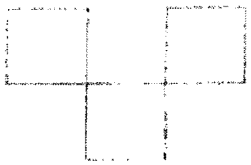

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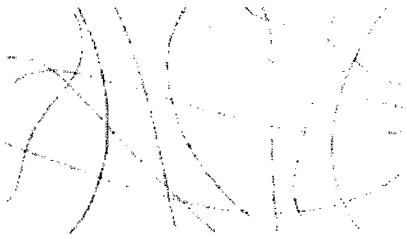

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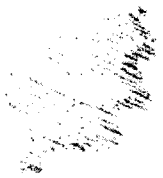

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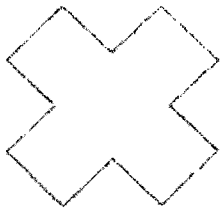

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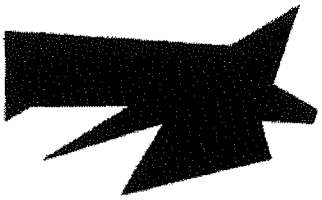

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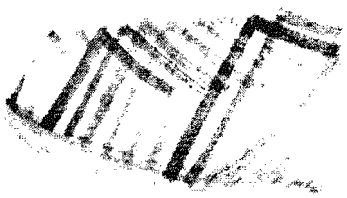

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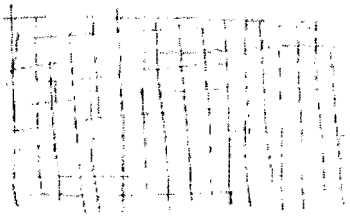

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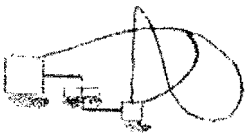

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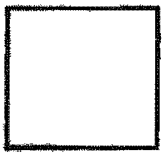

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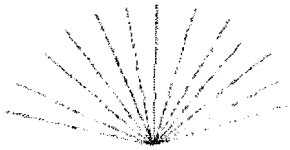

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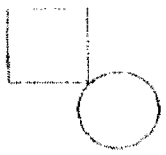

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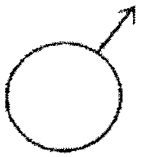

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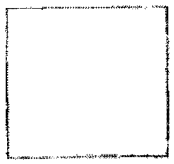

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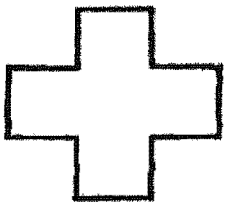

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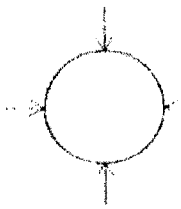

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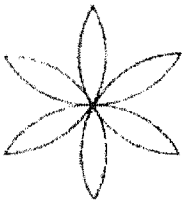

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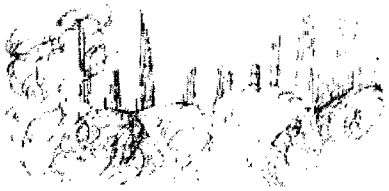

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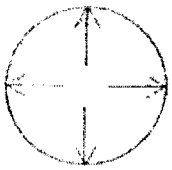

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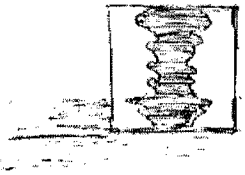

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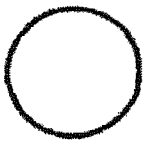

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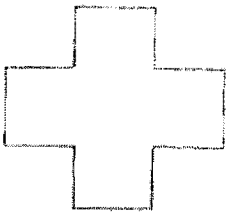

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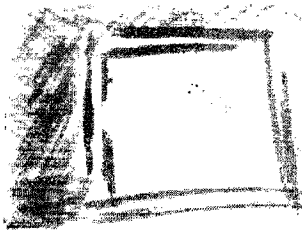

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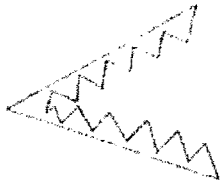

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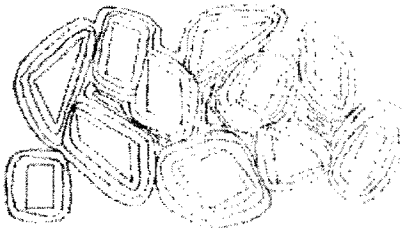

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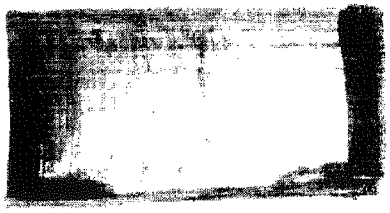

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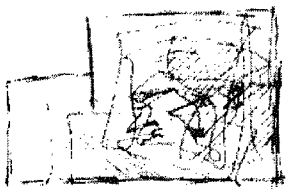

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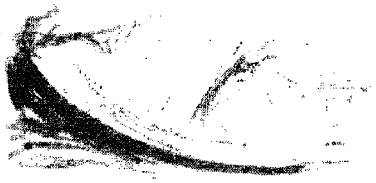

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Appendix B. *O-LIFE Measure of Schizotypy*

Unusual Experiences Subscale (All items are scored positively)

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT YOUR BELIEFS AND EXPERIENCES. PLEASE ANSWER THEM WITH A YES (Y) OR NO (N).

___ 1. Are the sounds you hear in your daydreams usually clear and distinct?
___ 2. Are your thoughts sometimes as real as actual events in your life?
___ 3. Does it often happen that nearly every thought immediately and automatically suggests an enormous number of ideas?
___ 4. Are your thoughts sometimes so strong that you can almost hear them?
___ 5. Do you think you could learn to read others' minds if you wanted to?
___ 6. Have you felt that you have special, almost magical powers?
___ 7. Do ideas and insights sometimes come to you so fast that you cannot express them all?
___ 8. Can some people make you aware of them just by thinking about you?
___ 9. Does a passing thought sometimes seem so real that it frightens you?
___ 10. Does your voice ever seem distant, faraway?
___ 11. Do you sometimes feel that your accidents are caused by mysterious forces?
___ 12. Do people in your daydreams seem so true to life that you sometimes think they are?
___ 13. Is your hearing sometimes so sensitive that ordinary sounds become uncomfortable?
___ 14. Have you felt that you might cause something to happen just by thinking too much about it?
___ 15. Are you so good at controlling others that it sometimes scares you?
___ 16. Do you ever have a sense of vague danger or sudden dread for reasons that you don't understand?
___ 17. Have you sometimes had the feeling of gaining or losing energy when certain people look at you or touch you?
___ 18. Have you ever thought you heard people talking only to discover that it was in fact some nondescript noise?
___ 19. Have you occasionally felt as thought your body did not exist?
___ 20. On occasions, have you seen a person's face in front of you when no one was in fact there?
___ 21. Do you often have a day when indoor lights seem so bright that they bother your eyes?
___ 22. Have you wondered whether the spirits of the dead can influence the living?
___ 23. Have you felt as though your head or limbs were somehow not your own?
___ 24. Now and then when you look in the mirror, does your face seem quite different than usual?
___ 25. Do you ever feel that your thoughts don't belong to you?
___ 26. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?
___ 27. When in the dark, do you often see shapes and forms even though there's nothing there?
___ 28. Have you sometimes sensed an evil presence around you, although you could not see it?
___ 29. Does you sense of smell sometimes become unusually strong?
___ 30. Do you ever feel sure that something is about to happen, even though there does not seem to be any reason for you thinking that?

Cognitive Disorganization Subscale (All items are scored positively)

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT YOUR BELIEFS AND EXPERIENCES. PLEASE ANSWER THEM WITH A YES (Y) OR NO (N).

___ 1. Do you often hesitate when you are going to say something in a group of people that you know more or less?
___ 2. Do you frequently have difficulty in starting to do things?
___ 3. Do you often worry about things you should not have done or said?
___ 4. When in a crowded room, do you often have difficulty in following a conversation?
___ 5. No matter how hard you try to concentrate, do unrelated thoughts always creep into your mind?
___ 6. Are you easily hurt when people find fault with you or the work you do?
___ 7. Do you easily lose courage when criticized or failing in something?
___ 8. Do you seem to be a person whose mood goes up and down easily?
___ 9. Are you sometimes so nervous that you are 'blocked'?
___ 10. Do you find it difficult to keep interested in the same thing for a long time?
___ 11. Do you dread going into a room by yourself where other people have already gathered and are talking?
___ 12. Do you often have difficulties in controlling your thoughts when you are thinking?
___ 13. Do you often feel that there is no purpose to life?
___ 14. Do you worry about awful things that might happen?
___ 15. Are you easily distracted from work by daydreams?
___ 16. Are you easily confused if too much happens at the same time?
___ 17. Do you worry too long after an embarrassing experience?
___ 18. Do you often feel lonely?
___ 19. Do you often experience an overwhelming sense of emptiness?
___ 20. Do you often feel 'fed up'?
___ 21. Would you call yourself a nervous person?
___ 22. Is it hard for you to make decisions?
___ 23. Do you ever feel that your speech is difficult to understand because the words are all mixed up and don't make sense?
___ 24. Are you easily distracted when you read or talk to someone?

*Introvertive Anhedonia Subscale (Items scored negatively are marked with *)*

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT YOUR BELIEFS AND EXPERIENCES. PLEASE ANSWER THEM WITH A YES (Y) OR NO (N).

___ 1. Have you had very little fun from physical activities like walking, swimming or sports?
___ 2. Do you enjoy many different kinds of play and recreation? *
___ 3. Has dancing, or the idea of it, always seemed dull to you?
___ 4. Is trying new foods something you have always enjoyed? *
___ 5. Are there very few things you have ever really enjoyed doing?
___ 6. Are you much too independent to really get involved with other people?
___ 7. Do you think having close friends is not as important as some people say?
___ 8. Are you rather lively? *
___ 9. Does it often feel good to massage your muscles when they are tired or sore? *
___ 10. Do you like mixing with people? *
___ 11. On seeing a soft, thick carpet have you sometimes had the impulse to take off your shoes and walk barefoot on it? *
___ 12. Are people usually better off if they stay aloof from emotional involvements with most others?
___ 13. Can just being with friends make you feel really good? *
___ 14. Have you often felt uncomfortable when your friends touch you?
___ 15. When things are bothering you do you like to talk to other people about it? *
___ 16. Do you have many friends? *
___ 17. Do you prefer watching television to going out with other people?
___ 18. Is it true that your relationships with other people never get very intense?
___ 19. Do you love having your back massaged? *
___ 20. Is it fun to sing with other people? *
___ 21. Do people who try to get to know you better usually give up after a while?
___ 22. Can you usually let yourself go and enjoy yourself at a lively party? *
___ 23. Are the bright lights of a city exciting to look at? *
___ 24. Do you usually have very little desire to buy new kinds of foods?
___ 25. Do you like going out a lot? *
___ 26. Do you feel very close to your friends? *
___ 27. Do you feel that making new friends isn't worth the energy it takes?

*Impulsive Nonconformity Subscale (Items scored negatively are marked with *)*

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT YOUR BELIEFS AND EXPERIENCES. PLEASE ANSWER THEM WITH A YES (Y) OR NO (N).

___ 1. Do you often overindulge in alcohol or food?
___ 2. When with groups of people, do you usually prefer to let someone else be the centre of attention? *
___ 3. When you catch a train, do you often arrive at the last minute?
___ 4. Do you often change between intense liking and disliking of the same person?
___ 5. Have you ever cheated at a game?
___ 6. Do you at times have an urge to do something harmful or shocking?
___ 7. Are you usually in an average sort of mood, not too high and not too low? *
___ 8. Would you take drugs which may have strange or dangerous effects?
___ 9. Do you stop to think things over before doing anything? *
___ 10. Have you ever blamed someone for doing something you know was really your fault?
___ 11. Would being in debt worry you? *
___ 12. Do you think people spend too much time safeguarding their future with savings and insurance?
___ 13. Do you ever have the urge to break or smash things?
___ 14. Have you ever felt the urge to injure yourself?
___ 15. Would it make you nervous to play the clown in front of other people? *
___ 16. Do you consider yourself to be pretty much an average kind of person? *
___ 17. Have you ever taken advantage of someone?
___ 18. Would you like other people to be afraid of you?
___ 19. Do you often have an urge to hit someone?
___ 20. Do people who drive carefully annoy you?
___ 21. Do you sometimes talk about things you know nothing about?
___ 22. Do you often feel like doing the opposite of what other people suggest, even though you know they are right?
___ 23. Do you often feel the impulse to spend money which you know you can't afford?

Appendix C – Negative Priming and Distractibility Tasks

TRY AND CROSS OUT AS MANY TARGET WORDS AS POSSIBLE UNTIL YOU ARE ASKED TO "STOP" (AT WHICH TIME PLEASE FLIP YOUR BOOKLET OVER)

PRACTICE EXAMPLE:

TARGET CATEGORY: DAYS OF THE WEEK

~~SATURDAY~~ ~~MONDAY~~

READER MELON THURSDAY LUCK COMPACT INNOCENT VIKING

BILLION CASSEROLE PARTY KETCHUP SUNDAY SPUNKY OBSCENE

FRIDAY SUBVERT SAINT PETTERN CONVINCE BALLOON TUESDAY

TORMENT BRILLIANT WAIL ALLEY CLEAN FELON SOLAR JUG

LIQUID TEXT TESTIFY WEDNESDAY IMPRESS SAILOR AUNT LORE

STOP

WHEN I SAY "START" TURN THE PAGE AND BEGIN

Target Category: First Names of Men and Women

HAT STREAM KITE UNITE TRAIN SOCIAL EXAMPLE JOHN VEST SPREAD GAME SPEAK DARE FORCE ROLL TRACY GLOVE BLACK SEASON THINK BECOME JOSHUA BIRD WISE SUSAN CITY FROM SHIRT COTTON SHOW SHOW NATION BOOK CURRENT PANTS YOUTH DANGER DARK AGENT MORNING STEEL CHRIS REST GROUND LETTER SALT GATE CAR TABLE MATTHEW HARDLY BELT HANG END ELEVEN YES PRETTY SERVE SKY SQUARE PRESSURE KIND TREE SANDLES FURNISH LOVE CORN DICE ALE FAVOUR KATE SHADOW BARB SHORTS TASK HOUSE TALK ACROSS DAY PLACE DESCRIBE HEAVY SCENE SILVER TOM WAY NATURE NO BRIGHT MUSIC MOON SKIRT DAVE FIELD STORY CAPTAIN SEA DRESS MACHINE MARKET LISA WEALTH SINCE SMILE GROUP SIGN SCARF EFFORT GIVE KELLY EXPLAIN SIMPLE JACKET DRIVE CUT STEVE OTHER PASS WHICH TUBE LIGHT WALL EXPLAIN RICK GATHER PROPER COVER ROBE ERIN TWENTY MATH MIDDLE JOB MOMENT KNOW SHOES SKY SURE VISITE FALL VOICE FACE SALLY SOCKS COST VIRTUE LANGUAGE BOB START SWEATER BIG LEAVE MAKE FLOWER TANYA SAIL READ SPIRIT FRAME CLUB DANIEL GREEN SURE FEEL RATHER TIE FLOOR APPLES BLAZER CASE TRUST MOVE RISE WEAR FURNITURE NEIL CHAIR FIELD MARKER HAMMER PHONE BETH BED SUIT DRINK OCEAN BANNER PIN PLANT MEET PEACE GRADE MITTEN GLEN DOING BOOK HEATING STAY GRID

Target Category: Names of Animals

UNITE TRAIN SOCIAL EXAMPLE DUCK VEST HAT STREAM KITE SPREAD
FORCE ROLL SNAKE GLOVE BLACK GAME SPEAK DARE SEASON THINK
BECOME TURTLE BAND WISE TIGER CITY FROM SHIRT COTTON SHOW
SHOW NATION BOOK CURRENT PANTS YOUTH DANGER DARK AGENT
STEEL BEAR REST GROUND LETTER SALT GATE CAR MORNING TABLE
MONKEY HARDLY BELT HANG END ELEVEN YES PRETTY SERVE SKY
SQUARE PRESSURE KIND TREE SANDLES FURNISH LOVE CORN DICE RAT
BIRD SHORTS TASK FAVOUR LION SHADOW HOUSE TALK ACROSS DAY
HEAVY SCENE PLACE DESCRIBE SILVER DOG WAY NATURE NO BRIGHT
MOON SKIRT FROG FIELD MUSIC STORY CAPTAIN SEA DRESS MACHINE
SINCE SMILE MARKET WOLF WEALTH GROUP SIGN SCARF EFFORT GIVE
WHALE EXPLAIN SIMPLE JACKET DRIVE CUT LEND OTHER PASS WHICH
CAT GATHER TUBE LIGHT WALL EXPLAIN PROPER COVER ROBE FAIR
TWENTY MATH MIDDLE JOB MOMENT KNOW SHOES SKY SURE VISITE
FALL VOICE COST VIRTUE FACE EAGLE SOCKS LANGUAGE FOX START
FLOWER RABBIT SAIL SWEATER BIG LEAVE MAKE READ SPIRIT FRAME
SURE FEEL RATHER TIE FLOOR APPLES BLAZER CLUB HORSE GREEN
CASE TRUST MOVE RISE WEAR FURNITURE DEER CHAIR FIELD MARKER
HAMMER PHONE FISH BED SUIT DRINK OCEAN BANNER PIN PLANT
MEET PEACE GRADE MITTEN GLEN DOING BOOK HEATING STAY GRID

Target Category: Articles of Clothing

LAMP BOX SHORE WRONG STRONG HAT WAVE ANCIENT DETAIL SPACE MIND LAUGH GLOVE PEPPER SOLDIER CLAIM SUN GROW SOON SEVEN SHIRT MONSTER ARRIVE SPOON GUITAR CLEF SALVE FOSTER TEA TIDY CLARITY TORTE ROOF OVEN LURK ISLAND ZAP NEURAL KNOB MEDAL GOLD FEEL FRUGAL SEMI CAMEO TRACK PILE STEREO PUKE SANDALS WAX PANTS RIGHT RECKON HALL SKIP MUFFIN SEEM DRAWER HOST ASH DROP MILD YEILDING UNZIP WOOD STUDY WHOEVER BABY TONE BELT SQUEEZE MILK WASH UNTO VAULT THRILL SHORTS SEEMLY RED RUPTURE PROCESS NINTH ROBE SATURN OF DEPUTY VITAL MODE SELF IMAGE STRADDLE BREAD SAGE VENUE SKIRT CHASM SALT PIE DISPOSE CONVINCE DRESS NOMAD SCARF SCALE TOWN GRUEL VENUE BULB ON WATER SORBET BLUE TEN VANISH TIDBIT CUP TELLING CANVASS BALL SWEATER MAN DRUM WHISKER NORTH CHEESY PAIR SIDE PUCK SHADE BOAT HORN POWER TIE SOCKS POWER CAPTOR RUBBER PLAN FIDDLE STAMP FLUTE PERSON FACTORY UNSURE OLD BLAZER PASS WORK NIP SUCCESS HUE YOUR WHEEZY YET TRAFFIC OCCUR MANY PORCH SHOES ORANGE MITTEN AUTO SYSTEM OBOE BASS ARRIVE VEST QUOTE BLESS PIANO GUSTO CLUTCH NUT TROLL LOFT FLOOD FORMAL HIS COMMUNE BEAN FRYER JADE SUIT PLURAL LATER WELL WET SCORE TROMBONE TOW BOGUS SEAL CLOSE SLAP BLAST GROUP JACKET MEMORY STRING

Target Category: Body Parts

EARTH ARM JOHN CHERRY PENDANT COPE MITTEN SCARF RABBIT OUT
WOLF BULK BID MINER SHOULDER BEAR WHALE SKILLS WRIST SNAKE
TRACY RECALL INJECT JOSHUA DUCK GLOVE NOSE ATTUNE TIGER BOB
DRUG LEG BROWN HAND SANDALS HALO LINE FERRY MIDDLE TANYA
DANIEL SHOES AGE TRUCK FARM COURSE FOUR LINGER FINGER FISH
LION BETH MATTHEW DRESS BITE FROG TICKLE SANE TENET SUSAN
FOOT DICE RING WEEP TRY CHOOSE PLACEBO FOX SWEATER JACKET
CAT EGG ARRIVE JOLT WINTER BELT BARB SPOONERISM COAL COURT
CARD ELBOW EAGLE ERIN SUIT INK THEIR PATRON GROUND SOCKS
TALK HAT FIRE DEBT IVORY BLUR COASTER HORSE SALLY COMPOSER
TOO NIGHT TRUST PROTEST HEAD MONEY TURTLE KNIFE GLOVE WIN
COAL COURT MODEL BERRY FAIR ALE SKIRT OLIVE ANKLE ADRIAN
CHRIS BIRD TOE MONKEY TRUMPET STEVE PANTS CHIN COMPUTER TAR
LISA TOM HELMET TROPICAL BIRD TIE PRECIOUS KATE ROBE SPASM
KNEE BLACK NUT VAPOR BLAB BLAZER RICK BOARD FOOL MERCHANT
SMOKE SULFUR PITCH DOG FISH EAR HALF MINUS NEIL SEEDLING
ARMY HAIR RAT WELCOME TOASTER ANIMAL SHIRT DANCE FINAL PIN
HEEL RESPECT EVE SHORTS KELLY KEYBOARD BELLY PLATE CAN ROT
DEER CANDY LEVY GLOVE LENT ROUGH LANDLORD ZOOM LIPS RAPIDS
SUCROSE VEST NECK COLIC MANOR DOLL EASEL FESTIVE BREAK TIME

Appendix D. *Embedded-Figures Test (Spatial Ability)*

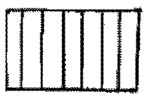
HIDDEN FIGURES

ON THE TOP OF EACH OF THE FOLLOWING 3 PAGES, THERE ARE TWO SIMPLE GEOMETRIC FIGURES. ONE OF THEM IS CONTAINED IN EACH OF THE COMPLEX FIGURES BELOW. THEY ARE THE SAME SIZE AND IN THE SAME POSITION (ALWAYS RIGHT SIDE UP).

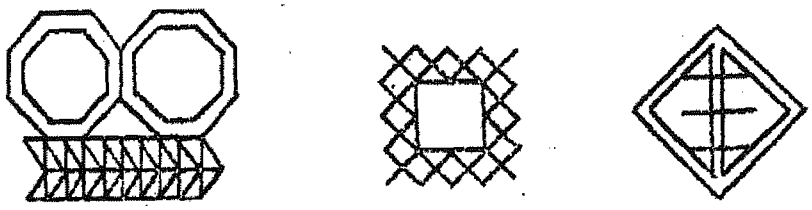
FOR EACH COMPLEX FIGURE, OUTLINE THE PART THAT IS THE SAME AS ONE OF THE TWO ABOVE FIGURES (MARK ONLY ONE FIGURE IN EACH DRAWING). YOU HAVE 8 MINUTES TO COMPLETE THIS EXERCISE, SO YOU DON'T HAVE TO BE NEAT, AS LONG AS IT'S OBVIOUS YOU SEE WHICH FIGURE IS CONTAINED IN EACH DRAWING. IF YOU SKIP ANY, TRY GOING BACK TO THEM WHEN YOU ARE FINISHED THE REST.

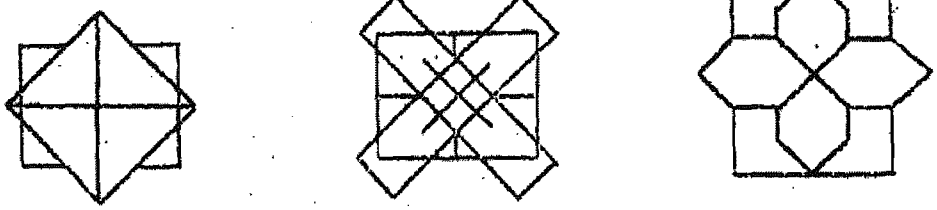
TRY TO WORK AS FAST AS YOU CAN.

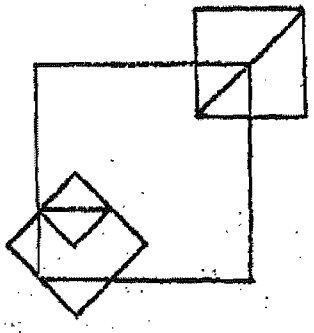
EXAMPLE:

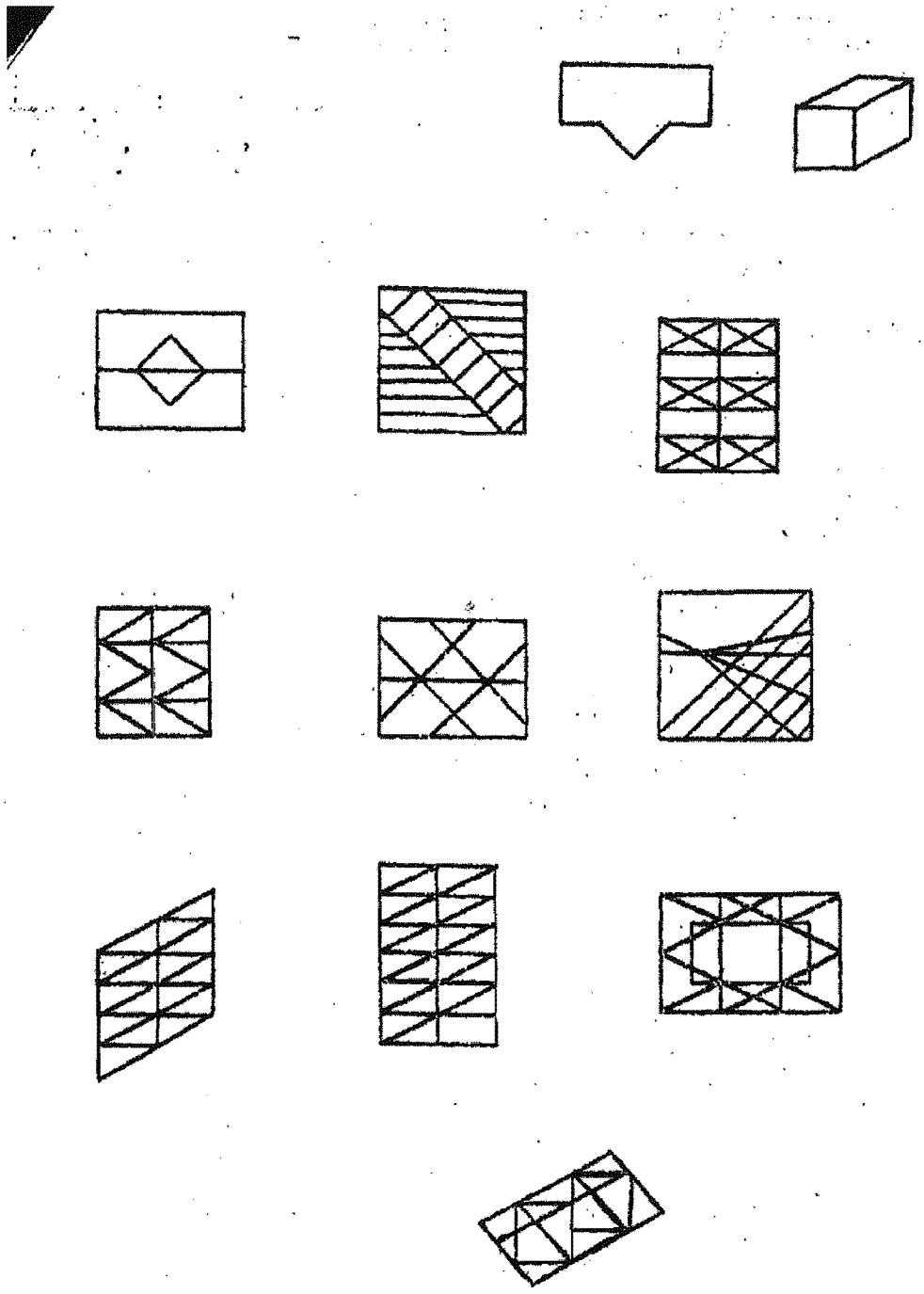


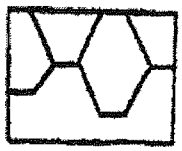
ANY QUESTIONS?

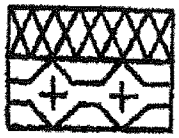


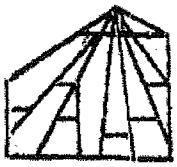


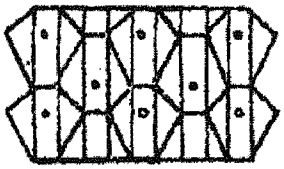


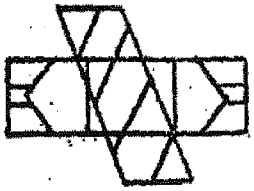


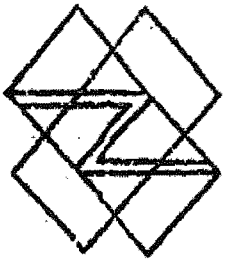


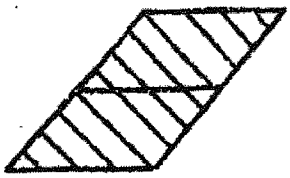


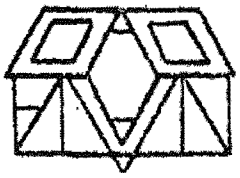












Appendix E. *Tellegen Absorption Scale (All items are scored positively)*

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT EXPERIENCES YOU MAY HAVE HAD IN THE PAST. PLEASE USE THE FOLLOWING SCALE TO INDICATE HOW TRUE THESE STATEMENTS ARE FOR YOU.

1 = Definitely false 2 = Mostly false 3 = Neutral 4 = Mostly true 5 = Definitely true

___ 1. Sometimes I feel and experience things as I did when I was a child.
___ 2. I can be greatly moved by eloquent or poetic language.
___ 3. While watching a movie or TV, I may become so involved that I forget about myself and my surroundings and experience the story as if it were real and I were taking part in it.
___ 4. If I stare at a picture and then look away from it, I can sometimes "see" an image of the picture, almost as if I were still looking at it.
___ 5. Sometimes I feel as if my mind could envelop the whole world.
___ 6. I like to watch cloud shapes change in the sky.
___ 7. If I wish, I can imagine some things so vividly that they hold my attention as a good movie or story does.
___ 8. I think I really know what some people mean when they talk about mystical experiences.
___ 9. I sometimes step outside my usual self and experience an entirely different state of being.
___ 10. Textures such as wool, sand, or wood sometimes remind me of colours or music.
___ 11. Sometimes I experience things as if they were doubly real.
___ 12. When I listen to music I can get so caught up in it that I don't notice anything else.
___ 13. If I wish, I can imagine that my body is so heavy that I could not move it if I wanted to.
___ 14. I can sometimes sense the presence of another person before I actually see her/him.
___ 15. The crackling and flames of wood fire stimulate my imagination.
___ 16. It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered.
___ 17. Different colours have distinctive and special meanings for me.
___ 18. I am able to wander off into my own thoughts while doing a routine task and actually forget that I am doing the task, and then find a few minutes later that I have completed it.
___ 19. I can sometimes recollect certain past experiences in my life with such clarity and vividness, I feel like I can experience them again or almost so.
___ 20. Things that might seem meaningless to others often make sense to me.
___ 21. While acting in a play, I think I could really feel the emotions of the character and "become" her/him for the time being, forgetting both myself and the audience.
___ 22. My thoughts often don't occur as words but as visual images.
___ 23. I often take delight in small things (like the five-pointed star shape that appears when you cut an apple across the core, or the colours in soap bubbles).
___ 24. When listening to organ or other powerful music, I sometimes feel as if I am being lifted.
25. Sometimes I can change noise into music by the way I listen to it.
___ 26. Some of my most vivid memories are called up by scents and smells.
___ 27. Certain songs or pieces of music remind me of pictures or changing colour patterns.
___ 28. I often know what someone is going to say before he or she says it.
___ 29. I often have "physical memories"; for example, after I've been swimming I m ay still feel as if I'm in the water.
___ 30. The sound of a voice can be so fascinating to me that I can just go on listening to it.
___ 31. At times I somehow feel the presence of someone who is not physically there.
___ 32. Sometimes thoughts and images come to me without the slightest effort on my part.
___ 33. I find that different odours have different colours.
___ 34. I can be deeply moved by a sunset.

Appendix F. *Hood Mysticism Scale (Items scored negatively are marked with *)*

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT EXPERIENCES YOU MAY HAVE HAD IN THE PAST. PLEASE USE THE FOLLOWING SCALE TO INDICATE HOW TRUE THESE STATEMENTS ARE FOR YOU.

1 = Definitely false 2 = Mostly false 3 = Neutral 4 = Mostly true 5 = Definitely true

___ 1. I have had an experience which was both timeless and spaceless.
___ 2. I have never had an experience that cannot be expressed in words. *
___ 3. I have had an experience in which something greater than myself seems to absorb me.
___ 4. I have had an experience in which everything seems to disappear from my mind until I was aware only of a void.
___ 5. I have experienced profound joy.
___ 6. I have never had an experience in which I felt myself to be absorbed as one with all things. *
___ 7. I have never experienced a perfectly peaceful state. *
___ 8. I have never had an experience in which I felt as if all things were alive. *
___ 9. I have never had an experience which seemed holy to me. *
___ 10. I have never had an experience in which all things seemed to be aware. *
___ 11. I have had an experience in which I had no sense of time and space.
___ 12. I have had an experience in which I realize the oneness of myself with all things.
___ 13. I have had an experience in which a new view of reality was revealed to me.
___ 14. I have never experienced anything to be divine. *
___ 15. I have never had an experience in which time and space were non-existent. *
___ 16. I have never experienced anything that I could call ultimate reality. *
___ 17. I have had an experience in which I felt that all was perfection at that time.
___ 18. I have had an experience in which I felt that all was perfection to me.
___ 19. I have had an experience in which I felt everything in the world to be part of the same whole.
___ 20. I have had an experience which I knew to be sacred.
___ 21. I have never had an experience which I was unable to express adequately through language. *
___ 22. I have had an experience which left me with a feeling of awe.
___ 23. I have had an experience that is impossible to communicate.
___ 24. I have never had an experience in which my own self seemed to merge into something greater. *
___ 25. I have never had an experience which left me with a feeling of wonder. *
___ 26. I have never had an experience in which deeper aspects or reality were revealed to me. *
___ 27. I have never had an experience in which time, place, and distance were meaningless. *
___ 28. I have never had an experience in which I became aware of a unity of all things. *
___ 29. I have had an experience in which all things seemed to be conscious.
___ 30. I have never had an experience in which all things seemed to be unified into a single whole. *
___ 31. I have had an experience in which I felt nothing is ever really dead.
___ 32. I have never had an experience which was incapable of being expressed by words. *

Appendix G. *Childhood Trauma Questionnaire (Items scored negatively are marked with *)*

THESE QUESTIONS ASK ABOUT SOME OF YOUR EXPERIENCES GROWING UP AS A CHILD AND A TEENAGER. PLEASE USE THE FOLLOWING SCALE TO INDICATE HOW TRUE THESE STATEMENTS ARE FOR YOU. ALTHOUGH SOME OF THESE QUESTIONS ARE OF A PERSONAL NATURE, PLEASE TRY TO ANSWER AS HONESTLY AS YOU CAN. YOUR ANSWERS WILL BE KEPT CONFIDENTIAL.

1 – Never true 2 – Rarely true 3 – Sometimes true 4 – Often true 5 – Very often true

When I was growing up, …

___ 1. I didn't have enough to eat.
___ 2. I knew there was someone to take care of me and protect me. *
___ 3. People in my family called me things like "stupid", "lazy", or "ugly".
___ 4. My parents were too drunk or high to take care of the family.
___ 5. There was someone in my family who helped me feel important or special. *
___ 6. I had to wear dirty clothes.
___ 7. I felt loved. *
___ 8. I thought that my parents wished I had never been born.
___ 9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.
___ 10. There was nothing I wanted to change about my family.
___ 11. People in my family hit me so hard that it left me with bruises or marks.
___ 12. I was punished with a belt, a board, a cord, or some other hard object.
___ 13. People in my family looked out for each other. *
___ 14. People in my family said hurtful or insulting things to me.
___ 15. I believe that I was physically abused.
___ 16. I had the perfect childhood.
___ 17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbour, or doctor.
___ 18. I felt that someone in my family hated me.
___ 19. People in my family felt close to each other. *
___ 20. Someone tried to touch me in a sexual way, or tried to make me touch them.
___ 21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.
___ 22. I had the best family in the world.
___ 23. Someone tried to make me do sexual things or watch sexual things.
___ 24. Someone molested me.
___ 25. I believe that I was emotionally abused.
___ 26. There was someone to take me to the doctor if I needed it. *
___ 27. I believe that I was sexually abused.
___ 28. My family was a source of strength and support. *

Appendix H. *Neuroticism Questionnaire (Component of the NEO-Five-Factor Inventory-FFI) (Items scored negatively are marked with *)*

THE FOLLOWING QUESTIONS ASK YOU TO THINK ABOUT EXPERIENCES YOU MAY HAVE HAD IN THE PAST. PLEASE USE THE FOLLOWING SCALE TO INDICATE HOW TRUE THESE STATEMENTS ARE FOR YOU.

1 = Definitely false 2 = Mostly false 3 = Neutral 4 = Mostly true 5 = Definitely true

___ 1. I am not a worrier. *
___ 2. I often feel inferior to others.
___ 3. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
___ 4. I rarely feel lonely or blue. *
___ 5. I often feel tense and jittery.
___ 6. Sometimes I feel completely worthless.
___ 7. I rarely feel fearful or anxious. *
___ 8. I often get angry at the way people treat me.
___ 9. Too often, when things go wrong, I get discouraged and feel like giving up.
___ 10. I am seldom sad or depressed. *
___ 11. I often feel helpless and want someone else to solve my problems.
___ 12. At times I have been so ashamed I just wanted to hide.

Appendix I. *Demographics Questionnaire*

Gender: F____ M____ Age: ____

Appendix J. Debriefing Letter

Dear Participant,

I am writing to thank you for your participation in our study entitled, "Creativity and the Schizophrenia Spectrum Unveiled: The Similarities and the Differences". Your assistance in completing the tasks and filling out the questionnaires is greatly appreciated. Thank you very much!

This study dealt with the correlates of creativity and cognitive similarities and differences between people who are highly creative (working visual artists) and people who either have schizophrenia or people who have characteristics that might be part of a normal continuum with schizophrenia.

Creativity was found to be related to two facets of schizotypy, the name for the above continuum. The two facets that were correlated with creativity were having unusual beliefs or experiences (including magical thinking) and the tendency to impulsive nonconformity.

The largest commonality among the artists and people with schizophrenia that was not found in the comparison group was the propensity to have mystical experiences. These are extreme, self-altering experiences such as a loss of sense of self such as feelings of being absorbed into all things, feelings of unity, spatial and temporal transcendence, the acquisition of special intuitive knowledge, and having experiences that cannot be put into words.

The greatest difference between the artists and the people with schizophrenia was that artists were generally higher in creativity (although many of the younger people with schizophrenia were highly creative), the artists generally performed better in spatial abilities, had better balance, and more positive states of self presence.

In summary, this study has taught us a little more about what characteristics are shared and what characteristics differ between people high in creativity and people with schizophrenia or on the normal continuum with schizophrenia.

Thanks again for your participation!

Sincerely,

Kerri Michalica (kittykerri@hotmail.com)
PhD Candidate

Harry Hunt (hhunt@brocku.ca)
Faculty Supervisor

This study has been reviewed and approved by the Brock Research Ethics Board. (File #07-011)

Appendix K. ANOVA Table for Community Groups

Variable	*df*	*F*	*p*
Gender	2, 69	1.50	.231
Age	2, 69	.72	.492
Barron-Welsh Art Scale	2, 69	1.67	.197
Embedded-Figures Test	2, 69	3.11	.051
Self-Rated Creativity	2, 69	34.93	.000**
Balance	2, 69	4.69	.012*
Unusual Experiences	2, 69	2.11	.129
Cognitive Disorganization	2, 69	1.54	.222
Introvertive Anhedonia	2, 69	4.57	.014*
Impulsive Nonconformity	2, 69	2.81	.067
Positive Presence	2, 69	14.21	.000**
Negative Presence	2, 69	2.37	.101
Absorption	2, 69	15.29	.000**
Mystical Experiences	2, 69	10.97	.000**
Childhood Abuse	2, 69	.42	.656
Neuroticism	2, 69	2.91	.061
Negative Priming †	3, 68	37.93	.000**
Distractibility †	3, 68	14.78	.000**
Names of Animals (Trial 2)	2, 69	5.90	.004**
Articles of Clothing (Trial 3)	2, 69	9.64	.000**
Body Parts (Trial 4)	2, 69	2.95	.059

*$p < .05$; **$p < .01$, two-tailed, † 2nd step of hierarchical multiple regression

Appendix L. ANOVA Results that Include the Student Group

		Student Group (N = 102)	Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Barron-Welsh†	*M*	32.36	28.20	30.00	23.68	3, 170	3.56	.016*
	SD	12.62	12.00	12.70	15.32			
Embedded-Figures Test	*M*	16.11	11.70	18.26	14.35	3, 170	2.75	.044*
	SD	6.41	8.79	8.14	8.09			
Self-Rated Creativity	*M*	2.68	3.14	4.22	2.64	3, 170	26.16	.000**
	SD	.96	.90	.51	.89			
Balance	*M*	3.59	2.82	3.76	3.64	3, 170	3.53	.016*
	SD	.77	.93	.78	.91			
Unusual Experiences	*M*	11.65	12.00	14.19	10.71	3, 170	2.08	.104
	SD	5.15	6.78	6.71	6.69			
Cognitive Disorganization	*M*	12.47	12.50	9.23	11.10	3, 170	2.88	.037*
	SD	5.42	3.69	5.92	6.05			
Introvertive Anhedonia	*M*	5.16	9.40	4.74	6.19	3, 170	3.73	.012*
	SD	4.15	5.19	3.83	4.35			
Impulsive Nonconformity†	*M*	8.76	8.70	8.81	6.65	3, 170	2.76	.044*
	SD	3.69	2.98	4.42	3.27			

*$p < .05$; **$p < .01$, two-tailed; † represents a significant difference between the student group and matched-age comparison group

		Student Group (N = 102)	Schizophrenic Group (N = 10)	Artist Group (N = 31)	Matched-Age Comparison Group (N = 31)	*df*	*F*	*p*
Positive Presence	*M*	2.94	2.71	3.72	2.76	3, 170	12.94	.000**
	SD	.65	.86	.74	.77			
Negative Presence	*M*	1.89	2.34	1.86	1.75	3, 170	1.63	.184
	SD	.73	1.00	.83	.55			
Absorption	*M*	2.83	2.86	3.72	2.83	3, 170	14.38	.000**
	SD	.69	.89	.56	.70			
Mystical Experiences	*M*	103.93	124.90	130.70	102.16	3, 170	10.80	.000**
	SD	16.19	31.89	24.00	22.53			
Childhood Trauma†	*M*	1.41	2.02	1.98	1.81	3, 170	9.48	.000**
	SD	.46	.77	.85	.78			
Neuroticism	*M*	35.07	36.70	29.45	32.90	3, 170	3.54	.016*
	SD	9.15	2.63	9.25	9.46			

*$p < .05$; **$p < .01$, two-tailed; † represents a significant difference between the student group and matched-age comparison group

Appendix M. Correlations Among all the Variables in the Student Group

Items	1.	2	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Gender	---	.13	.06	-.03	-.01	.12	-.06	.04	.23*	-.02	-.10
2. Age		---	-.10	-.02	-.00	.06	.08	.02	.17	.07	.00
3. Barron-Welsh Art Scale			---	.12	.02	-.14	.20*	.18	.05	.30**	-.12
4. Embedded Figure Test				---	.35**	-.02	.05	-.11	-.06	.23*	.21*
5. Self-Rated Creativity					---	.02	.30**	-.04	-.00	.36**	.22*
6. Balance						---	-.03	-.44**	-.12	-.01	.22*
7. Unusual Experiences							---	.28**	.19	.51**	-.11
8. Cognitive Disorganization								---	.34**	.40**	-.52**
9. Introvertive Anhedonia									---	.08	-.35**
10. Impulsive Nonconformity										---	-.05
11. Positive Presence											---

*p < .05; **p < .01; two-tailed

Items	1.	2	3.	4.	5.	6.	7.	8.	9.	10.	11.
12. Negative Presence	.01	.10	.06	-.08	.08	-.32**	.21*	.60**	.42**	.29**	-.47**
13. Absorption	.06	.10	.06	.13	.44**	.16	.64**	.24*	.03	.48**	.10
14. Mystical Experiences	-.02	.10	.18	.21*	.29**	.21*	.36**	.12	-.22*	.40**	.27**
15. Childhood Abuse	.13	.16	.25*	-.02	.14	-.05	.19	.16	.13	.27**	.05
16. Neuroticism	-.05	.12	.26**	-.07	.04	.33**	.21*	.77**	.27**	.41**	-.45**
17. Negative Priming †	-.16	.22*	-.09	.13	.14	.01	.10	-.03	-.04	.12	.12
18. Distractibility †	-.21*	.22*	-.09	.10	.14	.19	.09	-.13	.06	.09	.03
19. 2nd Trial of Negative Priming	-.28**	-.01	.10	.25*	.02	-.08	.13	.03	-.17	.17	.04
20. 3rd Trial of Negative Priming	-.25*	.20	-.04	.22*	.14	-.02	.15	-.01	-.11	.18	.12
21. 4th Trial of Negative Priming	-.29**	.21*	-.05	.18	.14	.14	.13	-.11	-.01	.14	.05

*p < .05; **p < .01; two-tailed, † partial correlations

Items	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
12. Negative Presence	---	.12	.04	.15	.69**	.04	-.02	-.11	-.01	-.06
13. Absorption		---	.63**	.30**	.18	.06	.00	.04	.07	.02
14. Mystical Experiences			---	.18	.19	.11	.00	.01	.10	.01
15. Childhood Abuse				---	.34**	-.20	-.18	-.23*	-.27**	-.25*
16. Neuroticism					---	-.01	-.10	-.02	-.02	-.10
17. Negative Priming †						---	.55**	N/A	N/A	N/A
18. Distractibility †							---	N/A	N/A	N/A
19. 2nd Trial of Negative Priming								---	.41**	.37**
20. 3rd Trial of Negative Priming									---	.61**
21. 4th Trial of Negative Priming										---

*p < .05; **p < .01; two-tailed, † partial correlations

Appendix N. A Closer Look at the Results of the Manipulation Tests for the Cognitive Task

There is a possibility that the manipulation test for the cognitive task did not work in the way that was expected because of unanticipated differences in the difficulty of the various trials. For instance, despite the absence of any manipulation in the student comparison group, the results suggest that the difficulty level was higher for the last two trials, especially the third trial (see below).

Trial 1 (First Names) – 17.27 (highest score = easiest)
Trial 2 (Animals) – 16.95 (high score = easy)
Trial 3 (Clothing) – 13.27 (lowest score = most difficult)
Trial 4 (Body Parts) – 14.07 (low score = difficult)

Furthermore, it appears as if the second trial (the same distractor trial) was facilitated for the groups with the manipulation (all groups with the exception of the student comparison group) because some of the distractors were repeated and thus, already inhibited. The student comparison group did not have these same distractors so they performed worse on the second trial than the first trial (first trial = 17.27, second trial = 16.95). The facilitation of the trials for the student experimental group may have thrown off the results of the manipulations, giving the appearance that they did not work out.

If this was the case, then perhaps the results for negative priming in the artist group may have been more in line with the hypotheses than previously believed. The artists were predicted to have reduced negative priming depicted by a higher score on the third trial. They did performed significantly higher than the schizophrenic group on the third trial ($p = .006$), and higher than the matched-age comparison group, although this probability did not reach significance ($p = .077$). This suggests that the artists seemed to display reduced negative priming (confirming the findings of Carson et al., 203) despite the fact that the manipulation of the task did not appear to work out. Although it was predicted that both the schizophrenic and the artist groups would have a reduction in negative priming, Williams (1996) found that the only subgroups of people with schizophrenia who showed a reduction in negative priming were the

reality distortion and disorganization subgroups. The patients in the present study were recruited from community programs instead of hospitals, making it less likely that they were in reactive stages in which positive symptoms such as reality distortion are more common. Furthermore, Beech, Powell, McWilliam, and Claridge (1990) found that anti-psychotics reduced the effects of cognitive inhibition by 'normalizing' the perception of people with schizophrenia, and most of the people in the schizophrenic group were on some form of medication.

Moreover, if one considers difference scores alone (see Table 7), which is questionable due to their high variability, then it can be seen that the difference between the second trial and the third (negative priming trial) was smaller in the artist group than the other two community groups, meaning that they have the greatest reduction in negative priming. Similarly for the distractibility trial, it was hypothesized that the schizophrenic group would be more distractible. However, the artists and the group with schizophrenia had lower difference scores between the second the fourth (distractibility trial) than the matched-age comparison group, meaning that they were less affected by the distractions. Because these results are based on difference scores, they must be interpreted with caution; however, they are suggestive for future research.

These results suggest that paper-and-pencil versions of negative priming and distractibility tasks are potentially promising, but care needs to be exercised in controlling for the level of difficulty of the various trials. Future research should look further into considering such tasks for measuring cognitive variables in research samples assessed in a community context.

Appendix O. Correlation and Regression Tables for the Mediation of Absorption

Correlations

Variable	Creativity	Absorption
	Student Group	
Creativity	---	.44**
Mystical Experiences	.29**	.63**
Unusual Experiences	.30**	.64**
Impulsive Nonconformity	.36**	.48**
	Schizophrenic Group	
Creativity	---	.77**
Mystical Experiences	.72*	.71*
Unusual Experiences	.44	.78**
Impulsive Nonconformity	-.07	-.07
	Artist Group	
Creativity	---	.28
Mystical Experiences	.33	.65**
Unusual Experiences	.01	.73**
Impulsive Nonconformity	.14	.19
	Matched-Age Comparison Group	
Creativity	---	.41*
Mystical Experiences	.30	.38*
Unusual Experiences	.13	.56**
Impulsive Nonconformity	-.03	.13

*$p < .05$; **$p < .01$, two-tailed

Regressions (Only done if Assumptions for Mediation are Met)

Variable	*df*	*B*	*t*	*p*	*pr*
		Student Group			
Unusual Experiences	6, 100	.040	.34	.738	.03
Impulsive Nonconformity	6, 100	.154	1.46	.148	.12
Mystical Experiences	6, 100	-.10	-.87	.389	-.07
		Schizophrenic Group			
Mystical Experiences	4, 9	.293	1.04	.347	.19

*$p < .05$; **$p < .01$, two-tailed