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Examining the Inner Experience of Left-Handers Using Descriptive Experience Sampling

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ABSTRACT

Examining the Inner Experience of Left-Handers Using Descriptive Experience Sampling

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Research suggests there are anatomical asymmetries of the human brain associated with right-hand or left-hand preference. In addition, left-handedness has been related to a wide range of psychological and physical problems. Despite these relationships, little is known about the inner experience of left-handers.

The present study, a replication of Mizrachi (2010) using a larger sample, used Descriptive Experience Sampling (DES) with three objectives: 1) examine the inner experience of left-handers; 2) compare the results of the present study to the results of Mizrachi (2010); and 3) compare the inner experience of left-handers to that of the general population as reported by Heavey and Hurlburt (2008).

Of 256 volunteers who completed the Edinburgh Handedness Inventory (EHI), 10 identified as being left-handed were invited to participate in the DES sampling of their inner experience. All agreed to do so and engaged in five days of DES sampling.

The findings suggest that the inner experience of left-handers is quantitatively and qualitatively different from the inner experience of the general population. Left-handers experience sensory awareness, words experienced without semantic significance, and multiple experience at a substantially higher frequency than the general population. Left-

handers experience inner seeing, inner speech, and feeling substantially less than the general population.

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CHAPTER 1

INTRODUCTION

Approximately 10 percent of the western population is left-hand dominant such that they use their left hand for writing and other one-handed activities (Medland, Duffy, Spurdle, Wright, Geffen, Montgomery, & Martin, 2005). Differences in anatomy and behavior between left- and right-handers have been observed since the 1800s (Herron, 1980). However, little, if anything at all, is known about the inner experience of left-handed individuals or about whether differences exist between the inner experience of left-handed and right-handed individuals. The present study sought to explore these characteristics and differences in inner experience using a methodology designed specifically to reveal inner experience in as detailed a manner as possible, Descriptive Experience Sampling (DES).

The following review of the literature is divided into four parts: handedness, left-handedness and other constructs, left-handedness and cognition, and left-handedness and self-awareness.

Handedness

There are several characteristics that distinguish human beings from other species. Among them are higher-order cognitive processes and handedness. In fact, humans appear to be the only species that exhibit a strong preference for the use of one hand over the other (Martin & Jones, 1999). Aside from this unique aspect of handedness which distinguishes humans from other species, handedness has been of particular interest in psychology due to the behavioral differences between left- and right-handers (Martin & Jones, 1999).

Hand movements are extremely important in the physical experience of human beings. The majority of what people do they do with their hands (Hammond, 2002). Hammond (2002) defines handedness as "a fundamental behavioral characteristic that is integrated into our everyday activities," (Hammond, 2002, p. 285). Although many people identify handedness with the hand that is used to write, handedness is actually a construct that involves a variety of activities and modalities. Individuals who consistently use the left hand to write may perform a variety of other activities with the right hand. Thus individuals may be identified as consistent- or mixed-handed. Chemtob and Taylor (2003) found that approximately 66% of the population are consistent right-handers whereas only approximately 4% of the population are consistent left-handers (Chemtob & Taylor, 2003). The authors report that the remaining 30% of the population are mixed right-handers (Chemtob & Taylor, 2003). Thus, the majority of the population are either consistent or mixed right-handers.

Interest in handedness dates back to the 1800s; however, it is likely that interest in this area existed throughout history. For example, there are references to left-handedness in the Old Testament (Herron, 1980). Early theories regarding handedness include structural asymmetry, dynamic balance, and blood supply. Such theories focused on asymmetrical arrangements of internal organs or the asymmetrical distribution of blood supply throughout the body. More recently, focus shifted to the brain when localization of speech in the left cerebral hemisphere was identified in the 19th century by Paul Broca (Herron, 1980).

The relationship of handedness and brain asymmetry continues to be of considerable interest and brain anatomical asymmetries are thought to underlie hand

preference (Phillips & Sherwood, 2005). Humans use their hands asymmetrically which reflects asymmetrical neural control. For example, the dominant hand typically plays a manipulative role while the non-dominant hand plays a stabilizing role. Research shows that the primary motor cortex is larger in the dominant than non-dominant hemisphere (Hammond, 2005). The primary motor cortex is important in controlling movements and guiding the direction and amplitude of muscle forces involved in successive movements (Phillips & Sherwood, 2005). It may be that the difference of the primary motor cortex in the right- and left-hemispheres leads to the behavioral asymmetries that result in handedness (Hammond, 2005).

Handedness has been associated with variation in size of the corpus callosum. The corpus callosum connects the two cerebral hemispheres and plays an integrative role in functional hemispheric specialization. Some postmortem and magnetic resonance imaging (MRI) studies show the total corpus callosum is larger in left-handed individuals. The size differences of the corpus callosum are believed to be an indicator for strength or quality of interhemispheric connections; thus, left-handed individuals might have an advantage regarding interhemispheric communication (Westerhausen, Kreuder, Sequeira, Walter, Woerner, Wittling, Schweiger, & Wittling, 2004).

Anatomic brain asymmetry surrounding the planum temporale has been the focal point of much research and has received the most attention in terms of handedness research (Beaton, 1997). The planum temporale is a roughly triangular region located in the posterior temporal lobe involved in speech sound processing. The presence of a larger planum temporale in the left-hemisphere was first introduced by Pfeifer in 1920 and von Economo and Horn in 1930. In 1968, Geschwind and Levitsky confirmed this

presence (Sequeira, Woerner, Walter, Kreuder, Lueken, Westerhausen, Wittling, Schweiger, & Wittling, 2006).

Relationship of Left-Handedness to Other Constructs

It is widely believed that handedness is indicative of hemispheric dominance such that left-handers are right-hemisphere dominant and vice versa (Hicks, Bautista, & Hicks, 1999). Because of the right hemisphere's involvement in attentional, visuospatial, and affective processing, left-handed individuals have been linked to domains that rely on these abilities, including fine arts, music, architecture, and mathematics among others (McNamara, Clark, & Hartmann, 1998). In addition, left-handedness has been related to a wide range of psychological and physical problems. Observations that there are a higher percentage of left-handed individuals in certain groups than in the general population have led to such associations (Coren, 1993). This section will review how left-handedness relates to an assortment of psychological and physical problems.

Criminality

A documented association between left-handedness and criminality can be traced back to the early twentieth century. In 1903, Cesare Lombroso found a disproportionate number of left-handed criminals. Notable left-handed criminals include Billy the Kid, Jack the Ripper, John Dillinger, and the Boston Strangler (Coren, 1993).

Current literature suggests that behavior of left-handed and right-handed individuals differs and that hemispheric dominance is involved in the development of delinquency. Similarly, research suggests that individuals who commit crimes have less left-hemisphere dominance and rely more on emotional and impulsive right-hemisphere responses (Gabrielli & Mednick, 1980).

Starting in 1972, Gabrielli and Mednick (1980) examined 265 Danish children drawn from a perinatal cohort of 9,125 children born between 1959 and 1961 in Copenhagen. Investigators obtained psychiatric hospitalization records of the parents. Children of schizophrenic parents (n = 72) and psychopathic fathers or character-disordered mothers (n = 72) were included in the study. The remaining subjects had parents with no previous psychiatric background (n = 121). These children were intensively examined using psychological, neurological, medical, psychophysiological, and social-family measures. Handedness was evaluated through the neurological and psychological assessments. In 1978, the investigators checked the Danish police register to determine which children had had problems with the law. The investigators found that 64.7% of the children identified by the neurologist as strongly left-handed were arrested at least one time since the evaluation whereas only 29.5% of right-handers were arrested. The authors concluded that left-handedness was a predictor of delinquency (Gabrielli & Mednick, 1980).

Bogaert (2001) evaluated the relationship between non-right-handedness and a history of criminal and/or sexual offending in a large sample of males ($N > 8000$). The sample consisted of investigations conducted at the Kinsey Institute for Sex and Reproduction in Indiana. After Bogaert controlled for parental income, year of birth, and age he found that males with a history of criminality and/or sexual offending had elevated rates of non-right-handedness. However, handedness was no longer significant when Bogaert controlled for education. Bogaert suggested that the relationship between education and criminality may be due to the educational difficulties non-right-handers face. However, education was not related in the pedophilia-handedness association

which suggests a different mechanism may be involved in this relationship. Bogaert concluded that the effects were small; thus non-right-handedness should not be used as a predictor of criminality (Bogaert, 2001).

Schizophrenia

Communication between the hemispheres is especially important in mental disorders such as schizophrenia. It has been suggested that individuals with schizophrenia may have an increase in left-hemisphere activity, a decrease in right-hemisphere activity, diminished interhemispheric communication, or a combination of the three (Ornstein, 1997).

An excess of non-right-handedness has been found in studies of schizophrenia. In 2001, Sommer and colleagues conducted a meta-analysis on studies on lateralization in schizophrenia published between January 1980 and December 1999. The authors grouped mixed-handedness and left-handedness together into a non-right-handedness group. Meta-analysis on handedness studies showed that the incidence of non-right-handedness was significantly higher in schizophrenic patients than in healthy subjects. In addition, a follow-up study on children showed that pre-schizophrenic subjects were significantly more non-right-handed than were the general population. The authors suggested a potential genetic mechanism may play a role in schizophrenia (Sommer, Aleman, Ramsy, Bouma, & Kahn, 2001).

Verdoux and colleagues (2004) explored how Schneiderian first-rank symptoms are related to handedness and speech disorder in psychotic subjects (Verdoux, Liraud, Droulout, Theillay, Parrot, & Franck, 2004). Schneiderian first-rank symptoms are symptoms identified by Kurt Schneider that are more likely to be found in schizophrenia

than other disorders, including the following: third person auditory hallucinations, thought broadcasting, delusional perception, running commentary, and thought echo (Botros, Atalla, & El-Islam, 2006). Verdoux et al. (2004) recruited patients admitted to the university department of the Bordeaux psychiatric hospital who had at least one positive psychotic symptom over the last month. The Edinburgh Handedness Inventory was used to assess handedness. Greater left-handedness was associated with higher Schneiderian scores (Verdoux et al., 2004).

Dream Content

Due to hemispheric variation and dominance, some researchers have assumed that dream content would vary as a function of handedness. McNamara, Clark, and Hartmann (1998) hypothesized that the dream content of left-handers would be more visual, affective, and bizarre than the dream content of right-handers. They recruited 420 undergraduate students to complete questionnaires. Of those, 109 reported a recent dream. Participants were asked to complete the Edinburgh Handedness Inventory (EHI) and were given a blank page to describe their dream. Dream content was evaluated by two research assistants who were blind to the hypothesis of the study, the identity, and the handedness of the participants whose dream content they were scoring. Seventy-nine of the 109 subjects who reported a recent dream were right-handed and 30 were left-handed, as indicated by the EHI. Researchers found that the dreams of left-handers contained more high imagery nouns, more affective words, and were more fictional. Dreams of right-handers more accurately reflected their everyday lives. The authors concluded that handedness does play a role in dream characteristics. They reported that, if their results could be replicated, it would imply a right-hemispheric advantage in

processing unusually vivid dreams and a left-hemispheric advantage in processing mundane dreams (McNamara et al., 1998).

In 1999, Hicks, Bautista, and Hicks replicated McNamara et al.'s findings. They recruited 203 college undergraduates to participate in their study. Participants completed the Briggs-Nebes Handedness Scale and the Spadafora and Hunt Dream Scale, which measures seven types of dreams: lucid dreams, archetypal dreams, fantastic nightmares, prelucid dreams, control dreams, post traumatic nightmares, and night terrors. Hicks and colleagues (1999) found that dream types stressing the vividness of the dream experience were more significantly related to handedness. More specifically, left-handers had significantly more lucid dreams (vivid dreams during which the individual realizes he/she is dreaming) and fantastic nightmares (highly vivid and upsetting dreams which are remembered in detail) than right-handers. The results of this study were consistent with McNamara et al. (1998) and support the idea that left-handers display right-hemispheric talent (Hicks, Bautista, & Hicks, 1999).

Learning

Although an association exists between visuospatial, attentional, and affective processing abilities and left-handedness, left-handedness has also been associated with learning disabilities (McNamara et al., 1998). In 1982, Geschwind and Behan explored the relationships between left-handedness and the frequency of developmental learning disorders as well as migraine and immune disease. Geschwind and Behan (1982) compared the incidence of these conditions in strongly left-handed subjects to strongly right-handed subjects. In their first study, the investigators developed a questionnaire containing questions about the personal and family history of the participant as well as a

modified version of the Oldfield Handedness Inventory. Left-handers reported significantly more developmental learning disorders such as dyslexia and stuttering than did right-handers. Left-handers also reported more family members with learning disorders than did right-handers. These results are consistent with previous findings suggesting a relationship between left-handedness and learning disabilities (Geschwind & Behan, 1982).

Even when no learning disability is present, left-handers and right-handers perform differently. Ward, Alvis, Sanford, Dodson, and Pusakulich (1989) evaluated the tactuo-spatial ability in subjects as a function of handedness. They recruited 78 self-identified right-handed and 75 self-identified left-handed undergraduate students to participate in their study. Handedness was also assessed by the Lateral Dominance Questionnaire. Subjects were blindfolded and learned a finger maze with either their dominant hand or nondominant hand. Investigators assessed transfer to the untrained hand. They reported a left-hand advantage in comparison with the right. Acquisition by the left-hand required fewer trials for both right- and left-handed subjects. This finding suggests a left-handed (right-hemisphere) advantage with tactuo-spatial tasks (Ward, Alvis, Sanford, Dodson, & Pusakulich, 1989).

Physical Well-Being

Immune disease has also been associated with left-handers and their relatives. Geschwind and Behan (1982) found that left-handed subjects reported a significantly higher frequency of immune disease than did right-handed subjects. In addition, left-handers had significantly more relatives with immune disease, specifically thyroid and bowel disorders. Geschwind and Behan (1982) also evaluated the frequency of left-

handedness in patients with immune disorders or migraines in neurological clinics in Glasgow and compared it to a general population group. They found a significantly higher percentage of left-handers in patients with severe migraines. They also found a higher percentage of left-handers in patients with myasthenia gravis, an autoimmune neuromuscular disease (Geschwind & Behan, 1982).

Posttraumatic Stress Disorder (PTSD)

Although most of the research on Posttraumatic Stress Disorder (PTSD) has been conducted on war veterans, PTSD is also common in the general public. Attempts to identify risk factors for PTSD other than exposure to trauma have indicated the importance of cerebral lateralization (Choudhary & O'Carrol, 2007). Evidence suggests that the right-hemisphere of the brain is involved in experiencing negative emotion such as fear as well as in the avoidance of behavior. Behavioral, electrophysical, and neuroimaging studies show comparative left-hemisphere hypoactivation and right-hemisphere hyperactivation in individuals with PTSD (Choudhary & O'Carrol, 2007).

In an attempt to better understand risk for developing PTSD, researchers proposed that a greater risk for developing PTSD in right-handers is associated with reduced cerebral lateralization for language. Furthermore, a lesser degree of cerebral lateralization for language in right-handed people was associated with the following characteristics: female gender, familial left-handedness, and mixed lateral preference (Chemtob & Taylor, 2003). According to this neuropsychological hypothesis, the right-hemisphere in the brain is more involved in emotion regulation and detection of danger. Thus cerebral organization of right-handers with less cerebral lateralization for language

may give more weight to right-hemisphere input during ongoing cognitive processing cognitive processing (Chemtob & Taylor, 2003).

An investigation with Israeli combat veterans indicated an association between mixed lateral preference among right-handed veterans with a vulnerability to combat-related PTSD. The study found a 65% rate of PTSD in mixed-handed veterans and a 43% rate in consistent right-handed veterans. Chemtob and Taylor (2003) replicated these findings in a sample of U.S. Veterans. They explored the relationship between the occurrence and severity of PTSD with degree of lateral preference (mixed versus consistent) as well as parental left-handedness in right-handed Vietnam veterans. Chemtob and Taylor (2003) found that veterans with mixed lateral preference were more likely to have PTSD than were veterans with consistent lateral preference (Chemtob & Taylor, 2003). Although these findings suggested a relationship between increased left-handedness and increased PTSD symptomatology, they could not distinguish whether the results were due to mixed-handedness or left-handedness (Choudhary & O'Carroll, 2007).

In 2007, Choudhary and O'Carroll explored laterality and experience of trauma in a healthy sample as well as laterality and PTSD in a civilian population. The authors hypothesized that there would be more leftward lateral preference in individuals with PTSD. They recruited 596 individuals from the University of Sterling to participate in their study. The Edinburgh Handedness Inventory and the Coren Inventory were used to measure lateral preference. To assess PTSD, the authors distributed the Posttraumatic Diagnostic Scale (PTDS; Foa, Cashman, Jaycox, & Perry, 1997) and, in some cases, a clinical interview. The severity of reexperiencing, avoidance, and arousal symptoms was

measured and summed. Fifty-one participants met all the criteria for a diagnosis of PTSD with relatively more left-handers (15%) than right (8%). Strong left-handers had a higher incidence of PTSD than did strong right-handers or mixed-handers. Left-handers also had significantly higher scores for arousal symptoms of PTSD. Thus, the authors found that leftward lateralization in handedness is associated with PTSD symptoms and prevalence. They offered a possible explanation for this finding: left-handers may experience emotional events differently. In addition, they suggested more research on the potential differences between left- and right-handers is necessary to further explain this phenomenon (Choudhary & O'Carroll, 2007).

Left-Handedness and Cognition

Actions are essential to human functioning and allow people to accomplish a variety of goals from eating and sleeping to buying a car and taking a vacation (Lozano, Hard, & Tversky, 2007). Traditionally, action and perception have been considered to be separate domains with perception viewed as preceding action (Gallese, 2007). Such traditional approaches viewed connections to the outside world as being of little importance to the mind and perception—that is, an individual's perceptual and motor systems were considered to be input and output devices that did not impact cognitive processes or mental representations (Wilson, 2002). This mode of thinking viewed cognition as relying on amodal abstractions that exist independently of physical operations. This idea is based on the popular computer metaphor which makes the claim that the human mind's software is independent of the body and brain hardware (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005).

Recently, there has been a shift towards a more holistic view of the mind and the body termed embodied cognition. The basic idea of embodied cognition is that cognitions consist of simulations of bodily experiences (Casasanto, 2009). According to this perspective, interactions with the physical space and world influence an individual's thought processes and mental representations (Markman & Brendl, 2005). Therefore the particular experiences an individual has with the environment effect cognition; thus individuals with different physical characteristics who inevitably interact with the word differently must also think differently (Casasanto, 2009). Considering embodiment is an important aspect of understanding cognition, interest in this area has been increasing for the past thirty years (Markman & Brendl, 2005).

As mentioned above, embodiment suggests that physical interactions with the world directly impacts cognition. A growing body of research on embodied cognition shows that social and emotional information processing and the body are closely linked such that our actions influence the way we understand the world (Lozan, Hard, & Tversky, 2007). More specifically, physical and bodily experiences are a requirement for perception (Gallese, 2007; Niedenthal et al., 2005). In this respect, one's cognitions are dependent upon the experiences one has with the world. Furthermore, cognitions can be considered mental simulations of physical experiences (Casasanto, 2009; Lyre, 2008).

One area emerging as a topic of interest in embodiment is handedness. Inherent physical differences between left- and right-handers have sparked interest regarding the potential differences between in mental representations of abstract concepts. Some of these studies will be discussed below.

Interest in handedness and cognition is two-fold. In an attempt to explore the relationship between handedness and cognitive processes, researchers interested in handedness have referred to theories of embodied cognition. Similarly, researchers interested in embodiment have expressed interest in handedness and the differences between left- and right-handed individuals: if individuals' cognitions are influenced by bodily experiences, then people with different bodies and different bodily experiences must also think differently. Individuals who are dominant with their right hand interact with the world in a way that is different from individuals who are dominant with their left hand. Considering the differences regarding manual performance between left- and right-handers, it is likely that right-handed individuals have more practice manipulating certain aspects of objects thus their understanding of that specific object is experientially different than left-handed individuals. The reverse is also likely to be true. Additionally, according to theories of embodied cognition, thinking about an action requires some mental simulation of how that action is carried out by the perceiver. Therefore actions performed by the dominant hand should have qualitatively different mental representations in left- and right-handed individuals. Casasanto (2009) termed this idea the body-specificity hypothesis (Casasanto, 2009).

Casasanto (2009) conducted a series of five experiments to explore whether left- and right-handers differed in their mental representations of abstract concepts. Casasanto (2009) was interested in how body-specificity may be important in the mental representation of abstract concepts. Also of interest was how perceptuomotor simulations influence the mental representations of abstract concepts, such as deceit and honesty, despite the fact that such abstract concepts do not directly interact with individuals'

perceptual and motor systems. That is, these abstract concepts have not been perceived with senses or acted upon with muscles (Casasanto, 2009).

According to Casasanto (2009), abstract concepts are mentally represented through the use of mental metaphors. Mental metaphors, to some degree, are conditioned over time such that individuals make associations between emotional states and physical experiences that usually co-occur (e.g., standing tall is usually associated with feeling good and slouching down with feeling bad). Through conditioning, mental metaphors such as positive is up and negative is down are established over time. Mental metaphors are reflected in the physical world through linguistic metaphors. After an association between a physical experience and an emotional state has been established, a mental metaphor is encoded through linguistic metaphors (Casasanto, 2009).

Studies show that metaphors from the physical world influence mental representations of a variety of notions. Examples of these include valenced concepts, time, power, and number. Mental metaphors enable individuals to identify, compare, and contrast abstract concepts even without the use of linguistic metaphors (Casasanto, 2009). Casasanto (2009) aimed to explore whether handedness influences individuals' judgment and the embodiment of mental metaphors. Casasanto (2009) conducted five experiments to test the associations between valence and horizontal space in left- and right-handers (Casasanto, 2009).

Casasanto (2009) concluded that there is a body-specific association between horizontal space and valence. Casasanto found that right-handers' responses were consistent with the mental metaphor of *Good is Right* whereas left-handers responses were consistent with the mental metaphor *Good is Left*. The majority of participants'

responses were consistent with the *Good is Up* metaphor regardless of their handedness. Considering left-handers have more interaction with the left resulting in more comfort and positive feelings toward the left aspect of objects/tasks therefore, handedness does influence individuals' judgment. The same is true for right-handers and the right. This result supports the notion that the relationship between valence and horizontal space is body specific such that individuals experience positive valence depending on their interaction with physical space or the world (Casasanto, 2009).

Casasanto (2009) found significant differences between left- and right-handers in terms of emotional valence and lateralized physical action. His research is consistent with the internalization of the *Good is Left* or *Good is Right* mental metaphors and supports the body-specificity hypothesis. People with different bodies, in this case hand preference, develop different mental representations including abstract concepts and in the absence of using their hands (Casasanto, 2009).

Although Casasanto's (2009) findings are interesting and an important contribution to the literature in that they support the idea that embodiment influences mental representations of abstract concepts, there are some flaws in this research. Casasanto provided participants with pre-determined items on a paper-and-pencil questionnaire which ignores the fact that there is very little, if anything at all, known about the mental life of left-handers as a group. Most of the research conducted throughout time has been developed for or evaluated under the assumption that the respondents are right-handed. There have not been any documented explorations of cognition as it is experienced by left-handers. The cognitive experience of left-handedness needs to be explored before aspects of experience can be calculated and

quantified. Casasanto (2009) also neglected to explore mental representations as they naturally occur. It is possible that Casasanto targeted a characteristic of experience (emotional valence) in his study that the participants do not typically experience. Additionally, Casasanto (2009) inferred the presence and characteristics of mental representations in his study and did not actually observe them. A way to approach the exploration of cognitive embodiment and handedness while attending to the difficulties previously mentioned is to use an exploratory, open-ended method that provides participants with the opportunity to relay their own, unique experiences (mental and physical) as they happen to them in their everyday lives.

Jones and Martin (1997) and McKelvie and Aikins (1993) explored the relationship between handedness and memory. Jones and Martin (1997) asked subjects to recall the direction the head of Queen Elizabeth II faced on British and Canadian coins. They found that left-handers had a higher frequency of recalling the correct rightward direction of the Queen's head than did right-handers (as cited in Martin & Jones, 1999). Thus handedness effects do appear to influence cognition.

Martin and Jones (1999) conducted five experiments to evaluate the assumption that cognitive processes are independent of handedness. They examined whether handedness effects on coin head recall also extend to coin head recognition using the coin head illusion. All coins in Britain bear the profile of Queen Elizabeth II's head facing the observer's right. Despite numerous interactions with coins, when asked to recall the direction of the Queen's head, most people recall her head facing the left (Martin & Jones, 1999).

The results of Martin and Jones (1999) indicated a significant difference in recognition performance between left- and right-handed participants for memory of faces strongly oriented to the left or right. In the first experiment, the authors found that the proportion of participants (from the University of Oxford) who recognized the image that accurately represented the Queen's head on the British coin was significantly higher for left-handed participants than for right-handed. In the second experiment, the authors found that this effect of handedness on memory for the orientation of a coin also exists when an experimental stimuli has only been seen on a single, controlled occasion. The authors found that left-handed participants recognized right-facing heads better than right-handed participants, whereas right-handed participants recgonzed left-facing heads better than left-handed participants. The authors reported that left-handers have an advantage in remembering right-facing heads whereas right-handers have an advantage remembering left-facing heads. The authors suggested this difference is due to a mnemonic handedness effect with both material encountered in everyday life (such as a coin) and stimuli presented on one occasion in controlled conditions (Martin & Jones, 1999).

To test if there is an underlying effect of handedness on the physical drawing of an object, Martin and Jones (1999) conducted a fourth experiment. They asked participants to "draw a quick sketch of your mother's head in profile" and "draw a quick sketch of your bicycle," (Martin & Jones, 1999, p. 273). The proportion of rightward sketched bicycles did not differ between left- and right-handed participants; however, the proportion of rightward sketched heads was significantly higher for left-handed participants than right-handed (Martin & Jones, 1999).

The first four experiments in Martin and Jones's (1999) study did not explore the subjective experience of the participants. In their fifth experiment, they set out to investigate whether there is a correspondence between underlying motor processes and reports of mental experience. This experiment involved recall, drawing, and mental drawing of Diana, Princess of Wales (a person whom the authors believed all the participants would be familiar with). In the recall condition, the authors found no significant main effect of handedness but they did find a significant main effect of orientation and a significant interaction between handedness and orientation. They concluded that left-handers were better at recalling the right-facing head than right-handers whereas right-handers were better at recalling the left-facing head than left-handers. For the drawing condition, the proportion of participants who drew right-facing heads was significantly higher for left-handers than right-handers. For the mental drawing condition, the proportion of participants who drew right-facing heads was significantly higher for left-handers than right-handers (Martin & Jones, 1999). The authors concluded that a significant contralateral handedness effect exists on the contents of mental drawing thus asymmetric motor processes are activated during an entirely introspective task (Martin & Jones, 1999).

Martin and Jones (1999) suggested that the motor image theory underlies the handedness effects of the above mentioned findings (Martin & Jones, 1999). According to the motor image theory, "the brain processes that are involved when specific movements are performed should also be activated in the absence of the physical movements themselves," (Viggiano & Vannucci, 2002, p. 1482). If an object is being physically held by the left hand, then the significant parts of that object should be stored

into memory with the same spatial position and direction as it was experienced with the left hand (Viggiano & Vannucci, 2002).

Viggiano and Vannucci (2002) investigated whether handedness and the directionality of objects impacts performance on drawing and visual objects identification. In their first experiment, the authors found a handedness effect for animals and vehicles. When drawing animal heads, right-handers exhibited a leftward preference whereas left-handers exhibited a rightward preference. With regard to the anterior part of vehicles, right-handers exhibited a leftward preference whereas left-handers exhibited a rightward preference. In the second experiment, the authors found a handedness effect in reaction times associated with correct identification of mobile objects (animals and vehicles) and animals. Right-handers were faster at identifying mobile objects facing the left than mobile objects facing the right whereas the reverse was found in left-handers. Right-handers were faster at identifying animals facing the left than facing the right whereas the reverse was found in left-handers. The authors concluded that mental representations involved in tasks such as object drawing and visual processes contain a directionality description of elements relevant to the object (Viggiano & Vannucci, 2002). A handedness effect was only found for two categories of objects (animals and vehicles) with the common features of asymmetry and motion (Viggiano & Vannucci, 2002). These findings are consistent with the idea of embodied cognition in that handedness influences individuals' perceptions.

Left-Handedness and Self-Awareness

Aside from some knowledge surrounding the difficulty left-handers have using items or tools designed for the right-handed person (e.g., desks, notebooks, can openers,

etc.) and some research exploring the associations between left-handedness and psychological and physical disorders, little is known about the inner experience of left-handers. The role of handedness has not been directly observed in studies of consciousness; however, studies have explored the role of hemispheric activity in self-awareness and consciousness.

Evidence suggests that tasks associated with the left- and right-hemisphere differ in electroencephalogram (EEG) recordings. Ehrlichman and Wiener (1980) recorded the EEGs of subjects while they performed covert mental tasks. The authors found the occurrence of EEG asymmetry related to left- and right-hemisphere tasks. Their strongest finding involved covert verbalizations: the directions of all relationships were in accordance with the literature on hemispheric specialization. Verbalizations were more strongly associated with left-hemisphere amplitude. Ehrlichman and Wiener (1980) also suggested that EEG asymmetries reveal cognitive differences between visuospatial and verbal tasks. The authors concluded that more research is necessary to identify accurate variation in hemispheric functioning (Ehrlichman & Wiener, 1980).

Some of the research on self-awareness has focused on covert verbalizations, or inner speech. Morin (2005) defined self awareness as "the capacity to become the object of one's own attention, where the individual actively identifies, processes, and stores information about the self" (Morin, 2005, p. 116). According to Morin, the self is involved in awareness through cognitive processes of imagery and inner speech. Inner speech has been indicated in such tasks as verbal self-guidance, problem solving, and memory. Morin argued that the role of inner speech in self awareness has been overlooked. Inner speech allows an individual to become more aware of his/her

independent existence and mental states. Morin argues that inner speech plays a fundamental role in self-awareness such that inner speech facilitates self-reflection through verbally communicating with oneself. Furthermore, Morin suggests that without inner speech apprehending one's inner life becomes difficult. Morin compared inner speech to a flashlight illuminating the room of self-awareness—that is, inner speech makes self-awareness much more vivid and clear. Due to the role of the left prefrontal lobe in self-reflection and inner speech, Morin suggested that the left-hemisphere is involved in self-awareness (Morin, 2005).

Lindell (2006) argued that the left-hemisphere is not solely involved in language processing. Lindell reported that "though there is no question that the left hemisphere is the superior language processor, a growing body of research has demonstrated significant linguistic ability in the "nonverbal" right hemisphere" (Lindell, 2006, p. 131). Research shows that right-hemispheric language dominance directly increases with degree of left-handedness. Lindell focused on the 95% of the population in which the right-hemisphere lacks the ability to generate productive language. Lindell reviewed a body of evidence suggesting right-hemispheric involvement in language processing. The left-hemisphere is involved in propositional speech whereas the right-hemisphere is involved in nonpropositional speech involving the "holistic construction of automatic, formulaic, and context-bound utterances (e.g., counting, nursery rhymes, days of the week); verbalizations that neither involve the generation of new ideas nor the processing of such ideas into original, grammatical utterances" (Lindell, 2006, p. 133). Lindell reported that the right-hemisphere is involved in the prosody of speech, including changes in pitch and rhythm. The right-hemisphere is also efficient in recognizing words that represent a

concrete referent, such as *giraffe*, whereas performance declines when the word represents an abstract concept, such as *faith*. Lindell's findings suggest that both hemispheres play a role in language processing and production (Lindell, 2006).

Keenan, Rubio, Racioppi, Johnson, and Barnacz (2005) examined the role of the right-hemisphere in self-awareness and the theory of mind. They reported that assessing consciousness in the right-hemisphere tends to be difficult because the traditional speech areas are located in the left-hemisphere; thus the right-hemisphere cannot verbalize its consciousness. The authors report that theory of mind and self-awareness are related in that one must have an understanding of one's own mind to be able to understand the mind of another. Theory of mind "involves the recognition that other minds are possible, and the individual may be privy to thoughts of another" (Keenan, Rubio, Racioppi, Johnson, & Barnacz, 2005, p. 695). The authors hypothesized that the right-hemisphere is active in higher-order consciousness (Keenan et al., 2005).

In 2001, Keenan, Nelson, O'Conner, and Pascual-Leone used an fMRI to explore cortical correlates during face recognition. They found that the right prefrontal cortex was active in participants during self-recognition, supporting the idea that self-recognition results from right-hemisphere activity (Keenan, Nelson, O'Conner, & Pascual-Leone, 2001). Similarly, Vogeley, Bussfeld, Newen, Herman, Falkai, Maier, Shah, Fink, and Zilles (2001) used fMRI to investigate the neural mechanisms of taking one's own perspective and taking someone else's perspective. Vogeley et al. (2001) found that self-perspective was associated with an increase in right temporoparietal activity as well as activity in the anterior cingulate cortex. Theory of mind was associated with an increase in anterior cingulate cortex and left temporopolar cortex

activity. In addition, there was an interaction of both self-perspective and theory of mind in the right prefrontal cortex (Vogeley, Bussfeld, Newen, Herrman, Falkai, Maier, Shah, Fink, & Zilles, 2001). Research suggests that there are differential mechanisms in terms of consciousness and that the right-hemisphere is more involved in processing of the self (Keenan, Nelson, O'Conner, & Pascual-Leone, 2001).

Research regarding the localization of self-awareness is inconsistent. Investigators have focused on certain tasks and attributed the localization of self awareness to their respective cerebral hemisphere. Studies have employed EEG recordings, fMRIs, etc. to explore this phenomenon.

CHAPTER 2

INTROSPECTIVE MEASURES

Understanding Inner Experience

Thinking is one of the most fundamental phenomena in psychology, but despite its importance, efforts to understand and explain this phenomenon have been unsuccessful (Aanstoos, 1983). Cognitive scientists have inferred cognitive processes through the development of performance measures. Clinical psychologists have relied on the self-reports of their clients during interviews or on questionnaires (Davison, Navarre, & Vogel, 1995). The questionnaire approach is limited by its retrospectiveness when trying to access an individual's stream of thought (Singer, 1975). Recall biases that affect the reliability of self-report and questionnaire data include: 1) participants tend to remember events that are more recent; 2) more salient experiences are likely to be recalled; 3) participants have a tendency to recall events that make them consistent with their view of how the world functions (Smyth & Stone, 2003; Yoschiuchi, Yamamoto, & Akabayashi, 2008); 4) recall can be influenced be experiences that happen after the situation to be recalled; and 5) recall may be impacted by the participant's current mood (Smyth & Stone, 2003). In addition, participants may misunderstand the questionnaire instructions (Smyth & Stone, 2003; Yoschiuchi et al., 2008).

The need for alternative methods of examining the study of ongoing behavior and everyday experiences arose from the limitations of laboratory studies. Investigators called for a method that could provide ecological validity for the behavior of interest, aid in the understanding of ongoing behaviors, explore the interaction between situation and personality, and restore interest in the study of the individual (Hormuth, 1986). In an

effort to reduce the recall biases of self-report and questionnaire measures and the lack of ecological validity of laboratory studies, psychologists have developed procedures to access the inner world of individuals (Davison et al., 1995). A variety of these measures will be discussed below.

Think-Aloud Methods

Think-aloud methods are designed to access an individual's cognitions. This involves an individual's reporting aloud the thoughts that occur while he/she is completing a problem-solving task. The goal of this method is to provide information about the content and process of an individual's cognitions. Think-aloud methods have been used since the 1940's to explore problem solving and, more recently, to study other types of spur-of-the-moment thought (Klinger, 1978). Modern think aloud methods consist of recording participants' verbalizations of their cognitions while engaged in a designated activity. Their responses are then evaluated in an attempt to understand an individual's ongoing thought process (Davison, Vogel, & Coffman, 1997; Singer, 1975).

Think-aloud measures have been criticized for several reasons. The situation itself is unnatural. Because individuals can verbalize only one thought at a time, only a small portion of what is going on inside the participants' mind is captured (Klinger, 1978). In addition, the task itself may influence the behavior of the participants (Davison et al., 1995). For example, evidence suggests that thinking out loud results in spending more time on a content theme (Klinger, 1978). Lastly, cognitions that are of low frequency but high significance may not be captured (Davison et al., 1995).

Thought-Sampling

Thought-sampling is a method for exploring thought content that tries to avoid some of those pitfalls. An experimenter will interrupt individuals during whatever activity they are engaged in and will request a narrative description of their consciousness before the interruption (Klinger, 1978).

In vivo thought sampling.

Klinger developed a thought-sampling approach that incorporated randomness (Kendall & Korgeski, 1979; Klinger, 1978-79). Participants in this method are to carry a beeper and, when the beeper sounds, freely record their thoughts or rate their inner experience using a Thought Sampling Questionnaire. The questionnaire consists of variables such as length of thought, vividness, and level of trust of their own memory. Participants may also use tape recorders to dictate their thoughts (Kendall & Korgeski, 1979). This method allows the researcher to compare non-retrospective data about the participant's cognitions with the participant's impression of his/her thought pattern (Kendall & Korgeski, 1979).

During his original study in 1978-79, Klinger used the thought-sampling technique to investigate the differences between fantasy and directed thought. He differentiated between two types of thought: operant thought processes, which are directed or task-oriented, and respondent processes, which are random daydreams or undirected thought. Through the use of thought-sampling, he showed the importance of current concerns as foreshadowing the content in the stream of consciousness (Klinger, 1978-79; Singer & Kolligian, 1987). Klinger recruited 20 college students who completed a series of questionnaires and interviews, underwent training for reporting

their inner experience, maintained a structured diary describing their lives in detail, and participated in a thought-sampling procedure every few weeks (Klinger, 1978-79).

Klinger used two types of thought-sampling methods. One took place in the laboratory; participants listened to two 15-minute prose narratives simultaneously through earphones. The passages had been altered on both channels on 12 different points to relate to a concern of the participant on one channel and relate to something irrelevant to the participant on the other. Klinger provided trained participants with a portable beeper that went off at random intervals. The randomness of the beeper allowed Klinger to conclude that he was actually capturing a random collection of cognitions (Kendall & Korgeski, 1979; Klinger, 1978-79). A tone was sounded 10 seconds after the end of each altered passage, at which point the tape was stopped and participants reported the thoughts that were occurring to them the moment before the tone sounded. Participants completed a Thought-Sampling Questionnaire which consisted of a narrative description of the mental content and ratings of variables. The additional variables included: duration of thought, specificity, directedness, simultaneous thoughts, detailedness, visualness, auditoriness, attentive to cues, recall of cues, controllability, confidence in recall of thought, usualness, and strangeness. Lastly, participants rated their ability to accurately rate the variables. In total, 936 thought samples were collected over a series of 78 listening sessions (Klinger, 1978-79).

The second sampling model occurred outside of the laboratory and provided 285 thought-samples over a series of 24 days. Only 12 of the student participants completed this portion. Participants were provided with a device that sounded randomly ("beeper"). The beeper sounded roughly once every 40 minutes. Participants were to carry the

beeper with them during their daily routines for a total of 24 waking hours. They were also provided with a pad of Thought-Sampling Questionnaires to be completed. When the beeper sounded, participants filled out a Thought-Sampling Questionnaire that was almost identical to the laboratory questionnaire (Klinger, 1978-79).

Klinger reported that the distribution of thought properties outside of the laboratory (the second sampling model) more likely represent typical human experience than the laboratory model. He reported outside of the laboratory thoughts tended to be more specific, more focused on the present, more directed, and more tied to immediate stimuli than thought inside the laboratory. There appeared to be little difference with regard to vividness of imagery between the two settings. Klinger found that the majority of the participants had operant thought processes with some respondent elements. Participants rated operant thoughts as more specific, controllable, more relevant to setting, and more recallable. Most thoughts were visual, brief, and related to ongoing activity. Most thoughts involved ongoing activity and consisted of typical kinds of content; however, more than one fifth involved unusual or distorted features which were mostly visual and brief (Klinger, 1978-79). Furthermore, Klinger reported that his findings provide strong evidence that waking thought varies along three dimensions: respondentness, stimulus independence, and fancifulness. He suggested a need to clearly differentiate between the terms "daydreaming" and "fantasy." Based on his findings, Klinger reported that a "daydream" should be redefined as "thought that is respondent, stimulus-independent, and fanciful." (Klinger, 1978-79, p.112). Deliberate daydreams or daydreams intentionally started for purposes such as self-entertainment or self-arousal should be redefined as "thought that is operant, stimulus-independent, and fanciful" (p.

112) and mind wandering about one's own life should be redefined as "thought that is respondent, stimulus-independent, and unfanciful" (Klinger, 1978-79, p.112).

More recently, Zotter and Crowther (1993) investigated cognitive characteristics of bulimic, nonbulimic, repetitive dieting, and nondieting women on two randomly selected days using in vivo thought-sampling. After screening and training were completed, participants received a three inch by five inch spiral notebook and an alarm that signaled every 30 minutes. Participants were told to record the thought they were having and the activity they were engaged in at the moment just before the alarm sounded. The researchers found that bulimic women report a significantly greater amount of eating or weight-related thoughts than do nonbulimic and nondieting women. In addition, the thoughts of bulimic women are more likely to be of negative affect than the other women. Zotter and Crowther reported that their findings were consistent with theoretical models of bulimia nervosa such that bulimics are more preoccupied with thoughts of food, eating, weight, and shape (Zotter & Crowther, 1993).

Thought-sampling method.

A thought-sampling (or thought-and-mood sampling) method was developed by Hurlburt to access and quantify an individual's mental life (Hurlburt, 1980). Participants were given a random interval sound generator and told to carry the generator with them from the moment they woke up in the morning until the time they went to bed for three consecutive days (Hurlburt, 1979). Participants were then interrupted at random intervals and self-reported the thought that was occurring at the moment of interruption, what they were doing, and the time of day (Hurlburt, 1979; Hurlburt, 1980).

Unlike retrospective methods, thought-sampling involves an immediate description of an actually occurring thought. This technique aims to gain ecologically valid data of thinking and behavior by eliciting responses from individuals in their natural environments. Individuals respond to random beeps and record their thoughts along with any additional inner or outer experiences that were occurring at the time of the beep. Participants respond by either completing a quantitative questionnaire, providing a short written narration of their experience, or a combination of the two (Hurlburt, 1997). This process is repeated until a series of single-thought descriptions are acquired. An investigator rates the series of single-thought descriptions on rating scales (Hurlburt, 1980). The primary goal is for the investigator to quantify the aspects of the individual's thinking or thinking and mood (Hurlburt, 1997).

Articulated Thoughts During Simulated Situations

In 1983, Davison, Robbins, and Johnson developed an alternative approach to the think-aloud paradigm. They evaluated the approaches developed by both Hurlburt and Klinger and acknowledged that in-vivo thought sampling had potential in terms of eliciting the participants' immediate concerns; however, they reported the technique lacked in ability to control or be knowledgeable about the actual stimuli the participants were reacting to. In addition, the questionnaire format restricted the breadth of cognition obtained. In response to these limitations, they proposed a need for a better method of exploring cognition (Davison, Robins, & Johnson, 1983).

Davison et al. (1983) identified four main features necessary in a cognition exploring method including: 1) allowing for open-ended verbal responses that would capture the participant's ongoing thought process as opposed to retrospective reporting;

2) the experimenter should present realistic and complex stimuli to the participants as well as have the capability of manipulating the stimuli; 3) both anxiety-provoking and neutral stimuli should be presented to the participants; and 4) the procedure should not be time-consuming or expensive. They introduced a model they believed met those requirements: Articulated Thoughts during Simulated Situations (ATSS; Davison et al., 1983).

ATSS offers an alternative to structured questionnaire methods (Davison, Haaga, Rosenbaum, Dolezal, & Weinstein, 1991). Davison et al. (1997) refer to ATSS as a "paradigm" because of its generality and lack of specificity in terms of procedures and technology (Davison et al., 1997). The procedure involves participants' listening and responding to audio-taped conversations intended to mimic a complex event. Participants listen to a 15-25 second audio-recording and are asked to imagine that the event is real and that they are a part of it. The researchers tell the participants that they are interested in the thoughts and feelings occurring during the situation. Following the recording are 30 seconds of silence. During the silent 30 seconds, the participants verbally report what they are thinking and/or feeling (Davison et al., 1983). Participants are told to say as much as they can until the 30 seconds are over (Davison et al., 1997). After the report, another 15-25 second segment is played, followed by the participants' 30-second report, and so on. Participants' verbal reports are tape-recorded to be analyzed later (Davison et al., 1983).

Davison et al. (1997) reported that ATSS compliments the in vivo random sampling of cognitions demonstrated by Hurlburt (1979). Furthermore, they report that the flexibility of ATSS allows researchers to evaluate cognitions in situations that would

be impractical, unethical, or too complex to study in vivo (Davison et al., 1997). Because of the unstructured response format of ATSS, respondents are provided an opportunity to engage in open-ended responding. This format increases the likelihood that the researcher is actually capturing the scope of the participants' cognitions without limiting them to experimenter-selected options. The authors state that "thinking aloud that immediately follows each brief segment taps cognitions as close to on-line as possible" (Davison et al., 1997, p. 952). By dividing the ATSS stimulus tapes into short segments, participants' retrospective responding with generalized thinking patterns is reduced (Davison et al., 1997). Due to the specificity of the audiotaped hypothetical situations presented to the participants, Davison et al. (1997) reported that ATSS provides situational specificity and experimental control in assessing cognitions. The researcher can confidently relate certain thoughts with certain situations as well as compare categories of thought across individuals. Researchers can also evaluate thoughts that are of importance but which only occur in infrequent situations (Davison et al., 1997).

For example, Eckhardt, Barbour, and Davison (1998) evaluated the associates of anger arousal in a community sample of 88 married men. The men were grouped into one of three groups; maritally violent (MV), maritally distressed-nonviolent (DNV), and maritally satisfied-nonviolent (SNV). The participants completed an assessment packet consisting of a State Anger Scale, Survey of Personal Beliefs, and Dysfunctional Attitudes Scale. Upon completion of the assessment packet, the participants listened to tape-recorded instructions informing them of the ATSS procedure. Three stimulus situations were included: two anger-inducing scenarios (overheard conversation and jealousy), and one control. Each scenario was divided into eight 30-second segments.

The researchers found that MV males articulated more aggregate irrational beliefs and cognitive biases during anger arousal than did nonviolent males. In addition, ATSS was more successful in discriminating between the groups as compared to the questionnaires. The researchers concluded that the fact that ATSS measures cognition while participants are enduring affective arousal is a significant strength in support of the method (Eckhardt et al., 1998).

Thought-Listing

Brock and Greenwald developed a self-report tool called the thought-listing procedure in the late 1960s. This procedure allows for eliciting either spoken or written listings. Participants are asked to list all the thoughts they were having when presented with a stimulus or a communication or problem of topic. It is assumed that participants are able to distinguish thoughts elicited by the stimulus from other thoughts (Cacioppo & Petty, 1981). Thought-listing differs from thought-sampling in that the listing occurs immediately after the event rather than at an interruption during the event.

Cacioppo, Glass, and Merluzzi (1977) used thought-listing to study the social anxiety of male participants prior to interacting with a female confederate. They found that male participants who scored high on The Social Avoidance and Distress Scale provided more negative self-statements (Cacioppo, Glass, & Merluzzi, 1977; Davison et al., 1997).

Forerunners to Modern Sampling

Flugel's method.

In 1925, Flugel proposed a method that would study the affect of individuals in their normal, every day life. Flugel observed affect at intervals varying from two minutes

to two hours. The nature and duration of the day's activities largely determined the length between the intervals. Flugel's method had two main goals: 1) to quantify the length and amount of pleasurable activities and unpleasurable activities experienced by individuals, and 2) to describe the mental states such as sensations, moods, emotions and thoughts that are related to the incidences of pleasures or unpleasures (Flugel, 1925).

Participants in Flugel's study were instructed to keep a detailed record of their pleasurable and unpleasurable experiences and the accompanying emotions. Furthermore, they were told to make frequent entries as to provide a more accurate description of the state. Participants rated the amount of their pleasure or unpleasure from -100 to +100. A rating of +100 indicated the most pleasure whereas a rating of -100 indicated the most intense unpleasure. A rating of zero indicated indifference. Participants also reported the content of the activity/experience as well as a description of the activity/experience. They were instructed to record their affective states for at least 30 days. In addition, they were given a list of questions to answer regarding their opinion of the captured affective states (Flugel, 1925).

Experience sampling method.

Experience Sampling Method (ESM) was developed by Csikszentmihalyi, Larson, and Reed to explore the activities and experiences of individuals in a natural setting (Csikszentmihalyi & Larson, 1987). ESM provides an opportunity to explore the activities, thoughts, and feelings of individuals in the moment rather than retrospectively (Csikszentmihalyi & Figurski, 1982). ESM participants respond to random or quasi-random beeps which signal the participants to report various aspects of their experience on the Experience-Sampling Form (ESF). ESF is a questionnaire designed to access the

internal and external situation of the participant at the time of the signal. The form consists of a variety of items, including open-ended questions regarding the location of the participant, activities the participant is engaged in, content of cognitions, and time. Likert-type items measure the participant's motivation, activation, cognitive competency, and affect (Csikszentmihaly & Larson, 1987).

An example is discussed to illustrate the use of this method. The earliest investigation using ESM began at the University of Chicago in 1975. Csikszentmihalyi et al. (1977) sampled 25 adolescent (age 13-18) volunteers in the Chicago area. The participants completed self-report forms at random times throughout a week, cued by an electronic paging device that sounded a beep at a predetermined, quasi-random schedule. The schedule consisted of five to seven signals per day during normal waking hours. Each participant was given a book of 50 self-report forms which consisted of four groups of items. The first group consisted of open-ended questions involving the participant's location at the time of the beep, the activity they were engaged in, any other activities going on, and who they were with. The second group inquired why the participant was doing the aforementioned activity. They were to check one of three choices, including an obligation to do it, a desire to do it, or lack of something else to do. The next group of items was designed to evaluate the quality of the participant's interaction with his/her environment. Participants were to respond to these questions on a 10-point scale ranging from "low" to "high." Questions included their challenges during the activity, their skills in the activity, and their level of control over the activity. The last group consisted of 13 items designed to access semantic differences between mood and physical experiences. Participants rated their state at the signaled moment on 7-point scales of adjectives. The

ends of each scale consisted of extreme opposites. The authors found that their sample spent most of their time in conversation with their peers or watching television (Csikszentmihalyi, Larson, & Prescott, 1977).

Johnson and Larson (1982) used ESM to investigate characteristics of the daily lives of normal-weight bulimic women. They compared the overall moods, mood fluctuation, social isolation, and amount of food related behavior of 15 bulimic patients with 24 normal controls. Each participant provided self-reports of 40 to 50 random moments in her life. Johnson and Larson (1982) found that bulimic women report negative mood states significantly more often than do normal women. Bulimic women experienced more dysphoria and mood fluctuation than did normal women. Overall, bulimic women as a group were significantly more sad, lonely, irritable, passive, weak, and constrained than the normal group. The two groups did not differ on items related to excitement and alertness (Johnson & Larson, 1982).

Ecological momentary assessment.

Ecological Momentary Assessment (EMA) was developed as a way of assessing variations in behavior across time and situations (Shiffman & Stone, 1998). Shiffman, Stone, and Hufford (2008) argued that the typical scientific emphasis on global assessments and retrospective reports limit both scientists and practitioners from obtaining a complete and accurate depiction of an individual's behavior (Shiffman, Stone, & Hufford, 2008). EMA allows subjects to report their experiences in their real world (Shiffman et al., 2008). EMA attempts to capture momentary reports of psychological, behavioral, and physiological aspects in an individual's natural environment (Smyth & Stone, 2003). Collection of many momentary reports allows the

researcher to arrive at a general picture of the participant's characteristics. The inductive approach of EMA uses sampling of many immediate, momentary instances to create a summary of the particular phenomenon of interest (Shiffman & Stone, 1998).

In EMA individuals are signaled in their natural environment to immediately report on a specific construct over repeated intervals (Smyth & Stone, 2003). For example, individuals may be asked to report on current or recent psychological states, environmental conditions or behaviors. Individuals are usually signaled multiple times a day for a period of days or weeks (Smyth & Stone, 2003). Although EMA is similar to ESM, EMA collects more diverse information and uses more flexible measures compared to the self-report measures, checklists, or brief open-ended questions collected in ESM.

Smyth and Stone (2003) maintained that EMA and other data capturing techniques were developed in response to the concern that retrospective recall of self-reported experiences in orthodox science are faulty. One of the concerns deals with retroactive reconstruction or the influence the outcome of an event has on the recall of the actual event. By signaling an individual to immediately report on a specific construct, EMA helps control for retroactive reconstruction. Another concern with orthodox data collection measures deals with ecological validity or generalizability of research conducted in the laboratory. There is concern that data collected solely in the laboratory may lack generalizability. Participants' behaviors or psychophysiological processes may differ in contrived situations such as the laboratory from their own natural environments. Some situations may also be too difficult or unethical to recreate in the laboratory. EMA signals participants in their natural environment thus reducing ecological validity and generalizability concerns (Smyth & Stone, 2003).

EMA studies vary depending on the behavior of interest to be studied. Longitudinal designs using the EMA method have been used to study stress and coping, depression, asthma, chronic pain, personality traits and negative affect, as well as eating disorders (Smyth, Wonderlich, Crosby, Miletnberger, Mitchell, & Rorty, 2001). Shiffman and Stone (1998) report that EMA has great potential to enhance the understanding of how behavioral factors effects disease (Shiffman & Stone, 1998).

Stein, Kenardy, Wiseman, Dounchis, Arnow, and Wilfley (2007) tried to identify the motivation behind binge eating in binge eating disorder through an exploration of the antecedents and consequences of binge eating using EMA. They gave 33 females with binge eating disorder a handheld computer for seven days and asked them to specify their present hunger, emotions, and binge status when the computer signaled them to do so. Investigators found more negative mood and hunger in prebinge than nonbinge times. Negative mood was highest after the binge. Because of the heightened negative mood following a binge, Stein et al. (2007) proposed that further research is necessary to explore the reinforcing aspects of a binge. The authors suggested an escape from self-awareness as a potential benefit of bingeing (Stein, Kenardy, Wiseman, Dounchis, Arnow, & Wilfley, 2007).

Descriptive experience sampling.

Descriptive Experience Sampling (DES; Hurlburt, 1990, 1993) is a descriptive sampling method designed to explore and describe inner experience. Hurlburt and Akhter (2006) define inner experience as "anything that is going on in awareness at the particular moment defined by the beep" (Hurlburt & Akhter, 2006, p. 274). DES was developed by Hurlburt and grew out of his thought-sampling and cognition-sampling

methods. DES was a response to the many problems and inadequacies of other methods of introspection (Wheeler & Reis, 1991). Hurlburt sought to describe real inner experience data by capturing participant's cognitions at random moments (Hurlburt, 1997; Hurlburt & Heavey, 2006; Heavey & Hurlburt, 2008).

DES is designed to capture inner experience as it occurs in the natural environment (Hurlburt & Akhter, 2006). Hurlburt and Akhter referred to the real events that are really being experienced by real people as "pristine experiences." They reported that "pristine experiences" are important aspects of consciousness research and psychology and general (Hurlburt & Akhter, 2006).

DES is not only designed to provide high fidelity descriptions of individuals' inner experiences, but to discover patterns of experience within individuals and across individuals within groups. At any point in time, an individual has a countless array of possible experiences. These experiences may be external such as temperature, tastes, and smells. They may be interoceptive, proprioceptive, or kinesthetic such as pressures, itches, and tickles. These potential experiences may also be inner events such as images, feelings, and thoughts. At any moment, a person generally chooses one (sometimes more) of these possibilities to create his or her pristine experience. One individual may have an emotional experience while someone else, in the same situation, might have a visual image. The goal of DES is to catch these pristine experiences in flight (Hurlburt & Akhter, 2006). Inner speech, unsymbolized thinking, inner images, feelings, and sensory awareness are examples of frequently found characteristics that have emerged across subjects using DES (Heavey & Hurlburt, 2008; Hurlburt, 1997; Hurlburt & Heavey, 2006).

The method of DES has been refined throughout the years; however, the main aspects of the method remain. A participant wears a beeper in his or her everyday environment. The beeper sounds at random intervals averaging six beeps per three hours. The beeps are delivered through an earphone and prompt the participant to pay attention to the experience that was ongoing at the last undisturbed moment before the beep. The participant is asked to immediately record the details of his/her experience in a notebook or other form of recording device. Within 24 hours of capturing a certain number of experiences, usually six, the participant will meet with a DES investigator for an expositional interview. This interview is designed to aid participants in providing high fidelity descriptions of their sampled experiences. Upon completion of the interview, the investigator writes the description of the participant's inner experience at each sampled beep. This process is repeated over several sampling days, usually four to eight, until approximately 20 to 50 samples of experience have been collected (Heavey & Hurlburt, 2008; Hurlburt, 1997; Hurlburt & Akhter, 2006; Hurlburt & Heavey, 2006).

DES is an idiographic procedure that produces a characterization of a specific person's experiences (Hurlburt & Akhter, 2006). Some DES studies collect samples from a group of participants that have some commonality. In this case, the investigator reviews each idiographic characterization to see if the participants have any significant characteristics in common. Thus, DES may be used in one of two ways: 1) as a purely idiographic procedure used to capture the inner experience of one individual, or 2) as a sequence of idiographic procedures with an ultimate, nomothetic purpose (Hurlburt & Akhter, 2006).

For example, Jones-Forrester (2009) used DES to explore the inner experience of 13 individuals with bulimia nervosa. Participants were given a small beeper that sounded a 400 Hz tone at random intervals ranging from one minute to one hour. Participants were provided with a small spiral notebook to record notes on their inner experience when the beep signaled. Participants were instructed to wear their beeper for approximately three hours (to allow for six beeps) during their daily activity. Participants were interviewed using the DES expositional interview method within 24 hours of collecting their six beeps. The DES expositional interview consisted of detailed questions to allow for an accurate depiction of the participant's experience at the moment of each beep. Participants repeated the sampling/interview process approximately six times each. Jones-Forrester summarized the salient characteristics of each individual as well as the salient characteristics of the group. She found that all the participants had attention that was divided, which she referred to as fragmentation. Additionally, Jones-Forrester reported that the inner experience of individuals with bulimia nervosa was characterized by unsymbolized thinking, inner speech, inner seeing, poorly differentiated affect that is confused with cognition, and the presence of interfering phenomena (Jones-Forrester, 2009).

DES Compared to Other Methods

Various methods of exploring the subjective experiences of individuals have been reviewed. This section will review the differences between those approaches and how DES may add to the understanding of the inner experience of left-handers.

The think aloud paradigm attempts to understand the emotions and cognitions of individuals as they occur. Think aloud studies are not retrospective in that investigation

occurs while the participants are in the moment. In addition, participants' reports are recorded verbatim so that details are not missed. This approach provides a detailed report of the internal processes of the participants. DES is similar to the think aloud paradigm in that they are both interested in a detailed depiction of the inner world of individuals. The think aloud paradigm uses the participants' verbal narrative of their experiences as the primary mode of data. Unlike think aloud studies that explore preselected events, DES explores single, momentary experiences. DES randomly samples participants in their natural environment whereas think aloud studies occur in experimental conditions. The fidelity of the think aloud results are limited by the amount that can be narrated while an activity is ongoing; that generally results in a gloss on cognitions, or perhaps cognitions and emotions. By contrast, DES has no time constraints. It aims at a particular moment, and will take as long as is required to elaborate all the salient details of that momentary experience, thus allowing complex characteristics of an individual's inner experience, including thoughts, feelings, sensations, and multiple simultaneous instances thereof to emerge. Furthermore, the DES focus on iterative immersion in the method facilitates the bracketing of presuppositions necessary to high fidelity descriptions.

Thought-sampling methods spontaneously explore thought content. Experimenters interrupt participants as they are engaging in a task and solicit for a narrative description of their thought content before the interruption. In Vivo Thought Sampling uses a beeper to randomly sample the inner experience of participants. When the beeper sounds, participants complete a Thought Sampling Questionnaire, rating characteristic of their thoughts on Likert-type scales. Similarly, Thought-and-Mood

Sampling also randomly explores the cognitions of individuals as they occur in their natural environment; however, it also accesses their moods. DES is similar to Thought (and Mood) Sampling in that both randomly sample participants in their natural environments. Unlike DES, Thought Sampling has participants rate their cognitive experiences on a questionnaire. Unlike Thought (and Mood) Sampling, DES explores all aspects of an individual's inner experience, not only their thoughts and/or moods.

ATSS is a broader approach to accessing the cognitions of individuals than thought-sampling and the think-aloud paradigm. ATSS studies are conducted in a controlled laboratory setting. Individuals listen and react to a series of tape-recorded simulated situations. ATSS is useful in that it allows investigators to explore cognitions during infrequent or complex situations. Individuals provide open-ended responses to the simulations. In this sense, ATSS is similar to DES because both allow participants to present the full range of their inner experience. Unlike DES, ATSS is conducted in a laboratory setting and explores only the cognitions of the participants. And, perhaps most importantly, ATSS aims at simulations whereas DES aims at pristine, naturally occurring experiences. There are some situations where simulations are doubtless faithful copies of pristine experiences, some situations where they are not. Unfortunately, at this stage it is unknown which is which.

Thought-listing is a self-report procedure which elicits participant's thoughts directly after an event. This is different from DES in that thought-listing is conducted in a controlled, laboratory setting. Additionally, the investigators in thought-listing studies explore the thoughts surrounding certain situations from individuals. These lists are all retrospective and are aimed only at thoughts with no careful attention paid to the

bracketing of the participants' or the investigators' presuppositions about the existence of or nature of thoughts.

The Experience Sampling Method (ESM) and Ecological Momentary Assessment (EMA) use beepers to interrupt individuals, randomly or at a set time, during their naturally occurring lives. At the moment of beep, participants complete a questionnaire which solicits feedback about their location, mood, environment, and other general characteristics at the time of the beep. These methods provide an overview of who, what, when, and where people spend their time as well as what they think and how they feel. DES is similar to ESM and EMA in that both use beepers to sample experiences in the naturally occurring lives of individuals. DES differs from ESM and EMA by working to bracket presuppositions individuals have about the nature inner experience. Beliefs about what one will find in a particular person's inner experience are set aside as to not contaminate what is there to be discovered. DES does not have a set of predetermined questions that may limit the scope of inner experience elicited. In this way, DES is both open ended and "open beginninged" (Heavey & Hurlburt, 2008).

DES is unlike Thought-Sampling methods, ESM, and EMA in that it is a qualitative method that provides qualitative descriptions and not quantitative analysis. DES has an open-ended approach in that it allows the participants to develop their own descriptive language for their inner experience. DES does not constrict participants' descriptions of their inner experiences by having them answer questions based on a predetermined concept or construct. The participant and the DES investigator together develop apprehensions of experience over the course of several iteratively improving interviews. In addition, the participant and investigator together identify salient

characteristics of the participant's inner experience. After these salient characteristics specific to a certain participant's inner experience have been identified, the investigator may identify nomothetic regularities that occur among those who share a certain similarity (Hurlburt, 1997).

For example, the differences between thought-sampling, ESM, EMA, and DES can be seen in the motivation for and findings of their respective studies. To illuminate the differences between the methods, four studies of bulimia nervosa, one a thought sampling study, one an ESM study, one an EMA study, and one a DES study will be discussed.

Zotter and Crowther (1994), in the study described above in the In Vivo Thought Sampling section, used in vivo thought-sampling to explore the cognitive characteristics of bulimic, nonbulimic, repetitive dieting, and nondieting women on two randomly selected days. Participants were provided with an alarm that sounded every 30 minutes. They were instructed to record the time, the thoughts they were having, and the activity they were engaged in the moment before the alarm sounded. Investigators found that bulimic women reported significantly more eating and weight-related thoughts than nonbulimic or nondieting women (Zotter & Crowther, 1994).

Johnson and Larson (1982) used ESM to explore the characteristics of the daily lives of normal-weight bulimic women. They investigated the overall moods, mood fluctuation, social isolation, and amount of food related behavior of bulimic patients as compared to normal control. Bulimic and normative women were provided with an electronic pager that sounded randomly. The sounding of the pager prompted the participants to fill out a self-report questionnaire which asked about their situation and

subjective experiences at that moment. Johnson and Larson (1982) found that bulimic women report negative mood states significantly more than normal women. In addition, bulimic women experienced more dysphoria and mood fluctuations, were more sad, lonely, irritable, passive, weak, and constrained than normal women (Johnson & Larson, 1982).

Stein, Kenardy, Wiseman, Dounchis, Arnow, and Wilfley (2007) used EMA to investigate the motivational factors behind binge eating in individuals with binge eating disorder through exploring the antecedents and consequences of binge eating. The participants reported more negative mood and hunger during prebinge than nonbinge times. Additionally, negative mood was at its peak after the binge (Stein et al., 2007).

Jones-Forrester (2009) used DES to explore the inner experience of individuals with bulimia nervosa. Participants were instructed to wear a beeper that randomly sounded in their natural environment. They were instructed to record all that was in their awareness at the moment of each beep. Jones-Forrester found that fragmentation of awareness, sensory awareness, unsymbolized thinking, inner speech, inner seeing, poorly differentiated affect, and interfering phenomenon characterized the inner experience of the participants (Jones-Forrester, 2009).

All four studies presented involved the use of a sounding device to prompt participants into giving accounts of their subjective experience. DES is different in that its lack of specificity allows for a more broad and accurate depiction of participants' inner experience. For example, the thought sampling study specifically instructed participants to record their cognitions the moment before the beep. This approach is similar to DES in that it allows participants to freely respond as opposed to answering a

series of preset questions or questionnaires. Thought sampling is different from DES in that it is designed to explore the thoughts of the participants whereas DES is designed to capture all that a participant experiences. In this way, thought sampling studies limit their potential findings. Although cognitions are important aspects of experience, they are not all of experience. Though DES studies may educe the cognitions of an individual, they are not limited to them.

The EMA and ESM studies both instruct participants to answer a series of predetermined questions. This approach assumes that all individuals share common experiences which, in turn, limits the scope of experiences to be captured. Unlike the thought sampling study which focused on the cognitions of the participants, the ESM and EMA studies focused on behavioral factors. Although the focus is different, emotions and cognitions versus behavioral factors, thought sampling, ESM, and EMA studies are similar in that they all narrow the potential findings of the study by specifying a particular aspect of experience. Though DES may find similar results to the three mentioned studies, it is not limited to them.

DES has an advantage over the other measures of introspection in that it allows for a more in-depth investigation to the inner world of participants. Unlike the findings on the emotions and cognitions of individuals with eating disorders in thought-sampling, ESM, and EMA studies, Jones-Forrester found that bulimic individuals as a group had more fragmentation of awareness, sensory awareness, images, and perceptual awareness than feelings, thought/feelings, feeling fact of body, and preoccupation with weight, shape, or food, and cognition (Jones-Forrester, 2009). This is a finding that studies exploring cognitions and emotions would not have been able to discover.

Commonly Found Characteristics of Inner Experience

Heavey and Hurlburt (2008) explored the inner experience of a stratified random sample of college students. They were interested in surveying the naturally occurring phenomena in the inner experience within and across people. They administered the Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1994), a measure of psychological distress, to 407 students taking introductory psychology courses at an urban university. They stratified the 407 SCL-90-R scores into 10 strata and selected a random sample of three participants from each stratum. Then they used DES to explore the inner experience of these 30 participants (16 female and 14 male). Participants were asked to participate in three days of DES sampling and interviewing with six samples per day. Samples from the first day were discarded as this day is considered as training. The first five samples were used on the second and third days of sampling unless one of those samples were unusable, in which case the sixth sample was used in its place. After the researchers gained an understanding of the experience occurring at each beep, they coded the experience according to the codebook developed by Hurlburt and Heavey (1999). The codebook describes 16 forms of inner experience. The researchers were aware that, because DES is an exploratory procedure, it was possible that either none of the codebook identified phenomena would occur or that new phenomena would emerge. After completion of sampling, Heavey and Hurlburt (2008) did not discover new frequently occurring characteristics of inner experience. They did find that five characteristics that occurred with substantial frequency (22% or higher) in the inner experience of their participants: inner seeing (34%), the experience of seeing things that are not immediately present in the external environment, was the most frequently

occurring main characteristic and had a within-participant frequency that ranged from 0% to 90% (Heavey & Hurlburt, 2008); feeling (26%), the direct experience of emotion, occurred frequently across Heavey & Hurlburt's (2008) sample and had a within-participant range of 0% to 90%; inner speech (26%), experienced to be like outer speech except it happens internally and is usually experienced as being in the person's own voice, had a within-participant frequency ranging from 0% to 75%; sensory awareness (22%), the attending to a particular sensory aspect of one's internal or external environment where the sensation itself is the focus of one's perception, had a within-participant frequency ranging from 0% to 100% and was the least frequent of the five main characteristics (along with unsymbolized thinking) in Heavey and Hurlburt's sample; and unsymbolized thinking (22%), the thinking of a thought without conveyance of that thought in words, images, or any other symbolic representation had a within-participant frequency ranging from 0% to 80% and was the least frequently occurring of the main characteristics in Heavey and Hurlburt's (2008) sample along with sensory awareness (Heavey & Hurlburt, 2008).

The next most frequently occurring phenomena included inner hearing (3%) or paying attention to auditory characteristics of an internal phenomenon and just doing (2%) or being engaged in an activity with no awareness of thinking about it as well as no other aspects of inner experience present at the moment. In fact, the remaining 11 characteristics (partially worded speech, unworded speech, worded thinking, imageless seeing, inner hearing, just doing, just talking, just listening, just reading, just watching tv, and multiple awareness) occurred with much less frequency than the main five (3% or less) (Heavey & Hurlburt, 2008; Hurlburt & Heavey, 2006).

DES and Left-Handedness

To date, there has only been one study that has used the DES method to understand inner experience in left-handers. This study was a Master's thesis in which the present author (Mizrachi, 2010) used Descriptive Experience Sampling to explore the inner experience of six left-handed participants (four male and two female participants). Mizrachi (2010) compared her results to those of Heavey & Hurlburt (2008) and suggested that sensory awareness may be more frequent in left-handers than in the general population, that inner speech (and words in general) may be less frequent in left-handers than in the general population. Additionally, when words were experienced by left-handers, they had atypical presentations. For example, they were not explicitly attended to for their function or meaning, or they were just happening—that is, they were being spoken outside of awareness. Feelings also occurred at a lower frequency in Mizrachi's left-handed participants than the general population. Participants expressed emotions through the tone of their speech, and understood that some of their thoughts were emotionally valenced, rather than actually experiencing an emotion (Mizrachi, 2010).

In addition to the experience of five main characteristics discovered by Heavey and Hurlburt (2008), novel characteristics of experience emerged across Mizrachi's (2010) left-handed participants. Left-handed participants' inner experience had a relatively high frequency of searching (i.e., being actively involved in the searching of something), and concentrated doing (i.e., carefully and concentratedly engaged in a physical activity). Just doing occurred with greater frequency in the sample of left-handers than in the general population. This suggests that left-handers engage in

activities outside of their awareness with more frequency than the general population. Finally, left-handed participants had multiple experiences more frequently than did the general population (Mizrachi, 2010).

CHAPTER 3

METHOD

This section will review the method used to examine the inner experience of left-handers in this study. This study consisted of three phases: the screening phase, the orientation phase, and the sampling phase. The participants, instruments and procedures used in each phase will be described below.

Phase 1: Qualification Phase

During the qualification phase, the researcher asked volunteers in psychology courses at an urban university to complete the qualification battery, which consisted of informed consent, a brief demographic questionnaire, and the Edinburgh Handedness Inventory (EHI, a measure of handedness). Volunteers received 0.5 research credits to meet a course requirement upon completion of the qualification battery. The volunteers who exhibited moderate to strong left-handedness based on their scores on the Edinburgh Handedness Inventory (EHI laterality quotient less than -40) during this phase were contacted via telephone to participate in the orientation phase. Volunteers who were contacted and agreed to participate in the orientation phase arrived at the Experience Sampling Lab in the Central Desert Complex of the UNLV campus.

Participants

Two-hundred and fifty-six students taking psychology courses at the University of Nevada, Las Vegas (UNLV) participated in the screening phase of the present study. Volunteers received 0.5 research participation credits upon completion of this phase.

Instruments

The Demographic Questionnaire, devised for this study, asked students to provide their name, date of birth, address, sex, e-mail address, home phone number, cellular phone number, preferred phone number, race/ethnicity, marital status, education level, employment status, a permanent address/phone number, and handedness.

The Edinburgh Handedness Inventory (EHI; Oldfield, 1971) was used to identify left-handed individuals invited to enter the Phase 3. The EHI, a brief 10-item handedness questionnaire, is the most widely used handedness questionnaire and was developed to provide a simple and brief method for assessing handedness in neuropsychological and other clinical and experimental work. The EHI was tested for reliability by Oldfield on over 1100 young adults (Lehnkering, Strauss, Wegner, & Siegmund, 2005; Oldfield, 1971). On the EHI, participants are asked to indicate their hand preference on the following activities: writing, drawing, throwing, scissors, toothbrush, knife (without fork), spoon, broom (upper hand), striking match (match), and opening box (lid). In addition, participants are asked to indicate which foot they prefer to kick with and which eye they use when only using one. Participants are asked to put a plus sign in the column corresponding to their preferred side (left, right) and to place two plus signs in the appropriate column if they never try to use the other hand unless absolutely forced to. If they are indifferent, they are asked to put one plus sign in each column. To score the laterality quotient of the EHI, the number of plus signs in the left column is subtracted from the number of plus signs in the right column; that difference is divided by the total number of plus signs and multiplied by 100. Scores range from -100 (strongly left-handed) to +100 (strongly right-handed). Cutoff scores for handedness used in the

literature are variable. However, Oldfield (1971) reported that laterality quotients between +31 and +40 in his subjects were indicative of marked deviations from truly right-handed behavior (Oldfield, 1971). Assuming that the reverse is also true, scores less than -40 would indicate truly left-handed behavior; we therefore chose -40 as a cutoff score for left-handedness.

Procedures

The researcher briefly described the study to students taking psychology courses at UNLV and asked for volunteers to complete the qualification battery. After informed consent was explained and obtained, volunteers completed the qualification phase package. Volunteers received participation credit (0.5) to meet a course requirement. The questionnaire was collected and scored. Volunteers who completed that qualification battery, consented to be contacted, and who exhibited left-handedness based on their scores on the EHI were invited to participate in Phase 2.

Phase 2: Orientation Phase

Ten individuals who in Phase 1 were identified as left-handed were invited to participate in Phase 2. All of the volunteers who were contacted agreed to participate in Phase 2. During this phase, the investigators explained the sampling method used in Phase 3. Participants were given a consent form to sign if they wished to participate in Phase 3 and be videotaped. If participants consented to participate in Phase 3 (all did so), they completed the Symptom Checklist 90-R (SCL-90-R), a measure of overall psychological functioning. They were also given a beeper and notebook used in Phase 3. Participants received 0.5 research credit for completion of this phase.

Participants

Ten individuals who in Phase 1 said on the demographic questionnaire that they are left-handed and who scored less than -40 on the EHI were contacted via telephone to participate in Phase 2. Participants received 0.5 research credit for participating Phase 2. Recruitment continued, selected from those eligible, until 10 left-handed participants had been advanced to Phase 3.

Instruments

The Symptom Checklist-90-R (SCL-90-R; Derogatis, 1994) is a 90-item inventory designed to provide an outline of both an individual's symptoms and their intensity. The items are scored on a five-point Likert scale indicating the rate of occurrence of the symptom. It is designed to measure symptoms on nine different subscales including: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The SCL-90-R may be administered to individuals 13 years of age and older and takes approximately 12 to 15 minutes to complete (Derogatis, 1994; Derogatis, Lipman, & Covi, 1973).

Procedures

The purpose of Phase 2 was to orient qualified participants to the sampling phase of the study (Phase 3) and to administer the SCL-90-R. Respondents met in the DES lab at the UNLV campus and were invited to complete informed consent and the SCL-90-R. They were informed of confidentiality and Informed Consent for the Orientation and Sampling Phases was obtained. Participants were advised that they may discontinue

sampling at any time and without penalty. Should a participant had chosen to withdraw from the study, they were to receive one research credit per each attended meeting.

The investigators explained the nature of the DES method in detail to the participants. Participants were given a three inch by five inch spiral notebook to record their experiences and a pocket-sized beeper programmed to beep at random intervals. They were instructed on the mechanisms of the device: how to turn it on and off, adjust the volume, and how to reset it. They were instructed to wear this beeper the 24-hours before the next meeting as to have "fresh beeps" for the expositional interview. Participants were told to capture their naturally occurring experience at the last undisturbed moment before the beep occurred and record their experience in a notebook. They were informed of confidentiality and told to skip any samples they did not feel comfortable reporting (Hurlburt & Heavey, 2006).

At their consent, participants were videotaped during the remaining interviews. They were asked to schedule a convenient time to meet with the investigators in the Experience Sampling Lab located in the Central Desert Complex at UNLV. Participants received 0.5 research credit for this phase of the study. This phase of the study took approximately half an hour to complete.

Phase 3: Sampling Phase

Ten participants who agreed to participate in Phase 3 individually met with two DES investigators approximately five times in the DES lab. All of the participants who participated in Phase 2 agreed to participate in Phase 3 and be videotaped. Participants arrived at the Experience Sampling Lab. During the sampling phase, the participants took the beeper with them and wore the beeper until it beeped six times (approximately

three hours) but were free (and encouraged) to engage in their normal daily activities while they wore the beeper. When the beep occurred, the participants were to write a few notes about what was happening in their inner experience when the beep sounded in the small notebook provided by the researcher. Within 24-hours of collecting the six beeps, the participants were interviewed regarding their inner experience during the beeps by the investigators at the Experience Sampling Lab. This interview was a detailed inquiry into the characteristics of the experiences that were occurring at the moment of each beep. This interview lasted approximately one hour and was videotaped for future examination by the researchers. This sampling/interview procedure was repeated four more times. Participants received four research credits for participating in this phase of the experiment. Recruitment continued, selected from those eligible, until 10 left-handed participants had completed the sampling phase.

Participants were advised that they may discontinue sampling at any time and without penalty. Should a participant had chosen to withdraw from the study, they were to receive one research credit per each attended meeting. During the participants' last meeting, the investigators collected the beeper and the notebook from the participant, though the participant was to keep the notes that they wrote down. Participants were debriefed during the last meeting. Videotapes of the sessions were transferred to DVD, given a number to identify the participant, and stored in a locked filing cabinet in the lab area.

Participants

Ten volunteers taking psychology courses at the University of Nevada, Las Vegas aged 18 years and older, who were identified as left-handed in Phase 1, and who agreed to participate in Phase 2, participated in Phase 3.

Apparatus

The participants received a random-interval-generating device (beeper) developed by Hurlburt (Hurlburt & Heavey, 2002). The pocket-sized beeper is rectangular in shape and emits a 700-Hz tone at random intervals that can be heard from an earphone. The random intervals were programmed for this study to range from a few seconds to one hour with an average of 30 minutes. The volume of the beeper is adjustable and the beep can be stopped by pressing a button. The participants also received a pocket-sized spiral notebook for recording notes describing their inner experience at the last undisturbed moment before the beep sounded (Hurlburt & Heavey, 2002).

Procedures

Participants took the beeper with them and were asked to wear the beeper until it beeped six times (approximately three hours) during a time of their preference. Within 24-hours of collecting the beeps, the participants individually met with two DES investigators approximately five times in the DES lab at the University of Nevada, Las Vegas (UNLV) campus. This phase of the study consisted of five, one-hour long expositional interviews, with the exception of the last meeting. During the expositional interviews the DES investigators interviewed the participant about the samples collected the previous 24 hours. The last meeting also included a thorough debriefing after the

expositional interview. Participants received four research credits for participation in this phase.

Meetings 1-5: Expositional Interviews and Debriefing

Meetings 1 through 4 were one-hour long expositional interviews. Each participant met with two investigators (Mizrachi and her advisor Hurlburt) to discuss the participant's recently collected samples of inner experience. Both investigators were present during each interview. During the expositional interview, the investigators essentially engaged in conversations with the participant in an effort to discover the phenomenology of the participant's inner experience. There is, essentially, only one legitimate topic in this conversation: what did the participant experience at the moment of the beep? The expositional interviews do not have a standard format although, typically, the participants consult their notes about their beeps and attempt to describe to the investigators their recently sampled experiences. The expositional interview is an unstructured interaction, and the participant typically initially provides a variety of reports about such things as: a) the background or context of the experience, b) the situation (who they were with, who was there, etc.), c) the activity they were engaged in (watching TV, driving, etc.), d) the experience that occurred before the moment of the beep, e) the experience that occurred after the moment of the beep, and f) the ongoing experience at the moment of the beep. The aim of the expositional interview is to focus as exclusively on f) as possible, and to allow other aspects only to the extent that they assist in the apprehension of f). This is a collaborative process in which the investigators work together with the participant to come to a high fidelity apprehension of the participant's pristine inner experience. Within each interview, the lead interviewer on

each beep was alternated. This is an iterative process which takes place over several interviews. With each successive interview the participant may become more skillful at identifying their at-the-moment-of-the-beep inner experience and filtering out extraneous material.

Due to the iterative nature of the expositional interviews, the first expositional interview is considered to be a training exercise rather than an opportunity for data collection. During that first interview, participants are frequently surprised by the amount of detail sought by the DES investigators, and therefore have difficulty answering the questions posed by the investigators. After struggling through this first interview, and hearing the kinds of details the investigators probe for, participants may become better able to observe their own inner experience. The remaining expositional interviews consist of the same kinds of questions aimed at the participant's experience as were asked in the first interview; however, participants are now likely to be better observers of their inner experiences and more proficient in describing them.

Meeting 5 included both an expositional interview and a debriefing, where participants' participation was discussed and participants had the opportunity to ask questions. Participants received research credit for their completion of the study.

Data

The aim of this study was to apprehend randomly sampled experiences from left-handed individuals and then discover the characteristics of each of those samples. The unit of data collected in this study is therefore the sample of inner experience.

DES, including the description writing of the participants' inner experience samples as well as the rating of the samples, is a collaborative process. Upon completion

of each interview, one investigator (Mizrachi) wrote a high fidelity description of the participant's inner experience during each beep. Mizrachi then sent these descriptions to her advisor and co-investigator (Hurlburt) to review and revise the descriptions, if necessary. Hurlburt sent his revised descriptions back to Mizrachi to be reviewed for final approval. If there were disagreements between the investigators, the videotape of the interview was reviewed. Upon approval of the written beep descriptions, Mizrachi then rated the inner experience characteristics during each beep. She then sent the ratings to Hurlburt to review and agree or disagree. If there were disagreements, the videotape of the particular interview was reviewed and the investigators discussed the beep until they came to an agreement.

Upon completion of sampling, Mizrachi considered the participant's entire set of samples of inner experience and discovered the characteristics of experience that emerged as salient across samples. This resulted in an idiographic description of each participants' experience. Upon completion of the idiographic description, Mizrachi sent the idiographic chapter to Hurlburt for review.

After completion of the sampling process with all 10 participants as well as completion of the 10 idiographic descriptions, the samples of experience from all participants were collaboratively considered to discover whether there are patterns, forms, and/or characteristics that emerged as salient across participants and that differ from the experiences of the general population as described by Heavey and Hurlburt (2008) and elsewhere. The characteristics of inner experience from the present study were also compared to the left-handed participants in Mizrachi (2010). This resulted in a nomothetic characterization of the experience of left-handers' experience. Upon

completion of the nomothetic characterization, Mizrachi sent the across-participant chapter to Hurlburt for review.

CHAPTER 4

RESULTS

This study was aimed at exploring the inner experience of left-handed participants; toward that end, 10 left-handed college students participated in Descriptive Experience Sampling (DES). Their characteristics are shown in Table 1.

Table 1
Demographics

	Participants										
	"AH"	"BP"	"CL"	"DH"	"NT"	"MM"	"MO"	"KA"	"JS"	"TS"	All
EHI Laterality Quotient	-100	-75	-75	-73	-68	-67	-53	-53	-50	-45	-65.9
Age	18	18	18	18	28	18	18	21	19	35	21.1
Gender	M	F	F	M	M	F	F	F	F	M	
Ethnicity[a]	H	AA	C	C	B	E	H	B	C	C	
SCL-90-R											
GSI Raw Score	0.06	0.53	0.005	0.79	0.19	1.53	0.37	0.71	0.51	0.32	0.50
GSI T-score	41	59	30	56	50	61	55	61	58	55	52.9
Norm Group[b]	A	A	A	B	A	B	A	A	A	A	
Number of samples[c]	20 (9%)	20 (9%)	18 (8%)	24 (11%)	23 (11%)	20 (9%)	23 (11%)	21 (10%)	24 (11%)	24 (11%)	217 (100%)

Note. [a]AA is African-American, B is Biracial, C is Caucasian, E is Ethiopian, H is Hispanic. [b]Norm A is adult nonpatients, norm B is adolescent nonpatients. [c]First day samples excluded (considered training).

Participants were administered the Edinburgh Handedness Inventory (EHI), a quantitative assessment of handedness, to evaluate their handedness laterality. The EHI consists of 10 items evaluating the hand preference of a variety of activities. Completion of the EHI yields a laterality quotient ranging from +100 to -100 (Oldfield, 1971). Negative laterality quotients are associated with left-handedness whereas positive laterality quotients are associated with right-handedness. The absolute values indicate degree of handedness with larger values signifying stronger handedness in either direction. Variations exist in the literature regarding the cutoff points of handedness; however, the present study used laterality quotients of -40 to -100 as indicators of left-handedness. Table 1 shows that our participants' EHI scores ranged from -100 to -45,

with four near -100, strongly left handed, and six clustering around -50, moderately left handed.

Participants also completed the Symptom Checklist-90-R (SCL-90-R; Derogatis, 1994), a self-report inventory aimed at reflecting the psychological symptom patterns of various respondents (community, medical, and psychiatric). The SCL-90-R is a self-report inventory consisting of 90 items with a five point rating scale of distress from 0 "Not at All" to 4 "Extremely." Scoring is based on nine symptom dimensions: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism. The Global Severity Index (GSI) is one of three global indices of distress intended to summarize the level of symptomatology and distress. The GSI is the best indicator of the current level or depth of distress combining both the number of symptoms reported along with the intensity of experienced stress. Overall, an individual's severity of symptoms can be assessed through elevations in the GSI thus the GSI should be used when only one summary measure is reported (Derogatis, 1994).

The participants' GSI raw scores and T-scores on the SCL-90-R are also presented in Table 1, which shows that participants' GSI T-scores ranged from 30 to 67. In general, when compared to adult nonpatient norms, T-scores above 63 are indicative of clinically significant psychological difficulties (Derogatis, 1994). Two of the participants, DH and MM, had T-scores in this range. When compared to adolescent nonpatient norms, DH's GSI raw score converted to a T-score of 56 suggesting his symptoms are not clinically significant. When compared to adolescent nonpatient norms,

MM's GSI raw score converted to a T-score of 61 suggesting her symptoms are not clinically significant.

Organization

The main results of this study, the descriptions of left-handers' experience, are organized on two levels: 1) idiographically, within each individual participant; and 2) collectively, across all participants. The next 10 chapters (Chapters 5 through 14) are idiographic descriptions of the inner experience of each individual participant as discovered by DES. Following the idiographic chapters, Chapter 15 describes the patterns and emergent characteristics of inner experience across all ten participants and compares the results from the present study to the literature.

The intent of idiographic analyses is to explore the characteristics of an individual's inner experience as thoroughly as possible. In DES, idiographic analyses are performed through a consideration of all the samples of inner experience collected by a participant and then describing those characteristics. Ten left-handed participants participated in the present study; thus the investigators created 10 idiographic descriptions. Each idiographic analysis is presented in its own chapter (Chapters 5-14); the chapters are presented in descending order of degree of left-handedness as measured by the EHI (that is, the most left-handed participant is presented first).

Following the idiographic analyses, an across-participant description considering all the samples of inner experience from all participants was prepared; it is provided in Chapter 15. The aim of this across-participant description is to discover the salient characteristics and patterns of the inner experience in left-handers. The results of the

present study are also compared to the results of Heavey and Hurlburt (2008) and Mizrachi (2010).

In 2008, Heavey and Hurlburt explored the inner experience of a stratified random sample of college students. They found that five characteristics occurred with substantial frequency (22% or higher) in the inner experience of their participants: inner seeing (34%), the seeing something in one's imagination that is not actually there; feeling (26%), the direct experience of emotion; inner speech (26%), the innerly speaking words usually in one's own voice; sensory awareness (22%), the attending to a particular sensory aspect of one's internal or external environment where the sensation itself is the focus of one's perception; and unsymbolized thinking (22%), the thinking of a thought without conveyance of that thought in words, images, or any other symbolic representation. The remaining characteristics occurred with much less frequency than the main five (3% or less) (Heavey & Hurlburt, 2008; Hurlburt & Heavey, 2006).

In 2010, Mizrachi examined the inner experience of six left-handed participants. Mizrachi (2010) found the main characteristics identified by Heavey and Hurlburt (2008) occurred in her left-handed participants; however, they occurred in varying degrees. Sensory awareness occurred with a frequency of 35%; inner seeing 24%; unsymbolized thinking 20%; inner speech 9%; and feeling 4% (Mizrachi, 2010).

CHAPTER 5

"AH"

AH was an 18 year-old Hispanic male who sampled with us in September and October 2010. AH received a laterality quotient of -100 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971); that is the maximally negative EHI score, indicating he is strongly left-handed. He received a GSI raw score of 0.061 (a T-score, compared to nonpatients, of 41) on the Symptom Checklist-90-Revised (SCL-90; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

AH sampled on five separate occasions, collecting 24 samples. Because Sampling Day 1 is considered training for the participants and AH declined to speak about one sample, 20 of AH's samples count towards his inner experience. The following characteristics will be discussed: sensory awareness, occurring in 14 samples (70%); unsymbolized thinking, occurring in 13 samples (65%); multiple experience, occurring in 6 samples (30%); emotion, occurring in 4 samples (20%); inner speech, occurring in 4 samples (20%); inner hearing, occurring in 3 samples (15%); feeling, occurring in 3 samples (15%); not semantic words, occurring in 2.5 samples (13%); and infrequently occurring characteristics.

Sensory Awareness

Sensory awareness was the most frequently occurring characteristic in AH's inner experience, occurring in 14 of 20 samples (70%). Here is an example:

Sample 5.4. AH was driving and the grey jeep in front of him had a Chicago Bears tire cover on it. At the moment of the sample he focused on the appearance of the bear and its shadings, noting the orange and blue in the logo. AH was also thinking about his favorite team, the Raiders, beating the Chargers and that the Raiders had not beaten the Chargers since 2003. This thought was centered on the notion "since 2003" but AH was not sure if the specific words, "since 2003" were present in his experience or if it was just the idea.

In this sample, AH was attending to the visual characteristics of the Chicago Bears tire.

Six of AH's sensory awareness samples involved movement or spreading of a sensory phenomenon. Here are examples:

Sample 3.3. AH was innerly speaking the words "I'm hungry!" as he was about to place a bowl of spaghetti and meatballs into the microwave. His inner speech had an emphatic tone. He was also feeling his entire inside and outside lower abdomen grumbling, moving around, and tingling. At the same time, he was seeing the food in his bowl and smelling the cold meat and sauce.

In this sample, the sensory awareness experienced in his lower abdomen involved some movement. Here is another example:

Sample 4.5. At the moment of the sample, AH experienced the sides of his head throbbing. He experienced the throbbing as originating in the inner portion of his head and extending outwards toward his skull. The pain was concentrated in the temporal area and faded outwards toward the rest of his upper cranium. The throbbing was rhythmic, about once a second. The beep sounded when the throbbing was at its maximum level. He was also slightly seeing the video game

2K11, however, the throbbing was by far more central in his experience (an estimated ratio of 99:1).

Not only did AH experience throbbing, the throbbing involved spreading or movement from the inner portion of his head outwards towards his skull.

In three of his sensory awareness samples, AH experienced multiple and separate sensory awarenesses occurring simultaneously. Here is an example:

> Sample 3.5. AH was standing outside. At the moment of the sample, he was drawn to the gloomy, gray colors of the clouds. That is, he was paying particular attention to the color of the clouds, not their shape or their significance (implications for weather, etc.). He also smelled the rain. He was also feeling relaxed and calm which was experienced by a sensation of relaxedness throughout in his upper body. He described this relaxedness sensation as a "dropping down" sensation similar to sinking into a bed. He may also have been thinking, *I love this weather*. This thought was not present in words or images. He was unsure if this thought was in his experience at the moment of the sample or after the sample.

In this sample, AH attended to the colors of the clouds (sensory awareness), the smell of the rain (sensory awareness), and a "dropping down" sensation throughout his upper body (sensory awareness).

Two of AH's sensory awareness samples involved the sensory awareness of words. Here are the samples:

> Sample 3.4. AH was putting juice in the refrigerator. At the moment of the sample, his attention was powerfully grabbed by the word "Ketchup" on the label

of a ketchup bottle. His focus was on the entire word "Ketchup" without attending to any particular aspect of its appearance or to its meaning or significance. That is, AH had no particular relation to the ketchup at that time—was not planning on using it, etc.—and no particular interest in the ketchup itself. The meaningless *word* "Ketchup" overtook him, unbidden, by surprise, so to speak, as he was involved with the juice. He was also thinking whether he should go do bench presses or not. This thought was not experienced in words or images.

Sample 4.2. AH was sitting in his car looking at the *Monopoly* game board he had received at McDonalds. At the moment of the sample he was looking at the black "$50", which was superimposed over the two brown properties. He was focused on the font, boldness, and black color of the "$50." He was also thinking he could actually win fifty dollars. This thought was not present in words or images and had no location.

In these samples, words/numbers were present in AH's experience; however, he was not attending to the words/numbers for their significance. Rather, AH was drawn to their appearance.

Two of his sensory awareness samples involved imaginary phenomena. In these samples, AH was attending to sensory qualities of imaginary experiences. Here is an example:

Sample 2.1. A second or so before the beep, AH's phone had made a sound indicating that a text message had arrived. At the moment of the sample, AH was innerly hearing something like an echo of the text message notification sound.

> The innerly heard sound was a "faded version" of the real sound; the innerly heard sound was repetitive like an echo but there were no pauses between each repetition—that is, it seemed like a continuous fading in volume and perhaps in some other way across time. This innerly heard sound seemed to be spreading throughout his mind, unlike the original actual sound which occupied a specific portion of experienced real space. He was also thinking the text message was from his friend Lucy, but this was substantially less salient in his experience than the hearing of the fading sound. Also less salient in his experience was being interested in the text message. This was perhaps both a thought and a feeling, a wondering what the text message said, and he was unable to describe the feeling of interested any more than saying it had no physical characteristics.

In this sample, AH was attending to the auditory characteristics of an innerly heard text message notification sound. Similar to the spreading/movement samples described above, the innerly heard sound involved spreading throughout his mind.

Unsymbolized Thinking

Unsymbolized thinking occurred in 13 of AH's samples (65%). Although variations of unsymbolized thinking occurred frequently in AH's inner experience, he did not have any clear, textbook examples of unsymbolized thinking. All of his samples fell into one of three categories: some kind of thinking secondary to something else (primarily sensory awareness), the presence of multiple possibilities, and about what to do next.

In the majority (seven) of his unsymbolized thinking samples, the thinking was occurring secondary, and sometimes tertiary, to another phenomenon. Here is an example:

> Sample 3.6. AH was flexing his left arm and was looking at it in a mirror. At the moment of the sample, AH was seeing his left arm from the elbow to the shoulder. He was noticing the cut of his tricep and bicep. He was also thinking to himself, *Are my arms getting bigger?* This thought was not experienced in words or images and was a general wondering and was not as present as the noticing of the visual characteristics.

In this sample, AH was primarily attending to the noticing of the cut of his tricep and bicep. The thought, *Are my arms getting bigger?* was secondary to this noticing. Here is another example:

> Sample 5.2. AH was watching the movie *Night at the Museum, Part 2*, the scene where Ben Stiller was describing his glow-in-the-dark flashlight. At the moment of the sample, AH was absorbed in the lime green color of the glow-in-the-dark flashlight. He was also thinking that the glow-in-the-dark flashlight was a good idea and wondering about if it would sell. This thought was not experienced in words or images or other symbols, and was not as present as the noticing of the lime greenness.

Similar to sample 3.6 described above, the unsymbolized thought in this sample (wondering if a glow-in-the-dark flashlight would sell) was secondary to another experience. In both of these samples, sensory awareness was the primary experience.

Five of AH's unsymbolized thinking samples involved the presence of multiple

possibilities. In these samples, there was a sense of multiple possibilities; however, the possibilities themselves were not articulated. Here are examples:

> Sample 2.4. AH was looking for a particular pair of pants. At the moment of the sample, AH was innerly seeing clothes hanging on a hanger and a laundry basket on the floor of his laundry room. He was seeing this as if he were standing in the doorway looking left inside his laundry room. He saw the clothes in shades of black and white, but did not differentiate the particular articles of clothing that were hanging. This inner seeing somehow represented where he had last seen his pants. Simultaneously he was wondering *where could they possible be?* He experienced this thought as not in words or images. There was a notion present of the places that they could be (in his closet, in his mother's house, in his father's house, and so on); however, whereas there was an implication of specific possible places, the specific places themselves were not present in his experience.
>
> Sample 5.6. At the moment of the sample, AH was listening to his friend talking on the phone about a gift for AH's brother's birthday. He was also thinking of what he should get his brother for his birthday. This thinking seemed aimed at deciding among several specific things that he might give him (a DVD set of a TV show, some music) but the things themselves were not directly present to AH at the moment of the sample. That is, it was as if there were several things "out there," not specified at the moment of the sample but also not absent, and AH was waiting for one of them to "coalesce" or "advance" or "become salient."

In these samples, there was an experienced suggestion of a list of possibilities; however, the members of the list were not articulated or directly present in AH's experience at the moment. Here is another example:

> Sample 3.2. At the moment of the sample, AH was thinking that he had to choose something to do tonight, out of many options available to him. There were no words or images to be thought, he was just knowing he had to choose something. He experienced time pressure or urgency about making this choice; that he had a limited amount of time to make his choice about what to do later. It was unclear whether this urgency was a mental feeling or a thought/feeling or some type of thought. The phrase "thinking that he had to choose something to do tonight" is a meta-awareness, in the sense that "choosing something to do" would be more straightforward. In this case, the meta-awareness is correct: he was indeed aware of his choices.

In this sample, the options were not quite as present as in the others. Additionally, it was difficult to determine whether AH was experiencing a thought, feeling, or some combination of a thought and a feeling. It is hard to know if this difficulty was an accurate reflection of AH's experience or if it is a reflection of AH's difficulty articulating his experience. This sample was counted as unsymbolized thinking.

One of AH's unsymbolized thinking samples involved thinking about what to do next:

> Sample 2.2. AH was putting back a bottle of hot sauce in the pantry. At the moment of the sample AH was thinking about what he was going to do next. Included in this thinking was the sense that he had a lot of homework to do. This

thinking did not include words, images, or any other symbolic representation. He was also experiencing a slight feeling of pressure by the idea of not knowing what to do. This was a mental feeling. Also in his experience was the visual seeing of the hot sauce bottle. The notion that he has a lot of homework to do and wondering what he was going to do next were the most salient aspects in his experience (he estimated 80%) compared to the mental pressure (10%) and seeing the hot sauce bottle (10%).

Multiple Experience

In six of AH's inner experience samples (30%), multiple, separate, and distinct phenomenon were simultaneously occurring. Examples of this have already been described above. In sample 2.2, described in detail in Unsymbolized Thinking section above, AH was thinking about what he was going to do next, feeling pressure, and seeing a hot sauce bottle. In sample 3.4, described in detail in Sensory Awareness section above, AH was seeing the word "Ketchup" on a ketchup bottle and thinking about whether or not he should work out. In sample 4.5, described in detail in Sensory Awareness section above, AH was experiencing the sides of his head throbbing and seeing the video game *2K11*. In sample 5.4, also described in detail in Sensory Awareness section above, AH was focused on the appearance of a bear on a tire cover and thinking about his favorite football team beating another team. Here is another example:

Sample 4.1. AH was at McDonald's waiting on his food order to come out. He was wondering when his food was going to come out, and this thought had no specific words, images, or other symbols to it. He was also re-hearing a series of

beeps that he had heard a few seconds earlier. The innerly heard beeps were about a third of a second apart, and there were five or six beeps in the series. As far as he knew, this innerly heard series did not differ from what he had externally heard, but he did not have clear recollection of the actual beeps. AH heard the beeps in the interior of the top half of his head (roughly inside the cranium), circulating in a way that he could not specify. He was also seeing his McDonald's tray with coffee on it, though this was a very small part of his awareness.

In this sample, AH experienced multiple, separate, and simultaneous experiences, including an unsymbolized thought (wondering when his food was going to come out) and an inner hearing (re-hearing a series of beeps).

Emotion

In four of AH's inner experience samples, an affective process was ongoing outside of his direct experience (20%). All of his emotion samples involved inner words, either spoken or heard, with an emphatic tone. Three of these examples have already been described above. In sample 3.1, described in detail in Inner Speech section above, AH was saying "He's escaping!" with an emphatic tone, though he was not experiencing an emotion at the moment of the sample. In sample 3.3, described in detail in Sensory Awareness section above, AH was innerly saying "I'm hungry!" with an emphatic tone. He was not, however, experiencing an emotion at the moment of the sample. In sample 5.1, described in detail in Inner Speech section above, AH was innerly saying "Ugh!" with a strong emphasis indicating he found the color he was seeing repulsive. AH was

not experiencing feeling repulsed at the moment of the sample, however. Here is the other example:

> Sample 4.3. AH had been playing *2K11* (a basketball video game). At the moment of the sample, he was innerly hearing "*I want to win!!!*" The words were innerly heard in his own voice with a hyper-dramatic emphasis. He was also (but with much less emphasis) seeing the basketball on the screen.

Despite innerly hearing the words with a hyper-dramatic emphasis, AH was not experiencing any feeling at the moment.

Inner Speech

Four of AH's samples involved inner speech (20%). In all of these samples, the inner speech involved an emotional or emphatic tone. Here is an example:

> Sample 3.1. AH was watching the movie *Shawshank Redemption* and the warden had just asked the inmate, "well?" At the moment of the sample, AH was innerly saying, "He's escaping" (a fact known to AH because he had seen the movie before). This was said with some emotional emphasis.

In two of his inner speech samples, AH's innerly spoken words were commenting on some internal or external event. One example has already been described. In sample 3.3, described in detail in Sensory Awareness section above, AH was saying "I'm hungry!" In this sample AH was also feeling his lower abdomen grumbling, moving around, and tingling. At the moment, it was as if AH actively surveyed his body and came to the conclusion that he was hungry. Rather than automatically processing the grumbling of his abdomen, AH innerly commented on the process perhaps in an attempt to integrate the grumbling into his experience. Here is the other example:

Sample 5.5. AH was driving behind a white truck with a white horse trailer. At the moment of the sample, AH was thinking that he was going to be late. He innerly said, "I'm going to be late!" in an angry/frustrated tone. He also felt frustrated, which was experienced as a quivering sensation originating at the base of the back of his neck and fading outwards to his shoulders and down his spine. AH was also just beginning to sweat, which was experienced as a tingly and evenly spaced sensation across his forehead right along his hairline. He was also seeing the whiteness of the horse trailer (as opposed to the trailerness of the trailer), but this was the least salient aspect of his experience.

In this sample, it was as if AH had surveyed his environment and came to the conclusion that he would be late. Rather than automatically processing this notion, AH commented on it.

One of AH's inner speech samples was not clearly an inner speech sample. In this sample, AH was sighing:

Sample 5.1. AH was driving and, at the moment of the sample, he was staring at a trash can to his right. He was captivated by the blue color of the trash can, which was a bright blue of about medium hue. He was also seeing the symmetrical white lettering in the middle of the trash can, but his attention was directed at the blue color. He was innerly saying, "Ugh!" to himself in his own voice with strong emphasis indicating that he found the color repulsive.

Similar to samples 3.3 and 5.5 described above, the innerly said "Ugh!" involved an emphatic tone.

All of AH's inner speech samples, including sample 5.1 which is not clearly inner speech, are said with some kind of emotional tone. In fact, all inner words in AH's experience whether innerly spoken or heard (e.g., inner hearing sample 4.3) are emotionally charged in their expression, but not in experience. That is, even though AH's voice sounds emotional, he does not feel emotion at the moment.

Inner Hearing

In three of his inner experience samples, AH was experiencing inner hearing (15%). In sample 4.3, described in detail in the Emotion section above, AH was innerly hearing "*I want to win!!!*" with a hyper-dramatic emphasis. His other two inner hearing samples involved an echo or rehearing of something that he had already heard. Both examples have already been described. In sample 2.1, described in detail in Sensory Awareness section above, AH was innerly hearing a "faded version" of the text message notification sound. In sample 4.1, described in detail in Multiple Experience section above, AH was innerly hearing beeps of a McDonald's machine. The innerly heard beeps were a rehearing or echo of a series of beeps he had actually heard a few seconds prior.

Feeling

Three of AH's inner experience samples involved feelings (15%). Two of his feeling samples included strong bodily sensations. Here is an example:

> Sample 2.3. AH was taking a test for a music class online and had been looking through his music book trying to find the answer to the question *around what year did white and black gospel differentiate?* At the moment of the sample, he was looking at the time indicator on his computer that showed he had only five

minutes left to complete the exam. The notion of having only five minutes to complete four questions was in his experience without words, images, or any other symbolic representation. More centrally in his experience he was feeling nervous, experienced as "nerves shaking" concentrated around his spine in his lower back. "Nerves shaking" meant multiple tingling sensations along and near his spine, more or less the kind of sensation that could be produced by fingers that were softly and lightly independently drumming rapidly inside and outside of his lower back area. The feeling gradually faded away as it moved away from his spine in his lower back but did not reach his extremities or the front of his trunk.

In this sample, AH was feeling nervous which was experienced as tingling sensations along his spine. Similarly, in sample 5.5 described in detail in Inner Speech section above, AH felt frustrated which was experienced as a quivering sensation originating at the base of his neck. In these samples, it was difficult to tell if AH's feelings were manifested as bodily sensations or whether AH primarily experienced the bodily sensations and then concluded that he must be experiencing a feeling.

One of AH's feeling samples did not include a clear example of feeling. In sample 2.2, described in detail in Unsymbolized Thinking section above, AH was experiencing a slight mental feeling of pressure. Whether or not "pressure" should be considered feeling is difficult to determine and dependent upon one's definition of feeling. That is, pressure is not a feeling in the same way as happy, sad, and frustrated are feelings.

Not Semantic Words

In three of his samples, words were present in AH's experience; however, the meanings of the words were not. In sample 3.4, described in detail in Sensory Awareness section above, AH was drawn to the word "Ketchup" but was not cognizant at all of its semantic nature. That is, he was drawn to the visual display (which could be said to be the word "ketchup") but it was not a word that drew his attention—it was rather something that was seen. In sample 5.1, described in detail in Inner Speech section above, AH was seeing lettering on a trash can but the meaning of the lettering was not in his experience at the moment (he was attending to the blue color of the trash can and the whiteness of the letters, not the wordness of the letters). In sample 4.2, described in detail in Sensory Awareness section above, AH was attending to the font, boldness, and black color of the $50 on the McDonalds' *Monopoly* game board. Although AH was attending to the visual characteristics of the $50, he did have some thinking that he could actually win fifty dollars. It is hard to determine if this sample is semantic or not semantic—that is, it is partially not semantic and partially semantic. Thus this sample was counted as .5 for a total of 2.5 not semantic samples (13%).

Infrequently Occurring Characteristics

Inner seeing.

AH's inner experience involved two samples of inner seeing (10%). In sample 2.4, described in detail in Unsymbolized Thinking section above, AH was looking for a pair of pants and was innerly seeing clothes hanging on a hanger. Here is the other example:

Sample 4.4. AH was playing the video game *2K11* and his character (Michael Jordan) was shooting foul shots. At the moment of the sample, AH was seeing the number 23 on Michael Jordan's jersey on the screen. The most prominent aspect of his experience was innerly seeing Michael Jordan doing the "jumpman" dunk. He was seeing Michael Jordan (wearing his red jersey with white stripes and the number 23 in black) in the air with his right arm extended forward and legs spread apart. He was seeing this from the side as if he was sitting in the bleachers and Michael Jordan was dunking in the basket to AH's right; his back was toward AH. The inner seeing was still.

Anticipation.

In one of his samples (5%), AH was experiencing a sense of something to happen. In sample 2.2, described in detail in Unsymbolized Thinking section above, AH was thinking about what he had to do next. He also had a sense that he had a lot of homework to do.

Discussion

Overall, AH seemed to be a motivated DES participant. He was interested in the process of exploring inner experience as well as his inner experience. AH frequently experienced sensory awareness, unsymbolized thinking, and multiple experiences.

CHAPTER 6

"BP"

BP was an 18-year-old African-American female who sampled with us in October and November of 2010. She received a laterality quotient of -75 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) indicating she is strongly left-handed. She received a GSI raw score of 0.53 (a T-score, compared to nonpatients, of 59) on the Symptom Checklist-90-R (SCL-90-R; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the lack of clinically significant psychological difficulties.

Characteristics of Inner Experience

BP sampled on five separate occasions, collecting a total of 25 samples. Because Sampling Day 1 is considered training for the participants, 20 of BP's samples counts her inner experience characteristics. The following characteristics will be discussed: inner speech, occurring in 8 samples (40%); sensory awareness, occurring in 5 samples (25%); not semantic words, occurring in 5 samples (25%); unsymbolized thinking, occurring in 3 samples (15%); happening of, occurring in 3 samples (15%); inner hearing, occurring in 2 samples (10%); words present, occurring in 2 samples (10%); infrequently occurring characteristics; and noteworthy characteristics.

Inner Speech

Inner speech was the most frequently occurring characteristic in BP's inner experience, occurring in 8 of her 20 samples (40%). All of BP's inner speech samples consisted of her own voice. Five of BP's inner speech samples involved innerly saying a statement. Here is an example:

Sample 2.4. BP had been looking at one of two triangles on her classroom board and had realized she was looking at the wrong triangle. At the moment of the sample, she was innerly saying "I was focusing on the wrong triangle." She was also seeing the correct triangle on the board.

In this sample, BP's inner speech similar to outer speech.

Two of BP's inner speech samples involved innerly asking a question. Here are the examples:

Sample 2.6. BP had read a Twitter post that said the singer Faith Evans died when the rapper Notorious B.I.G ("Biggie") died. At the moment, BP was innerly saying "Did she really?" The innerly spoken words conveyed the message that BP did not believe what the post had said.

Sample 5.5. BP was innerly saying "Why is he still talking about the same thing?" referring to her teacher. There was nothing else in her experience.

One of her inner speech samples involved a recollection:

Sample 5.1. BP was driving and saw a little girl walking with a violin. At the moment, BP was seeing the little girl. She was seeing all of the little girl and not paying attention to any particular aspect of her. BP was also innerly saying "I remember when I played the violin."

One of her inner speech samples involved an inner speaking and a separate inner hearing of unrelated phenomenon:

Sample 4.2. BP had heard a Brian McKnight song, and, before the moment of the sample, she had been innerly hearing this song and innerly signing along to it. At the moment, she had stopped singing and was innerly saying "I know the beeper

is about to go off." This was a declarative, flat sentence that was as clear as if she had said it out loud. The meaning of the innerly said words were in BP's experience. The sentence was about BP—about what she knows—and not the beeper—when it will go off. At the same time, BP continued innerly hearing the Brian McKnight song. She was not innerly singing at the moment of the sample.

One of BP's inner speech samples involved an attempt at problem solving:

Sample 2.2. BP had been doing her math homework on the computer. At the moment, she was innerly saying "196 plus ___," where the blank would eventually hold the solution to the problem. She was aware of how the solutions should visually look; that is, she was trying to create a solution that *looked in the right way*, not a solution that followed some rule or that followed some verbal instruction. And by "looked in the right way" we mean that it had the proper visual characteristics. That is, if she were performing a sum, she would create a column of numbers, not because the rule says to create a column but because she had learned that when solving this kind of problem, you have to create something that looks like a column of numbers. So far it only involved "196 plus___."

Sensory Awareness

BP's inner experience consisted of five sensory awareness samples (25%). All of her sensory awareness samples involved the sensory awareness of words/letters/numbers. We have already seen one example, sample 2.2 described in detail in Inner Speech section above. In this sample, BP was aware of the visual characteristics of a solution. The solution itself was not in her experience; however, she was aware of what it should

look like. Two other sensory awareness samples involved attending to the visual characteristics of seen words:

> Sample 4.4. BP was looking at a list of songs on the computer screen as the songs were being downloaded. In her experience, she was attending to the visual characteristics of the display as it scrolled up. She was absorbed in the way the list looked. She was not attending to the list for what it represents.
>
> Sample 5.3. BP was reading a page in her UNLV Planner. At the moment, she was seeing the phrase "feeling more confident and connected." BP was seeing all of the words in the phrase without understanding. BP understood that the meaning would come to her later; however, at the moment of the sample the meaning was not present, she was just seeing the words.

BP's other two sensory awareness samples involved attending to the auditory characteristics of heard words. Here are the examples:

> Sample 4.1. Her grandmother was talking about not wanting Sarah Palin's daughter to be on the Dancing with the Stars anymore, but at the moment her words as a meaningful sentence was not part of BP's experience. Instead, BP was hearing the vocal/auditory characteristics of her grandmother's voice. That the voice was speaking meaningful words was not relevant—only the sound of the voice.
>
> Sample 5.4. BP was listening to her teacher talk about the government being a hard job. In her experience, BP was tracking the vocal expression patterns of the words he was saying. BP was not tracking the meaning of the words. BP had

somehow zeroed in on the words “hard job” but recognized them as objects of emphasis and not for content.

In all of these samples, the meanings of the written or spoken words were not in BP’s awareness at the moment of the sample. All that she was attending to was the sensory quality of the words.

Not Semantic Words

BP’s inner experience consisted of a rare phenomena relating to words. In five of BP’s samples, words were present; however, BP was not attending to the words for their meaning. All five of her samples involved the sensory awareness of words either seen or heard (25%). In these samples, BP was attending to either the auditory/vocal and visual characteristics of words rather than attending to their meaning. Three of these samples involved attending to the visual characteristics of words. For example, in sample 2.2 described in detail in Inner Speech section above, BP was trying to create a solution that had the proper visual characteristics. She was not aware of the solution itself, she was only aware of how it should look. In sample 4.4, described in detail in Sensory Awareness section above, BP was attending to the visual characteristics of a list of songs on the computer screen. In sample 5.3, described in Sensory Awareness section above, BP was seeing a phrase in her planner; however, the meaning of the phrase was not in her experience. Two of these samples involved attending to the auditory characteristics of words heard. In sample 4.1, described in detail Sensory Awareness section above, BP’s grandmother was talking and BP was attending to the vocal/auditory characteristics of her grandmother’s voice. In sample 5.4, described in detail in Sensory Awareness section

above, BP was tracking the vocal expression patterns of her professor's speech; she was not attending to the meaning of the words he was saying.

Unsymbolized Thinking

Unsymbolized thinking occurred in three of BP's samples (15%). Here are examples:

> Sample 4.5. BP was reading a status on Twitter. At the moment, she was reading "I miss having a best friend." The meaning of this sentence was immediately, automatically a part of the reading process. She was also thinking that she misses seeing her best friend. This was a thought without words, images, or any symbolic representation.
>
> Sample 4.6. She had just read a Facebook status and was in the act of clicking the *Like* button. At the moment of the sample, she was still thinking about what the status had said. The act of clicking the *Like* button was not in her experience.

In this sample, BP was thinking about the status she had read on Facebook earlier, the thought did not include any characteristics.

One of BP's unsymbolized thinking samples involved the unfolding of words, BP experienced the words unfolding or coming to her rather than her creating the words. Here is the example:

> Sample 3.1. Before the moment of the sample, BP had thought about and figured out what she was going to say in a phone claim to replace her grandmother's phone. At the moment of the sample, she was typing the phrase *it won't go to another screen unless* (the beep sounded as she was typing the word *unless*). The notion *it won't go to another screen unless* was present in her experience;

however, the words themselves were not in her experience. The thought was unfolding as she was typing the words, but it seemed there were no words in this thought—that is, there was a temporal unfolding of the thought in synch with the typing of the words, but the experienced thought did not, apparently, include the words rather it only included the idea the words represented. She was also aware of typing with the intention of creating the words; she was not experiencing the physical aspect of the typing.

Happening Of

In three of BP's samples, there was an ongoing phenomenon; however, BP was not actively involved in the creation of the phenomenon (15%). In these samples, she was more of an observer. Two examples have already been described above. In sample 2.2, described in detail in Inner Speech section above, BP was innerly saying a math problem and waiting for the solution to visually appear. BP was not actively involved in creating the solution, experientially, she was just waiting for the solution to come to her and look the right way. In sample 3.1, described in detail in Unsymbolized Thinking section above, BP was typing the sentence *it won't go to another screen unless*. At the moment, BP was seeing the sentence unfolding on the screen. Here is the other example:

Sample 3.3. BP had been wondering if there was something wrong with the beeper. At the moment, she was thinking *I started it this morning*. The specific words were present in BP's experience sequentially, that is they seemed to present themselves to her one after the other. However they were not innerly spoken, heard, or seen. In her experience, the words were presenting themselves to BP and she was not creating them.

In these samples, BP was not experiencing herself as the creator of the words rather she was more of an observer. The words were just happening.

Inner Hearing

Two of BP's samples involved inner hearing (10%), one of which was of her own voice, a relatively rare phenomenon in right-handed people. One example of inner hearing has already been discussed in Inner Speech section above: in sample 4.2, BP was innerly hearing a Brian McKnight song. BP's other sample of inner hearing involved the hearing of her own voice:

> Sample 2.3. BP was in her math class. At the moment, she was innerly hearing "is my calculator in degrees?" in her own voice. She was confident that the experience was of *hearing* her own voice (as if played back by a tape recorder) rather than *speaking* in her own voice (talking into a tape recorder). She was also reaching for her calculator but that was not in her experience.

Words Present

In two of BP's samples, there were specific words present in her experience (10%); however, the words themselves were not presented in any symbolic representation. One example, sample 3.1, has already been described in detail in Unsymbolized Thinking section above. In this sample, the notion *it won't go to another screen unless* was present as she was typing the words; however, the words themselves were not present in her experience. In sample 3.3, described in detail in Happening Of section above, the words *I started it this morning* were sequentially presenting themselves to BP. However, the words were not innerly spoken, heard, or seen.

Infrequently Occurring Characteristics

Multiple experience.

Only one of BP's samples involved multiple experience (5%). In sample 4.2, discussed in detail in Inner Speech section above, BP was innerly saying "I know the beeper is about to go off" and innerly hearing a Brian McKnight song.

Computing.

In one of her samples, BP was involved in mental calculation (5%):

Sample 2.1. BP had just dropped off her grandmother at work and was driving. She had been thinking about her ex-boyfriend's cousin and was wondering how old she was when she had her child. At the moment of the sample, the idea *was she pregnant when she was sixteen?* was in her experience without words, images, or any other symbolic representation. BP was calculating how old her ex-boyfriend's cousin was when she had her child.

Doing of.

In one of her samples, sample 3.1 described in detail in Unsymbolized Thinking above, BP was typing a sentence (5%). At the moment of the sample, BP was experiencing the act of typing—that is, this was not just happening. BP was aware of the act of typing with the intention of creating the words on the screen.

Words spoken out loud.

One of BP's samples involved saying something out loud to herself (5%). Here is the example:

Sample 3.2. BP had been trying on pants and looking in the mirror at herself from a sideways stance. At the moment of the sample, she was seeing her whole self in

the mirror. She was also saying out loud to herself, "I like these," in reference to the pants.

Listening with comprehension.

One of BP's samples involved listening with comprehension—that is, BP was following along and attending to the meaning of spoken words (5%). Here is the example:

Sample 4.3. BP was watching an interview on TV with the singer Robin Thicke. At the moment, BP was absorbed in the interview. She was being carried along by the interview, what the interviewer was asking and Robin Thicke's responses. In this sample, the meaning of the sentences was immediately present as she heard them; this is distinctly different from sample 4.1 (discussed in detail in Sensory Awareness section above), where the meaning did not accompany the words.

Noteworthy Characteristics

Feelings.

BP did not have any experience of feelings in her samples. Furthermore, the presence of emotion without being directly experienced did not occur in her inner experience either.

Discussion

BP seemed to be a motivated DES participant. BP had a difficult time elaborating on her individual samples. However, overall, her samples seemed to be more straightforward and less complicated than the other participants in this study. Her most frequently occurring characteristic was inner speech (40%). She also experienced

sensory awareness and not semantic words frequently. BP did not have any experience of feeling nor did any of her samples involve an ongoing affective process.

CHAPTER 7

"CL"

CL was an 18-year-old Caucasian female who sampled with us in September and October 2010. CL received a laterality quotient of -75 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971); indicating she is strongly left-handed. She received a GSI raw score of 0.005 (a T-score, compared to nonpatients, of 30) on the Symptom Checklist-90-R (SCL-90; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

CL sampled on five separate occasions, collecting a total of 21 samples. Because Sampling Day 1 is considered training for the participants, 18 of CL's samples counts her inner experience characteristics. The following characteristics will be discussed: sensory awareness, occurring in 7 samples (39%); feeling, occurring in 6 samples (33%); inner seeing, occurring in 6 samples (33%); anticipation, occurring in 4 samples (22%); listening with comprehension, occurring in 2 samples (11%); inner speech, occurring in 2 samples (11%); emotion, occurring in 2 samples (11%); and infrequently occurring characteristics.

Sensory Awareness

Sensory awareness was the most frequently occurring characteristic of CL's inner experience, occurring in seven of her samples (39%). Two characteristics emerged in CL's sensory awareness samples, including attending to a bodily sensation and attending to the sensory characteristics of an innerly seen image.

Two of CL's sensory awareness samples involved paying attention to a bodily sensation. Here are the examples:

> Sample 3.1. CL was sneezing. In her experience, she was innerly saying the words, "I'm sneezing," in her own voice in a matter-of-fact tone. She was also experiencing the sneezing sensation in her nose and squinting eyes.
>
> Sample 3.2. CL was taking a shower. At the moment of the sample, her eyes were stinging and she was annoyed. The annoyance was a mental annoyance. Both the stinging and the annoyance were simultaneously experience, the stinging more prominent.

In both of these samples, CL was attending to the sensory qualities of some bodily experience (sneezing sensation in nose and squinting eyes, stinging in eyes).

Two of CL's sensory awareness samples involved attending to the sensory characteristics of an innerly seen image. Here is an example:

> Sample 2.3. At the moment of the sample, CL was innerly seeing herself in her English class. She was seeing this from her own perspective, as if she were sitting in her class. She innerly saw her paper, saw her notebook curved to the left on the table, her blue sharpie pen on the left, and her left hand. She also saw the classroom walls in her periphery. Something about the ugliness of the whitish/yellowish wall color was present in her awareness; however, she was mostly attending to the paper, pen, and her hands.

In this sample, CL was drawn to the ugliness of the whitish/yellowish classroom wall color.

Feeling

Feeling was found in six of CL's inner experience samples (33%). Four of her samples involved a mental feeling. One example has already been described in detail in Sensory Awareness section above. In sample 3.2, CL was taking a shower. At the moment of the sample, CL's eyes were stinging and she was annoyed. The annoyance was a mental annoyance that was simultaneous to but less salient than the stinging. Here are other examples:

> Sample 2.1. At the moment of the sample, CL was worried. This was a powerful mental experience that was contained within the mental realm—that is, CL understood herself to be feeling not thinking, and there was no experienced bodily aspect.
>
> Sample 4.2. CL had completed a math problem on the computer and the math program had just indicated to her that her answer was incorrect. At the moment of the sample, CL was innerly saying "what!?!" to herself in her own annoyed, frustrated, cock-sure voice, as if she knew the computer must be mistaken (although that was not explicitly being thought). She was also annoyed that the computer indicated she was incorrect. This was a mental annoyance. CL was unable to describe her feeling annoyed more than saying that it was occurring mentally. CL said that others would not have been able to recognize that she was annoyed. CL was both innerly saying "what!?!" in an annoyed way and feeling annoyed at the moment of the sample.

In this sample, the annoyance presented itself in two ways to CL, CL was innerly saying, annoyingly, "what" and more or less separately feeling annoyed. However, despite the

multiple presentations of the annoyance, CL was sure that observers would not have been able to recognize she was annoyed. That is, the experience of annoyance was contained within the mental realm.

In one of CL's feeling samples, she was experiencing curiosity. Whether curiosity should be called feeling is questionable. Here is the sample:

> Sample 3.4. CL had been thinking about the DES experiment and what the DES investigators expect to find in left-handers in general and particularly about CL herself. At the moment of the sample, CL was mentally curious. This curiosity was aimed at the DES experiment; however, the DES experiment was not in her experience at the moment of the sample. CL was under the impression that the thought content, about the experiment and her own participation, had been explicitly present a few seconds earlier, but had now passed, leaving a sense of curiosity but no particular content.

Unlike the abovementioned feeling samples, CL's other two samples of feeling involved some bodily manifestation of the feeling. Here is an example:

> Sample 2.2. CL had launched her Macintosh computer in the Windows mode by mistake; it was about to load the Windows screen. At the moment of the sample, CL was innerly seeing the screen of her Mac computer laptop. She was seeing the start bar on the side of the screen, a large "W" on the screen, and three large icons. She was also seeing the silver frame of the screen. She saw three icons, but the icons were not detailed enough to see the writing on them. She was seeing the screen straight ahead. This was an accurate rendition of the screen that would be coming on her real computer in a few seconds. CL was also experiencing a

bodily frustration located in the middle of her chest that was actively spreading outwards on both sides. The innerly seen image was more salient in her experience. Regarding her feeling, CL said she "felt it, but it wasn't that big of a deal."

In this sample, CL's feeling (frustration) was spreading from the middle of her chest outward. Similar to this, her other bodily feeling also involved movement. Here is the example:

Sample 2.4. CL was talking to a woman on the phone. The woman had helped CL come up with a solution for a problem CL was having. At the moment of the sample, CL was experiencing relief. This was experienced as the release of tension from her upper body as if a weight had been lifted off of her shoulders. She was also taking in what the woman was saying. The relief was more salient in her awareness.

Inner Seeing

Inner seeing occurred in six of CL's inner experience samples (33%). Here is an example:

Sample 5.1. CL had been looking in a magazine at a picture of a laptop case she wanted to purchase, trying to determine if her laptop would fit in it. At the moment of the sample, CL was innerly seeing her left hand placing her silver laptop into a laptop case that was black and white with polka dots. She was seeing the computer halfway into the case. She was also seeing the brown wooden kitchen table the computer was on and the white tile floor underneath the

table. She was not paying particular attention to the colors. The things seen were moving.

Four of her inner seeing samples included sensory awareness. One example, sample 2.3, has already been described in the Sensory Awareness section above. In this sample CL was drawn to the ugliness of the whitish/yellowish classroom wall color in her inner seeing. Here is another example:

> Sample 3.3. CL had told her sister, Amy, where to find quarters in her room. CL was innerly seeing the drawer of her dresser. She was seeing the drawer half open, seeing at the left side of the drawer a pink box with quarters and pennies, the orange lid to the pink box, and an empty perfume bottle. The pink box and orange lid were distinctively pink and orange. Something about their color was important. The inner seeing was in motion though nothing in the image was moving. The inner seeing was a simplification of what was actually in the drawer—that is, her real drawer has those things in it as she saw them, but also has other objects that were not included in the inner seeing. CL had a sense that she was seeing what Amy would see if she looked into the drawer, although this sense was not differentiated from the seeing itself. Simultaneously, CL was also expecting to hear Amy's voice (because CL knew that Amy would not be able to find the quarters). This was some kind of mental expectation, as if she knew that Amy would be calling out soon; that is, this was *not* a listening-for or perking-up-her-ears-for Amy's voice.

In this sample, CL was drawn to the pink and orange color of the innerly seen box.

Two of CL's inner seeings included involvement with her external environment. For example, in sample 2.2 described in detail in Feeling section above, CL was innerly seeing her computer screen in the way that would actually exist in her external environment, but was not yet in that state. Here is the other example:

> Sample 5.5. CL was putting makeup on in the bathroom. She heard the movie her sister had started playing in the living room. CL had seen this movie many times and, at the moment of the sample, CL was innerly seeing the scene that she was actually hearing. Her experience was of seeing the movie, with the dialogue and sounds being provided by the actual hearing. As far as she could tell, the innerly seen movie was identical to the actual movie (although she didn't claim they were identical—she simply didn't know of any differences). She was seeing an overcast scene with a girl walking and pulling off her wig on a corner with a taxi behind her. CL was innerly seeing what seemed to be all the details of the real movie scene. She was taking in the whole scene but mostly attending to the main character. She was also hearing the audio of the movie playing. So she was both innerly seeing the scene of the movie and hearing the actual audio from the movie.

In this sample, CL's inner experience is directly involved with her external environment.

Anticipation

In four of her samples CL was anticipating something happening (22%). In sample 2.2, described in detail in Feeling section above, CL was innerly seeing an accurate rendition of the screen that would be coming on her real computer in a few seconds. In sample 3.3, described in detail in Inner Seeing section above, CL was

expecting to hear her sister's voice, as if she knew her sister would be calling out for her soon. In sample 4.1, the frozen emotion described in detail in Emotion section below, CL was waiting for something to happen. In one of her samples, CL was anticipating finding something. Here is the example:

> Sample 5.2. CL was searching through her closet for a particular pair of shoes. She was visually looking for them. She was also mouthing (nothing audible in either her imagination or real world) words to a song playing on her iTunes; however, this was happening automatically and not in her experience. All that was in her experience was the searching for the shoes.

In this sample CL was actively searching for a pair of shoes in her closet.

Listening with Comprehension

In two of her samples (11%), CL was listening with comprehension. In sample 2.4, described in detail in Feeling section above, CL was talking to a woman on the phone and taking in what she was saying. Here is the other example:

> Sample 4.3. CL was talking to her friend, Christy, on the phone. At the moment of the sample, she was listening with comprehension to what Christy was saying. There was nothing else in her experience at the moment. When she surveyed herself after the moment, she discovered that she was calm in her body and shoulders, and was breathing deeply in relaxation (because of what Christy was saying), but that was not in her experience at the moment of the sample.

In these samples, CL was following along and taking in what was being said.

Inner Speech

Inner speech occurred two times in CL's inner experience (11%). Both samples involved CL's own voice. In sample 3.1, described in detail Sensory Awareness section above, CL was innerly saying "I'm sneezing," in her own voice. In this sample, CL was actively surveying, and commenting, on a bodily process rather than automatically integrating this process as part of her experience. Her other inner speech sample involved an emphatic tone. In sample 4.2, described in detail in Feeling section above, CL was innerly saying "what!?!" to herself in her own annoyed voice.

Emotion

During two of CL's inner experience samples, an affective process was ongoing; however, CL was not directly experiencing a feeling at the moment (11%). One example has already been described in detail in Listening with Comprehension section above. In sample 4.3, CL was calm and relaxed; however, she did not experience this at the moment. She only knew herself to be calm and relaxed after the moment of the sample when she surveyed her body. Here is the other example:

> Sample 4.1. CL had been doing her homework when a truck quickly pulled into her driveway and she had seen someone head for her garage. A wave of pure fear had overtaken her, but at the moment of the sample, she was in a suspended animation state, frozen, anticipating, waiting to hear something, as if her senses were oriented to anything that might happen in the garage, and she was waiting for something to happen. Apparently-the fear was suspended at the moment of the sample, so that at the exact moment of the sample nothing is experienced, an anticipatory void aimed at the garage.

In this sample, CL had been taken over by fear although, at the moment of the sample, the fear was frozen and not experienced. CL was somehow able to suspend her fear at the moment.

In both of these samples, there was a clear emotional state (calm and relaxed, fear) that had been experienced either prior to or would be experienced after the moment of the sample; however, at the moment, CL's experience did not include the feeling. Her feelings appear to be separate, and oftentimes secondary, characteristics that can be turned off and on at her will.

Infrequently Occurring Characteristics

CL had seven characteristics that each only occurred one time in her inner experience samples (6% each).

Not semantic words.

In one of her samples, words were present in CL's experience; however, the meanings of the words were not. In sample 5.3, described in detail in Words Present section below, CL's eyes were aimed at the word *magnificent*; however, the word or its definition were not in her experience at the moment of the sample.

Happening of.

In one of her samples, CL was drawing lines and attending to the drawing of the lines; however, the watching of the lines unfold was a happening kind of experience. Here is the sample:

Sample 4.4. CL was adding lines to a palm tree she had drawn. She was paying attention to the drawing of the lines and watching the lines unfold. Simultaneously, she was also wondering when the beeper would sound. This was

a thought without words, images, or any other symbolic representation. The palm tree was experientially more in her awareness than the wondering (an estimated ratio of 60:40).

This experience is unusual in the sense that, even though she was making the lines, it was as if the lines were coming out of her pen—that is, the lines were driving the pen, rather than the pen driving the lines.

Words present.

In one sample, words were present in CL's experience without any symbolic characteristics:

Sample 5.3. CL had been reading a magazine and looking at the word *magnificent*, the last word in a sentence. Her experience was of the word magnificent, not of the sentence that contained the word. At the moment of the sample, CL was innerly seeing a cartoon pink elephant. The elephant was seen from the right side, aimed towards the right but looking back at her. She was seeing the pink elephant with a black outline; the remaining of her imaginary visual field was black. The words *pink elephant* were also present in her experience, separately from the innerly seen cartoon pink elephant. The words were present in pink, bold letters without any spaces. The word *pink* and letter *e* in elephant were all capitals, **PINKElephant**. The words were present in her experience but, despite their visual characteristics (color, font, etc.), she was not innerly seeing them, hearing them, or saying them. CL said that, although she does not see the words *pink elephant*, she knew they were there in that way. Both the seeing of the cartoon pink elephant and the pink words pink elephant were

present in her experience at the same time but separately. Her eyes were still aimed at the word *magnificent*, but that was not in her experience at the moment. In this sample, the words *pink elephant* were present in CL's experience with specific visual characteristics; however, she was not seeing them (nor was she hearing them or saying them). That is, somehow the visual characteristics of the words were present to CL even though there was no visual experience of the words. That may seem impossible, but the investigators questioned CL carefully on this point, and this was the joint conclusion.

Focus on words (rather than sentences).

In one of her samples, sample 5.3 described in detail in Words Present section above, CL's eyes were aimed at a word (*magnificent)*, which happened to be the last word in a sentence. Her experience was of the word and not of the sentence that contained the word. During the expositional interview, CL was unable to recall the sentence that contained the word. CL's experience seems to be of words rather than sentences.

Multiple experience.

In one of her samples, CL was experiencing multiple, distinct phenomenon. In sample 4.4, described in detail in Happening Of section above, CL was drawing a tree and watching the lines unfold. Simultaneously, she was wondering when the beeper would sound.

Inner hearing.

CL's inner hearing sample involved innerly hearing a hummed version of a commercial tune:

Sample 2.5. CL was innerly hearing a hummed version of a commercial tune. It was as if a hummed, simplified version of the tune was replaying in her head. There were no words or instruments, just humming. She was experiencing this as if it were the commercial. She was not experiencing the doing of the humming, rather this was an inner hearing of the humming.

Unsymbolized thinking.

In sample 4.4, described in detail in Happening Of section above, CL was wondering when the beeper would sound. This was a thought without words, images, or any other symbolic representation.

Discussion

CL seemed to be a motivated subject. She expressed interest in DES and appeared to have gained clarity and self-awareness from the process. Most of CL's inner experience samples consisted of one characteristic. Sensory awareness, feeling, and inner seeing were her most frequently occurring inner experience characteristics.

CHAPTER 8

"DH"

DH was an 18-year-old Caucasian male who sampled with us in October and November of 2010. He received a laterality quotient of -73 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) indicating that he is strongly left-handed. He received a GSI raw score of 0.79 (a T-score, compared to nonpatients, of 67) on the Symptom Checklist -90-R (SCL-90-R; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the possibility of psychological difficulties. When comparing DH's GSI raw score to adolescent nonpatients he received a T-score of 56, however.

Characteristics of Inner Experience

DH sampled on five separate occasions, collecting a total of 30 samples. Because Sampling Day 1 is considered training for the participants, 24 of DH's samples counts his inner experience characteristics. The following characteristics will be discussed: sensory awareness, occurring in 11 samples (46%); inner seeing, occurring in 9 samples (38%); unsymbolized thinking, occurring in 7 samples (29%); inner speech, occurring in 7 samples (29%); not semantic words, occurring in 4 samples (17%); multiple experience, occurring in 4 samples (17%); emotion, occurring in 3 samples (13%); feeling, occurring in 1 sample (4%); infrequently occurring characteristics; and noteworthy characteristics.

Sensory Awareness

Sensory awareness was the most frequently occurring phenomenon in DH's inner experience, consisting of 11 samples (46%). Here are examples:

> Sample 2.6. DH was playing the guitar. At the moment of the sample, he was seeing his left hand and feeling the strings with his left hand to make sure his left

hand was in the right position. He was feeling the strings more than the looking (an estimated 70:30). He was also hearing the sound he was making as his right hand strummed. The seeing/feeling of his left hand was most salient in his experience (an estimated 70:30).

Sample 5.5. DH was looking down at the kitchen table at two magazines stacked on top of each other. At the moment of the sample, he was seeing a part of a man's arm in a photo on the bottom magazine. DH was mostly attending to the veins on the man's arm from the bicep down towards his hand, the way the veins bulged and their significance of muscularity.

Three of DH's sensory awareness samples involved the sensory awareness of words. Here are examples:

Sample 3.3. He had heard a song on the radio and had been trying to figure out what the song was. He had gone to Yahoo Search and typed in the portion of the lyric that he could remember. At the moment, he was seeing an array of bold and unbolded words on the computer screen. He was paying attention to the pattern of bolding, not to the meanings of the words that he was seeing. He knew the bolded words were the ones that he had typed, but that was not part of his experience at the moment; at the moment he was paying attention to the visual characteristics of the bolding/nonbolding. He was also experiencing what he called "gratification" because he knew the bolded words were what he was looking for. Rather than gratification being directly experienced, at the moment there was more a mental relief, an absence of the compulsion of needing to find

the song that had strongly existed earlier. The seeing of the bold and unbolded words was most salient in his experience (an estimated 70:30).

Sample 5.2. DH was writing the words *white dwarf* on a piece of paper. At the moment of the sample, he was paying visual attention to what he was writing. It was as if the writing was automatically coming out of him and he was visually monitoring the appearance of words. He was attending to how the words looked and not what the words represented or meant. He was also innerly saying, "what *is* the sun?" in his own voice. The written words were more salient in his experience (an estimated 80:20).

Similar to the samples just described, one of DH's samples involved the sensory awareness of a traffic signal. In this sample, DH was not attending to the signal for its meaning. Here is the example:

Sample 3.4. He had been driving over a bridge. At the moment, he was noticing the brightness of a red stop light as it emerged from being occluded by the bridge. He was attending to the glowiness of the stop light. He was also seeing the road around him but he was mostly attending to the glowiness of the stop light.

As mentioned above, sensory awareness was the most frequently occurring characteristic in DH's inner experience. The majority of his samples (8/11) were typical sensory awareness experiences; however, 3 of his 11 samples involved attending to the sensory qualities of words or symbols (sign in sample 3.4).

Inner Seeing

DH's inner experience involved nine samples of inner seeing (38%). Five of DH's inner seeing samples involved a seeing of something he had already seen, although the inner seeing transformed the original in some way. Here are examples:

> Sample 2.4. DH was on the couch with his eyes shut thinking about a movie he had watched a week ago. At the moment, he was innerly seeing two girls (characters from the movie) standing in a kitchen. He was seeing this as if he was standing in the kitchen with them, he recognized himself as being in the scene. The girls were standing close together facing DH (though he could not see any aspect of himself). The seeing was a still image and in color. This was an accurate recreation of a scene from the actual movie, with the exception of DH's presence. He was also thinking *how sad* without words, images, or any other symbolic representation.
>
> Sample 3.6. DH had been studying. At the moment, he was innerly seeing two arrows. He was seeing a red arrow point up to the left and a blue arrow point down to the right. The arrows were both bent outwards in the center similar to the recycling logo (except the recycling logo is gradually curved whereas the seen arrows were rather sharply bent). He was seeing the arrows against a black background. The heel of each of the arrows seemed to "fade" or disintegrate in both color and form. There was some sense of the meaning of the arrows. This was a seeing of what he had seen before, though the original arrows were straight up and down, not bent, and without fading or disintegrating.

Sample 4.4. DH was looking in a magazine at an advertisement for a wristwatch. Before the moment of the sample, DH had been innerly saying "My dad has the same exact watch but nicer," (referring to the fact that the advertised watch has a leather band whereas his father's watch has a stainless steel band). At the moment, he was seeing the wristwatch as he had seen it in the magazine, except that now his inner seeing had replaced the leather band, which was wrapped around a model's wrist, with a stainless steel band similarly wrapped. Thus he saw the magazine wristwatch advertisement (but what he saw had had the band replaced). He was seeing the watch with a stainless steel band in the same position and orientation of the original leather band. Simultaneously, the thought that his father's watch was nicer was still in his experience; the meaning continued on in his experience (that is, half the meaning of the original sentence somehow continued on) but the words were no longer present.

Sample 5.6. DH had just finished having a conversation with his sister, Jamie, in which she indicated if she had to die she would rather drown than be stabbed. DH had disagreed with Jamie and was walking away from her. At the moment, he was innerly saying, "You're nuts." The words were innerly spoken in a mostly irritated and also comical way (60:40). DH was not feeling irritated at the moment; that is as far as he knew if it had not been for the characteristics of his voice, there would have been no indication of irritation at all. Simultaneously, he was innerly seeing a scene from the movie *Saving Private Ryan*. DH was innerly seeing a man in a green suit laying on top of another man, trying to stab him with a knife. The man on the bottom was struggling against his attacker with his

hands. The seeing was in motion. The only colors DH was seeing was the green uniforms and the pale white faces of the men. The whiteness of the faces was unrealistic and more pale in nature than what would be in real life. It was as if the seeing were incompletely colored, not that he was focused on the incompleteness but that most of the scene was in black and white except for the green of the uniforms. DH was seeing this from an angled perspective, he was seeing the rear left side of the man on bottom and right side of the man on top.

One of his samples involved innerly seeing himself:

Sample 3.5. DH had been talking to his mom about taking a new class at the gym. At the moment, he was innerly seeing a vivid and still picture of himself jiu jitsu fighting another male, Tommy. DH was seeing himself with his back on the floor with Tommy up on his knees and on top of DH. Tommy's body was parallel to DH's. DH was wearing a yellow belt and white gi, and Tommy was wearing a blue gi. DH was seeing this image from a viewpoint closer to his feet (in the image). He was seeing the right side of his body and the left side of Tommy's.

Here is a visual image that may have significance for understanding the visual experience of left-handed individuals:

Sample 3.1. DH had been irritated because he needed to use the bathroom and his sister, Olivia, was occupying it, brushing her teeth. At the moment, he was thinking *its taking her so long* without words, images, or any symbolic representation. He was also hearing Olivia brushing her teeth. He was also innerly seeing Olivia's reflection in the mirror brushing her teeth. This was an

illustration of what he was hearing. He was seeing Olivia as if she were bent over and her face near the mirror. He was seeing Olivia with pimples, greasy hair, and a grey shirt brushing her teeth. He was seeing more of the right side of her face. He was only seeing Olivia's reflection, however (not her face and body that were being reflected). The thought was more salient in his experience (an estimated 60:40).

In this experience, he innerly saw Olivia's reflection, not Olivia herself. Although it is unknown why he would do that, it is worth noting that seeing the reflection reverses Olivia's seen handedness.

Unsymbolized Thinking

Unsymbolized thinking occurred in seven of DH's samples (29%). Six of his unsymbolized thinking samples were straightforward. Two examples have already been described in detail in Inner Seeing section above. In sample 2.4, DH was thinking *how sad* without words, images, or any other symbolic representation. In sample 3.1, DH had been waiting for his sister to finish brushing her teeth so that he could use the bathroom. At the moment, the thought *its taking her so long* was present without words, images, or any symbolic representation. Here are other examples:

Sample 2.1. DH was watching TV. He was paying attention to the appearance of a woman's hair on the screen ("it had a weird design on it"). He was also thinking that her hair was odd. This was a thought process that did not involve words, or comparisons, or any other symbolic representation. At the moment of the sample, he was both seeing the oddness of the woman's hair and thinking that her hair is odd.

Sample 2.5. DH was feeling the edge of his ipod headphones, tracing them to find the end. At the moment of the sample, he was wondering *where is the end of it*, this thought was present without words, images, or any other symbolic representation. He was also feeling the wires though the thought was more salient in his experience (an estimated 70:30).

Sample 5.1. He had been looking for a can of soda and eliminating places of where it could be. At the moment of the sample, DH was wondering where his soda could be. This was a thought process that did not involve images, words, or any symbolic representation. The soda itself or the places it could be were not in his experience at the moment. He had a pill in his mouth and was experiencing a light weight on the middle of his tongue. He was also physically looking for the soda; however, this was not in his experience at the moment.

One of DH's examples involved a lingering thought. In sample 4.4, described in detail in Inner Seeing section above, DH had innerly said "My dad has the same exact watch but nicer" prior to the sample. At the moment of the sample, the words were no longer present; however, the idea was still in DH's experience.

Inner Speech

Inner speech occurred in 7 DH's 24 samples (29%). All of DH's inner speech samples consisted of his own voice. Here is an example:

Sample 5.3. DH had been looking at a five-point star he had drawn in his notes earlier indicating that the section in his notes was important. At the moment, DH was seeing the five-point star. He was also saying, "H e Flare" (as in helium flare). Before the moment of the sample, he had been repeating the words "H e

Flare." At the moment of the moment of the sample, he was saying one unit of the "H e Flare" repetitions. He was attending more to the sound of the words. What the words refer to was not in his experience at the moment. That is, the star had indicated that this was important, and he was repetitively saying the words over and over. But he was not thinking about or attending to what the words meant. It was as if the repetition of the word sounds was all that was ongoing. In this sample, DH was attending to the sound of the innerly spoken words and not the meanings.

Three of DH's inner speakings involved an emotional or emphatic tone. One example has already been discussed in detail in Inner Seeing section above. In sample 5.6, DH was innerly saying, "You're nuts" in an irritated, comical way. Here is another example:

Sample 3.2. He had been doing homework simulations on the computer. He had been trying to make a rat press a lever by shocking him. At the moment, he was innerly saying, "Why aren't you!?!?" DH was saying this in a powerful, almost yelling, tone which represented his frustration though he was not experiencing frustration at the moment. This inner speech conveyed DH's wondering about why the rat was not moving to the right. DH was also noticing the rat was facing the wrong direction on the screen, the rat was facing the left and the lever was to the right. DH was frustrated, and his inner speech conveyed frustration, but he did not experience frustration at the moment.

In two samples, DH was innerly speaking; however, he did not seem to be the agent of his inner speaking. Here is an example:

> Sample 4.3. DH had been writing his experience in sample 4.2 in his notebook. At the moment, he was innerly seeing the same image as he was seeing in sample 4.2. Most of his attention was focusing on himself having the image, a cognitive process or an examination of the extent to which he had been experiencing the image at the moment of sample 4.2. At the moment, he was innerly saying "50 vision," meaning that 50% of his attention had been aimed at the image. The inner speaking was happening automatically. That is, he had little or no experience of the creation of the speaking, although he had experience of the speaking itself. .

Not Semantic Words

In four of DH's samples (17%), words were present but he was not attending to the words for their meaning. These examples have already been described above. In sample 3.3, described in detail in Sensory Awareness section above, DH was seeing an array of bold and unbolded words on the computer screen. DH was not attending to the words for their meaning, rather he was attending to them for their visual characteristics. In sample 3.4, described in detail in Sensory Awareness section above, DH was noticing the brightness of a red stop light and was not paying attention to the meaning of the stop light. In sample 5.2, described in detail in Sensory Awareness section above, DH was writing the words *white dwarf*. DH was attending to the visual characteristics of the words and not the meaning of the words. In sample 5.3, described in detail in Inner

Speech section above, DH was innerly saying "He Flare." He was attending more to the sound of the words than their meaning.

Multiple Experience

Four of DH's samples involved multiple experience (17%). In these samples, DH was experiencing separate and unrelated stimuli simultaneously. For example, in sample 5.1 described in detail in Unsymbolized Thinking section above, DH had been thinking about where his soda could be. Simultaneously and unrelated to the thought, DH was also feeling a pill on his tongue.

Emotion

In three of DH's samples, there was an ongoing emotion (13%) but DH was not directly experience the feeling. These examples have already been described above. In sample 2.4, described in detail in Inner Seeing sample above, DH was thinking *how sad*; however, he was not experiencing sadness at the moment. In sample 3.2, described in detail in Inner Speech section above, DH was innerly saying "Why aren't you!?!?" in a powerful tone representing his frustration, though he was not experiencing frustration at the moment. In sample 5.6, described in detail in Inner Seeing section above, DH was innerly saying "You're nuts" in an irritated and comical way though he was not feeling irritated at the moment.

Feeling

DH's inner experience rarely involved feeling, only one of his samples involved the direct experience of an emotion (4%):

Sample 4.2. DH had been watching the World Series baseball game. At the moment, he was innerly seeing the pitcher from the chest up, seeing the right side

of the pitcher's torso and face. Mostly DH was seeing the pitcher's eyes, they were bright blue and watery (as if he was going to cry). This inner seeing was an accurate re-seeing of what had appeared perhaps five minutes earlier on TV, except that the inner seeing was a still screen shot (as if it were one frame from the original viewing). DH was also innerly saying, "that sucks." This was in his own voice and said with a drawn-out empathic tone. DH was also feeling empathy for the pitcher. This was mostly experienced mentally and (perhaps) partially experienced as a pulling-downward in his face.

Three other samples might be marginally considered feelings by a broad definition of that term. In sample 3.3, described in detail in Sensory Awareness section above, DH was experiencing gratification or mental relief, an absence of a compulsion he had been experiencing prior to the beep. Whether one should call the lack of something that had previously been ongoing an experience is questionable; if so, then sample 3.3 might be called a feeling. Here is another example:

Sample 4.1. DH was driving home. He had just picked up food and was singing his own "private remix" of a Blink 182 song. That is, he was adding and changing words to the song. At the moment, he was singing, "I can't wait 'til I get home." He was singing the song from Blink 182's perspective. DH was singing the song as if transported into the Blink 182 persona. He was also experiencing anticipation to get home. This was a mental anticipation or "compulsion" to get home, DH would not feel peace until he ate. That is, it was as if the need/want to eat imposed itself actively on DH; that is, the urge to eat

was a being-done-to experience, not an active experience. The singing was more salient in his experience (an estimated 70:30).

If mental anticipation or "compulsion" to get home is considered an emotion, then sample 4.1 is a feeling. Here is the other example:

> Sample 4.5. He had read something funny on Facebook. At the moment, he was having a reaction to a statement, a reaction that the statement was ridiculous, which, if put into words, would be something like *Nah!* or *No way!* or *Yeah, right!* This was a mental, automatic reaction to the statement that seemed to come to him, rather than being created by him. That is, DH understood this reaction as being much more similar to the *I have to eat* compulsion of sample 4.1 aforementioned than to the *my father's watch is nicer* thinking of sample 4.4 (described in detail in Inner Seeing section above), and he understood the similarity to 4.1 as that the reaction was experienced as being done to him rather than his creating the reaction. DH was also smiling, though that was not in his experience at the moment.

If noticing ridiculousness can be considered an emotion, then sample 4.5 can be considered a feeling.

Infrequently Occurring Characteristics

Doing of.

In three of his samples, DH was engaged in the completion of an activity (13%). In sample 2.6, described in detail Sensory Awareness section above, DH was feeling the strings of his guitar to make sure his hand was in the right position. In sample 4.1, described in detail in Feeling section above, DH was singing a song from the perspective

of the band who sings the song. In sample 5.2, described in detail in Sensory Awareness section above, DH was visually monitoring the appearance of the words he was writing.

Happening of.

In two of his samples, DH had little or no experience of the creation of an activity—that is, the activity was just happening (8%). In sample 4.3, described in detail in Unsymbolized Thinking section above, DH was innerly saying "50 vision"; however, he had little or no experience of the creation of the inner speaking. In sample 5.2, described in detail in Sensory Awareness section above, DH was writing the words *white dwarf*. He was attending to the visual presentation of the words and not the writing—that is, the writing was automatically happening.

Anticipation.

One of DH's samples involved an anticipatory state (4%). In sample 4.1, described in detail in Feeling section above, DH was experiencing a mental anticipation to get home.

Inner hearing.

One of DH's samples involved inner hearing (4%). In this sample, DH was innerly hearing a song:

> Sample 4.6. DH had been looking at a picture of Mario Brothers' characters on his computer screen with a solicitation to add a caption to the picture. At the moment, he was innerly hearing the Jaws theme song, which was seeming to him as being a good caption. He was also seeing the picture on the screen. The inner hearing was most salient in his experience (an estimated 60:40).

Noteworthy Characteristics

Words.

DH had seven inner speakings, which are quite similar to the inner speakings of right-handed people. In one sample, DH had an inner speaking that was outside of his experience—that is, the inner speaking was just happening. DH did experience inner hearing in one sample. In this sample, he was innerly hearing a song (the theme song to *Jaws*). Three of DH's sensory awareness samples involved the sensory awareness of words. In these samples, words were present; however, DH was attending to them for their auditory of visual characteristics and not for their meaning.

Discussion

Overall DH seemed to be a motivated DES participant. He was interested in the process of exploring inner experience as well as his inner experience. DH frequently experienced sensory awareness, inner seeing, unsymbolized thinking, and inner speech.

CHAPTER 9

"NT"

NT was a 28-year-old Biracial (Caucasian/Asian) male who sampled with us in January and February 2011. NT received a laterality quotient of -68 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) indicating he is left-handed. He received a GSI raw score of 0.19 (a T-score, compared to nonpatients, of 50) on the Symptom Checklist-90-R (SCL-90-R; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

NT sampled on five separate occasions, collecting a total of 27 samples. Because Sampling Day 1 is considered training for the participants, 23 of NT's samples counts his inner experience characteristics. The following characteristics will be discussed: sensory awareness, occurring in 16 samples (70%); not semantic words, occurring in 10 samples (43%); multiple experience, occurring in 10 samples (43%); doing of, occurring in 8 samples (35%); unsymbolized thinking, occurring in 3 samples (13%); emotion, occurring in 2 samples (9%); anticipation, occurring in 2 samples (9%); inner seeing, occurring in 2 samples (9%); feeling, occurring in 1 sample (4%); and noteworthy characteristics.

Sensory Awareness

Sensory awareness occurred in 16 of NT's samples (70%), which suggests that sensory awareness is highly characteristic of NT's inner experience. Here are typical examples of sensory awareness:

Sample 3.1. NT was sitting in the passenger seat of a car while his girlfriend was driving. At the moment, he was seeing a dull silver color (which happened to be a sign), a white color (which happened to be the post the sign was connected to), and black etchings (he was experiencing the etchiness of it, not the etchings themselves) within the metal square (which happened to be letters). NT was not attending to the signness, postness, wordness, or letterness. All that was in his experience was the silverness, whiteness, and blackness of the etchings. This was a weak experience in that NT was passively or idly involved in the apprehension of the colors, and they did not grab him as energetically as sample 3.4 below.

Sample 3.4. NT was looking at a pastry. At the moment, he was seeing white, brown, yellow, which happened to be a pastry of several pastries, but he was not aware of the pastryness at the moment. And he was seeing dark circles that happened to be chocolate chips on one of the pastries, but he was not aware of the chocolate-chipness at the moment. All that was in his experience was the whiteness, brownness, yellowness, and dark circleness.

Here is a less typical example:

Sample 2.2. NT was flipping through a book. As he flipped, his eyes came to rest on a diagram with cross-hatchings. At the moment, the many cross-hatchings were central in NT's experience. He was not attending to them as part of the diagram or for their meaning, but he was attending to them for their visual aspect—in fact, he did not know what the diagram was about. He was also seeing the pages that surrounded the diagram, seeing an array of opened pages as he flipped them. In retrospect, he said that the pages looked sort of like the petals of

a flower (although the flowerness was not in his experience at the moment). Thus, it was as if he was experiencing cross-hatchings with something around them (paper).

This sample is an unusual sensory awareness in that NT was also aware of the area surrounding the focus of his attention (the opened pages surrounding the cross-hatchings) despite their being irrelevant to the cross-hatchings. Here is another unusual example:

> Sample 3.6. NT was in class and his professor was talking about the down-regulation of drugs. At the moment, NT was innerly seeing a double ring circle that was his representation of the down-regulation of a cell. The outer ring was pink and the inner circle was white. NT was also seeing "suckers," by which he meant things that looked like the suction cups on an octopus tentacle, popping into the outer ring. NT was seeing only a slice of the cell. NT was attending to the colorness and shapeness of the cell more than the suckerness of it. NT was writing notes and experienced a low level recognition of the act of writing, and no experience whatever of the words he was writing. There was nothing else in his experience, including no experience of the instructor, who was speaking (even though he was processing her meaning as evidenced by the taking of notes and the creation of a parallel inner seeing).

In this sample, NT was attending to the sensory stimuli (the colorness and shapeness) of an innerly seen image.

Five of NT's sensory awareness samples featured the sensory awareness of words. Two of these samples involved the sensory awareness of a written word. Here is an example:

Sample 4.3. NT had been idly looking at a phrase handwritten in his notepad. At the moment, his eyes were directed at the word "collecting." Something about the word "collecting" had drawn NT's attention. The word was mentally present in his head, however, the meaning of the word or the words that came before it were not in NT's experience. It was as if his experience consisted of word, word, word, collecting (beep). He was not apprehending the meaning of the word.

In this sample, the word "collecting" was present in NT's experience, however, he was not attending to the meaning of the word, rather he was drawn to the word for other reasons, though that was not in his experience at the moment. Here is the other example:

Sample 5.1. NT had been reading a text book. He had looked away to see who was talking, and now had returned his gaze to the textbook. At the moment, his eyes were directed at the textbook and he was seeing fuzzy black shapes against a white background. The fuzzy black shapes were letters in the text book, however, he was not recognizing them as letters.

In this sample, although NT had been reading and was currently seeing the words on the page, he was not recognizing the letters he was seeing as words, rather he was attending to the letters for their sensory qualities (their appearance against the whiteness of the page). NT's other sensory awareness of words samples involved attending to the auditory characteristics rather than the meaning of spoken words. Here are examples:

Sample 3.5. NT was in class attending to a classmate named Ellen. NT was listening to Ellen talk about drinking and driving and seeing her arm movements. The object of NT's experience seemed to be Ellen as a person, not merely her talk or her arm movements. That is, NT heard Ellen talk from the perspective of

recognizing that that is how Ellen always talks; and he was seeing her gesticulate from the perspective of recognizing that Ellen always gesticulates like that.

Sample 4.6. NT was in class and attending to his professor, Dr. Simon. NT was taking in the way Dr. Simon was speaking, somehow recognizing the Simon-ness of her talking. NT was also experiencing anticipation or some sense of where the discussion was heading. The actual topic was not in his experience, just the expectation of the topic.

Not Semantic Words

NT had a unique presentation of words in his inner experience. In fact, words were present very little in his experience and, when they were, NT did not experience the words for their meaning regardless of their presentation. Ten of NT's samples of inner experience involved this phenomenon (43%). In these samples, words were somehow present, either written, heard, read, or thought; however, the words themselves or the meaning of the words were not in NT's experience.

Three examples of not semantic words have already been described in detail in Sensory Awareness section above. For example, in sample 3.1, NT was attending to the sensory aspect of a sign. A sign is designed, constructed, and installed specifically to convey words—everything about a sign is aimed at *Read these words*. Even though his eyes were aimed at the sign, the words did not penetrate NT's experience. Similarly, in sample 2.2, NT was attending to the sensory characteristics of a diagram in a book. A book is designed, constructed, and printed specifically to convey words—the main thrust of a book is aimed at *Read these words*. But even though his eyes were aimed at the book, the words did not penetrate his experience. This example is slightly weaker

because books do contain pictures rather than merely words. But even those pictures are designed for semantic purposes, and he sees them for their sensory purposes. In sample 3.6, NT was innerly seeing a double ring circle, a representation of the down-regulation of drugs his professor was talking about at the moment. However, NT was not attending to the double ring circle for its representation or meaning, he was attending to the sensory characteristics. Even though the innerly seen image was a representation of what he was hearing his professor talk about (down-regulation of drugs), the down-regulation of drugs was not in his experience. Rather, NT was only attending to the sensory aspects of the image.

Here is an example of reading:

Sample 5.5. NT had been reading an article about the quality of life outcomes in children with Autism. NT had just read the phrase "academic achievement." At the moment, the notion of academic achievement and how NT could place the concept of academic achievement into a paper he will be writing was present in his awareness. This was a thought present without any form of symbolic representation. NT was unable to determine whether the words "academic achievement" were present in his experience or whether it was just the concept. NT's eyes were still directed at the words in the article (and probably continued to track along as if he were reading); however, he was not comprehending the reading. Furthermore, someone (perhaps the professor—he was in class) was talking, but he was not hearing this at all.

Although NT was reading, he was not aware of the words or the meaning of the words he was reading.

Here is another example:

> Sample 2.3. NT had been deciding between the phrases "it appears" or "sometimes" to use in the e-mail he was writing. At the moment, he was waiting for the cognition to happen, at which time the chosen word would come out of his fingers. There was nothing in his experience—he was waiting for the choice to be made so that he could continue typing.

In this sample, NT was trying to decide on choice of words. The words themselves, however, were not in his experience at the moment.

Multiple Experience

Ten of NT's inner experience samples feature multiple experiences (43%). The most frequently occurring combination of multiple experience in NT's samples included sensory awareness with other sensory awareness (three times). Here is an example:

> Sample 4.4. NT was at Starbucks chewing a pastry. At the moment, he was experiencing the sweetness and chewyness of the pastry. He was also looking at jars of brown caramel. In his experience was the brownness in the jars. He was not attending to the bottleness or caramelness of the bottles—in fact, he did not see the shapes of the individual jars. NT was also thinking about the vivid sensory awarenesses in the inner experience of schizophrenics [referring to a conversation he had had earlier]. This was a thought without any symbolic representation.

In this sample, NT was experiencing multiple and separate experiences, including the sweetness and chewyness of a pastry (sensory awareness), the brownness of the jars (sensory awareness), and thinking about the sensory awarenesses in the inner experience

of schizophrenics (unsymbolized thinking that happens to be about sensory awareness). Here is another example of multiple experience:

> Sample 5.2. NT was looking at a display of brown pastries. In his experience, he was seeing "golden pockets" or splashes of goldness (approximately 10-20). NT was seeing the golden-brown color of the pastries. He was not interested in the pastryness or the shape of the bagels, scones, muffins, croissants, etc. he was looking at, all that was in his experience was their golden-brownness. All the splashes of color seemed the same. Simultaneously, NT was also idly thinking of a cheese bagel. This thought was presented without words, images, or any other symbolic representation.

Other combinations of multiple experience include sensory awareness and doing of (twice); sensory awareness, doing of, and emotion (twice); sensory awareness and unsymbolized thinking (twice); sensory awareness and emotion (once); inner seeing and doing of (once); and not semantic and doing of (once).

Doing Of

Eight samples in NT's inner experience involved intentional doing (35%). In these samples, NT was actively involved in the doing of some action. The action was not automatically happening. NT was experientially invested and directing the activity. Here are examples:

> Sample 5.3. NT had been typing on the computer, sent a document to be printed, and was walking towards the printer. At the moment, he was experiencing the movement towards, (and that towardsness was towards the printer but the aim of the towardsness, the printer, was not in his experience at the moment). NT was

not experiencing the movement as a bodily sensation, however the movement was present mentally. NT was also experiencing a sense of drive and forwardness. This was experienced as both a mental and bodily purpose. This was separate but related to the experience of movement towards something. NT was also seeing a purpleness and (less intently) silverness (which happened to be a stapler but that was not in his experience).

Sample 3.3. NT and his girlfriend had just finished laughing. At the moment, NT was looking down and seeing a jumble of light crooked angles against a dark background. The angles happened to be steps but the stepness was not in NT's experience at the moment. NT was also experiencing an uplifiting or light feeling that was left over from the previous laughter. NT also had some experience of being in motion—that is, he was not simply moving.

Sample 2.6. NT was in his car with the door open about to get out. At the moment, he was prepared to slap the door frame with his right hand. [His car typically gives him an electrostatic shock when getting out, so he has acquired the behavior of slapping the car so that the shock doesn't sting or surprise him.]

One of NT's doing of samples involved the act of writing. This example has already been discussed in detail in Sensory Awareness section above. In sample 3.6, NT was taking notes; however, he was only slightly aware of the act of writing but not at all aware of the words he was writing or the words his professor was saying.

Unsymbolized Thinking

There were three samples that perhaps should be counted as being unsymbolized thinking (13%). One sample of Unsymbolized Thinking has already been described in

detail in Not Semantic Words section above. In sample 5.5, NT had been reading and the notion of academic achievement was present in his experience without symbolic representation. In this sample, there was some kind of "notion" present to him about how academic achievement might fit into his paper. This notion did not involve words or other symbols, and from that perspective might be said to be unsymbolized. However, the unsymbolized thinking concept typically involves a more specific, differentiated thought.

The other two samples that might be considered unsymbolized thinking were similarly nonspecific. Sample 5.2 (described in detail in the Multiple Experience section) involved "idly thinking about a bagel" without any form of symbolic representation in his inner experience. However, typical unsymbolized thinking is more specific (what about the bagel was being thought?). Similarly, at sample 4.4 (described in detail in the Multiple Experience section) NT was thinking about the vivid sensory awarenesses in the inner experience of schizophrenics, but there was no *about-what* in that thinking.

Thus, all three of these perhaps-unsymbolized-thinking seemed more like not-well-differentiated thinking than the more usual unsymbolized thinking of other DES participants, which is typically as differentiated as, for example, inner speech. Additionally, two or maybe three of these samples also involved multiple experience including an unsymbolized thought and a sensory awareness (in sample 4.4), while, simultaneously, attending to the sensory aspects of jars of brown caramel (the brownness); in sample 5.2, NT was thinking of a cheese bagel while, simultaneously, attending to the sensory aspects of a display of pastries (the golden brown color). It is

concluded that to the extent that NT experience unsymbolized thinking, it was off of the center of the target.

Emotion

NT's samples had very little direct experience of a feeling (the direct experience of emotion). There were two samples that, depending on how one understands things, might be said to involve emotion (9%). Here are the samples:

> Sample 4.5. NT was walking along a cross-walk. Before the sample, NT had been thinking of a Bipolar participant, Suzy, in his research study who had completed the research battery in 8 hours even though most people typically complete the battery in 4/5 hours. NT had been thinking about how Suzy's friend will also participate in his study and how she is probably expecting to complete the battery in 8 hours as well. NT was also thinking that his research project involves such long batteries. At the moment, NT experienced a lingering negative valence from the previous thought regarding the 8 hour research project battery. He was also attending to the stripey whiteness of the cross-walk. He was drawn to the whiteness of the lines. He was also attending to the cross-walkness of the white stripes, indicating that it is a cross-walk. The negative valence, stripey whiteness, and cross-walkness were all equal in his experience. NT was also experiencing a motion of forwardness, however, this was less so in his experience.

The "negative valence" in this example might be considered a feeling, but it has none of the specificity that is often associated with DES reports of feeling.

The second of NT's samples that might be said to include emotion was sample 3.3, discussed in Doing Of section above, NT was experiencing an uplifting or light feeling that had been left over from his laughing with his girlfriend prior to the moment of the sample. However, it was not clear whether at the moment of this sample this was a bodily uplifted/lightness (in which case DES would consider it a sensory awareness). That is, the laughing might, a bit before the sample, have involved feeling, but the experience of the feeling was now gone, and what remained was a bodily lightness.

Anticipation

Two of NT's samples involved an anticipatory state (9%). In these samples, NT was experiencing an anticipation of something about to happen. One example, sample 4.6, has already been described in detail in Sensory Awareness section above. NT was hearing his professor speaking and anticipating something to come; however, whatever that something was not in his experience at the moment of the sample. Here is the other example:

> Sample 4.1. NT had been leaving a message on Amy's, his girlfriend, voicemail. Before the moment of the sample, NT had said the word "maybe." At the moment, NT was experiencing a mental sensation of something about to happen. It was as if his mind paused, waiting for the thoughts backed up in his mind to move forward, and he was somehow experiencing the imminence of the continuation of the sentence. He was also slightly experiencing the dark ground in front of him, that is, the groundness was in his experience in an undifferentiated way.

In this sample, NT was anticipating the rest of the sentence; however, whatever the rest of the sentence was not in his awareness at the moment of the sample.

Inner Seeing

Inner seeing occurred twice in NT's inner experience (9%). One of NT's inner seeing samples (sample 3.6 described in detail in Sensory Awareness section above) involved the inner seeing of something that was related to external stimuli. In this sample, NT was innerly seeing a double ring circle that was a representation of what his professor was talking about at the moment (down-regulation).

NT's other inner seeing sample was relevant to or a representation of an ongoing thought he was having. Additionally, this inner seeing sample was a mental recreation of something that NT had actually seen in the physical world. Here is the example:

> Sample 2.5. NT had been wondering if he will still be in shape in seven years when he turns 35. NT had then thought of his friend, Mike, who was 35 and in shape. He had thought about the last time he saw Mike at a bar eating a pizza and had wondered how he could eat a pizza and still be skinny. At the moment, NT was innerly seeing a whole, round pizza sitting on a dark bar with a brown wooden counter. He was also seeing the elevated portion of what was a stage. The bar was wide with wide angles. There was nothing else and no one in the bar. This was a recreation of something that had happened. NT was innerly seeing this as he had seen it when it really happened except that the innerly seen scene was simplified—it had no people at the bar, no people on the stage, and he did not have a sense of being there at the moment—that is, his experience was of

seeing a scene, not of being in the scene. The seeing was in color; however, NT was not particularly attending to the colors.

Feeling

NT did not have any clear examples of feeling. In one sample, NT was experience pressure (4%). Here is the example:

> Sample 2.4. NT had been playing the game Star Craft 2 on the computer. At the moment, he was experiencing the yellowness of the enemy base and the greenness of some circles (a mass unit that he recognized to be his army). He was drawn to the yellowness of the screen. This was the most central aspect of his experience. He was also experiencing something like pressure—wanting to kill before he was killed in the game, but this pressure was difficult to describe. He was also hearing the sounds of the game. The hearing was the least salient aspect of his experience.

The "pressure" in this sample might, in an extremely loose understanding of "feeling," be considered a feeling. Thus, NT had no clear-cut feelings (see Emotion section above), and one sample that *might* be considered to be feeling if that term is given a broad or loose definition.

Discussion

Overall, NT's samples of inner experience suggest that he experiences sensory awareness much of the time; also frequent were not semantic word experiences, multiple experience, and doing of. Words were present only rarely in NT's inner experience, and his overall experience with words was unusual. NT did not have any samples of inner

speech, typically the most frequent form of words in experience. NT had two samples of emotions; both involved the lingering of a previously triggered feeling.

CHAPTER 10

"MM"

MM was an 18-year-old Ethiopian female who sampled with us throughout October 2010. She received a laterality quotient of -67 on the EHI (EHI; Oldfield, 1971) indicating that she is left-handed. MM received a Symptom Checklist-90-R GSI (SCL-90-R; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973) raw score of 1.53, which converts to a T-score compared to adolescent nonpatients of 61, suggesting the lack of clinically significant psychological distress. MM's GSI score was higher than any of our other subjects, necessitating the use of the adolescent nonpatient norms.

Characteristics of Inner Experience

MM sampled on five separate occasions, collecting a total of 27 samples. Because Sampling Day 1 is considered training for participants, samples from this day are omitted. Additionally, because MM was sleeping during two of her samples on Sampling Day 4 (samples 4.1 and 4.2) and chose to skip one (sample 4.5), those samples are omitted as well. Thus 20 of MM's samples will be considered as reflecting her inner experience characteristics. The following aspects of her inner experience will be discussed: sensory awareness, occurring in 12 samples (60%); unsymbolized thinking, occurring in 7 samples (35%); not semantic words, occurring in 5 samples (25%); doing of, occurring in 3 samples (15%); emotion, occurring in 3 samples (15%); infrequently occurring characteristics; and noteworthy characteristics.

Sensory Awareness

Sensory awareness was the most frequently occurring characteristic in MM's inner experience, occurring in 12 of her 20 samples (60%). Here are examples:

Sample 2.2. MM had been looking at her index finger to see whether or not it is clean. At the moment of the sample, she was seeing that her fingernail is slanted. She was also experiencing a thoughtful recognition of the slantedness of the nail. The thought *hmm, slanted* was present in her experience without words or images. This is a parallel, but separate, thought present in her experience. All that is in MM's experience at the moment of the sample is seeing the slantedness of the fingernail and recognizing that the fingernail is slanted.

Sample 5.6. MM's Psychology instructor had been talking about a research finding in which 76% of college males consented to bring a female back to their room to have sex if asked. At the moment of the sample, MM was paying attention to the laughter in the room. She was noticing the whole class laughing (including herself). She was not, in her experience, differentiating between her own laughter and the rest of the class's laughter, rather she was experiencing the class laughter as one. She was also seeing the back of the head of a male student sitting in front of her.

Four of MM's samples involved the sensory awareness of words or numbers. Here is an example:

Sample 3.2. MM had been studying for her Psychology course and because of an interruption and short conversation with her roommate, she had lost track of where she was in the book. At the moment of the sample, MM's searching for a particular word (she could not remember the word during the interview but there was a specific word involved) was in her experience. MM was seeing all the words on the page. She was not seeing the sentences or meaning of the words, in

her experience she was just seeing a bunch of disconnected words which were not noticed for their meaning or for their contextual significance, but instead were just a display of words. MM was searching for the particular word where she had left off (and when she found it she would resume reading). She was not searching for the meaning of the word or for the general content or topic where she had left off, she was just looking for the word.

In this sample, MM was seeing words on a page but not attending to their meaning. Instead, MM was attending to the display or appearance of the words. Here is another example:

> Sample 3.1. MM had been studying for her Psychology course. At the moment, she was writing the word *pseudo-forgetting*. In her experience, she was "watching the flow" of *pseudo-forgetting*, that is—she was engaged in the way *pseudo-forgetting* was unfolding and being revealed on the page. This was a visual watching of *pseudo-forgetting* appearing on the page. This experience was not in any way about the meaning of *pseudo-forgetting*, or even the wordness of *pseudo-forgetting*; it is about the way this visual thing *pseudo-forgetting* (which happens to be a word) unfolds itself on the page.

In this sample, MM was seeing the words unfold on the page. She was not attending to the words for their meaning, rather she was attending to the visual characteristics of the words. Additionally, MM was experiencing herself as more of an observer of the creation of the words rather than being the creator. Here is another example of the sensory awareness of words/numbers:

Sample 5.4. MM was walking through the dorms hallways slowly, on her way to class. At the moment of the sample, MM was seeing a sign with numbers on a door to her left. MM was drawn to the yellowness of the numbers and not the meaning of the numbers. All that was in her experience was the yellowness of the numbers.

In this sample, MM was attending to the yellowness of the numbers rather than the numerical value or meaning of the numbers.

One of her samples involved the spreading of pain:

Sample 4.6. MM had just finished taking a shower. At the moment of the sample, she was experiencing stomach pain. This felt as if a needle was poking her in the stomach. She experienced the pain as oscillating. She was feeling the pain in her stomach but the discomfort spreading throughout the trunk of her body but not in her extremities.

In this sample, the sensory awareness was experienced as spreading throughout the trunk of her body.

In one of her samples, MM was experiencing sensory awareness in a unique way:

Sample 4.4. MM was clicking buttons on her phone with her right thumb. At the moment of the sample, her phone was vibrating. MM was experiencing the feeling of the vibration on her right thumb. She was also hearing the vibration through her thumb. It was as if she could hear the vibration through her thumb, she was not hearing the vibration through her ears. Apparently MM was repeatedly clicking the buttons so that she could feel/hear the vibration. MM was also hearing a reggae song her friend, Barbara, was playing. MM also heard her

roommate Katie saying, “Dude, I just learned ChapStick shouldn’t go in the laundry.” The hearing and feeling of the vibration was the most salient in her experience (an estimated 60/20/20).

MM was experiencing the vibration as being heard through the sensation of the vibration on her thumb.

Sensory awareness was the most frequently occurring phenomenon in MM’s experience. The majority of her samples were typical sensory awareness examples. Four of her samples involved the sensory awareness of words or numbers.

Unsymbolized Thinking

Unsymbolized thinking was the next most frequently occurring characteristic in MM’s inner experience, occurring in seven of her samples (35%). Here is an example:

Sample 5.5. MM’s Psychology course instructor had been talking about how men think about sex more frequently than women, but women suppress their thoughts about sex because it is not socially acceptable. MM had read about this the night before in her psychology book. At the moment of the sample, MM was listening to the instructor and realized she had heard this before. This was a thought without words, images, or any other symbolic representation.

Four of her unsymbolized thinking samples involved a thought about a stimulus. Here are examples:

Sample 2.1. MM’s lights were off and she was trying to find her RebelCard. She had been trying to distinguish between her RebelCard and Marlok card through their textures. She expected the RebelCard would be more smooth and the Marlok card would be more rough. At the moment of the sample, she was feeling

the two cards at the same time with her left hand. She was feeling the smoothness of both cards on her fingers. MM was also experiencing a thought process related to but separate from the feeling of the cards. MM was thinking something along the lines of *What the hell, is this the Marlok card or the RebelCard?* This notion was present in MM's experience without words, images, or any symbolic representation.

Sample 2.5. MM had just completed entering a text message and was watching her phone to see if it sent. At the moment of the sample, she was seeing the blue dots moving on the screen indicating the text message is sending. MM was also thinking *don't say message failed!!* This was an intense thought present without words, images, or any symbolic representation.

Sample 5.2. MM had been getting ready to go to class and wanted to change her clothes in the bathroom but the bathroom was occupied. MM had grabbed her clothes and was trying to find another place to change in privacy (so her roommate and friend would not see her). At the moment of the sample, MM was holding her clothes and looking towards her right at an area she could change. In her experience, she was seeing the area where she might go and deciding if that is a good place to change. This was a thought that did not involve words, images, or any other symbolic representation.

Unsymbolized thinking was the second most frequently occurring phenomenon in MM's inner experience, occurring in 7 of her 20 samples. Four of these samples involved some thought about an external stimulus.

Not Semantic Words

In 5 of MM's 20 samples (25%), words were present; however, MM was not attending to the words for their meaning. Three examples have already been described in detail in Sensory Awareness section above. In sample 3.1, MM was writing the word *pseudo-forgetting* and rather than attending to the semantic meaning of the word, she was "watching the flow" or unfolding of the word on the page. In sample 3.2, MM was seeing a display of words on a page. She was not, however, attending to their meanings. In sample 5.4, MM was attending to the yellowness of the numbers on a sign. The value or meaning of the numbers were not in her experience. Here is another example:

> Sample 3.3. MM was changing clothes in the bathroom and a song was playing on the stereo in a room on the other side of the bathroom. At the moment of the sample, MM was trying to remember what song it was. She was hearing the melody of the song. The song had words but the words were not in MM's experience (as if she had actively stripped the words away leaving only the melody, which is how she remembers songs). All she was attending to was the melody. MM was searching her memory for the melody of that particular song, as if many known melodies were "stored in her memory banks" and she would eventually discover the one that matched the actually heard melody. This was not a one-by-one search, but rather somehow a waiting for the memory to produce a melody that matched the melody currently being heard.

In this sample, MM was hearing the melody of a song. Although the heard song did, in fact, have words to it, MM was only attending to the melody of the song. Here is the other example:

Sample 2.3. MM was typing a colon and parenthesis (to make a smiley face) on her phone. This was an automatic, bodily action with little experience.

In this sample, the meaning of the combination of the colon and parenthesis was not in MM's experience.

In these samples, words were present in various ways; however, in MM's experience, the words were ignored or stripped of their meaning.

Doing Of

In 3 of her 20 samples (15%), MM was involved in effortfully completing an activity. Here is an example:

Sample 2.4. MM had been studying in the study room and three people entered the room. The male had started to talk about animals and MM was trying not to eavesdrop. At the moment, MM was instructing herself not to listen to him or pay attention to his words. MM was actively involved in the ignoring of what he was saying. The experience was of actively screening out the conversation, *not* of (for example) trying to pay attention to something else.

In this sample, MM was concentrating on the blocking out of the conversation happening in her company. Rather than focusing her attention elsewhere (i.e., her study material), MM was actively involved in the blocking out of the conversation. Here are other examples of actively doing:

Sample 2.6. MM had her head down in her biology book and was trying to take a five minute nap. In her experience, she was actively involved in the task of falling asleep. She was effortfully *trying* to fall asleep.

Similar to sample 2.4, MM was actively involved in the trying to accomplish some task or activity. Here is another example:

> Sample 2.7. MM was eating spaghetti in her bed and attempting to keep the spaghetti on her fork inside the plate. At the moment of the sample, she was seeing a piece of spaghetti dangling from her fork (she was only seeing the dangling spaghetti and not the fork). She was also trying to keep the spaghetti inside her plate. This was a concentrated effort of keeping the spaghetti in the plate.

Emotion

MM did not experience feelings in any of her samples. However, in three of her samples (15%), there was some marginal presence of emotion. In these samples, there was the presence of an emotion; however, MM was not directly experiencing the emotion at the moment. In sample 5.6, described in detail in Sensory Awareness section above, MM was laughing. However, she was not experience a feeling at the moment. In two of these samples, MM was talking out loud about emotion, but not directly feeling the emotion at the moment. Here is an example:

> Sample 5.1. MM had been talking to her friend, Hannah, about how MM tends to be closed off when she is angry. At the moment of the sample, MM was talking to Hannah; however, this was happening automatically and out of MM's experience. All that was in MM's experience was somehow expressing to her friend that she is closed off. Words are coming out, and what Hannah is doing is coming in; however, all that is in MM's awareness is conveying to Hannah that MM is closed-off. MM does not feel closed-off at the moment.

In this sample, MM was telling her friend about how she gets closed-off when she is angry. However, MM was not feeling closed-off or angry at the moment. Here is the other example:

> Sample 5.3. MM had just changed her clothes and was looking in the mirror. She was seeing her bra through her shirt. At the moment of the sample, the thought that it would be embarrassing if other people saw her bra was present in her experience. MM was not thinking of particular people, rather she was thinking that she would be embarrassed if people in general saw. MM was not feeling embarrassed at the moment, it was the likelihood of embarrassment that was present to her. This thought was present without words, images, or any symbolic representation (an instance of unsymbolized thinking). MM was also saying, "this is so embarrassing" out loud with the intention of her roommate hearing. The words were reflecting MM's thought process in that she was not telling her roommate that she was embarrassed, rather she was indicating to her roommate that she would be embarrassed if people saw her like her roommate was seeing her. The talking was happening automatically—that is, MM did not feel as if she was driving the words, they words were just happening.

In this sample, MM was both thinking and telling her roommate that she would be embarrassed if people saw her bra; however, MM was not feeling embarrassed at the moment. MM did not have any other involvement or direct experience of feelings in her samples.

Infrequently Occurring Characteristics

Anticipation.

Two of MM's inner experience samples involved anticipation of finding something (10%). In sample 3.2, described in detail in Sensory Awareness section above, MM was searching for a word on a page. In sample 3.3, described in detail in Not Semantic section above, MM was searching her memory for the melody of a particular song.

Multiple experience.

In two of MM's samples, multiple and separate phenomenon were occurring simultaneously (10%). In sample 4.4, described in Sensory Awareness section above, MM was feeling/hearing the vibration of her phone and, unrelated to the vibration of the phone, hearing a song and hearing her roommate talking. In sample 5.6, also described in detail in Sensory Awareness section above, MM was attending to the laughter in the classroom. She was also seeing the head of a male student sitting in front of her.

Inner hearing.

MM experienced inner hearing in one of her samples (5%). In this sample, MM was innerly hearing the voice of someone else:

> Sample 4.3. In bed but awake, MM had been thinking about her roommate, Katie, telling MM about how Katie's mom gets upset when Katie spends time at her aunt's house because Katie's mom thinks they are starting a new family. At the moment of the sample, MM was innerly hearing Katie say the words "I don't like Vegas" the way Katie's mom had said them. The innerly heard words were

of Katie mimicking her mother. This was an inner rehearing of something that had happened before.

In this sample, MM was innerly hearing something she had heard before, something that someone else had already said. The inner hearing of someone else's voice is an unusual phenomenon.

Just doing.

One of MM's inner experience samples involved just doing (5%). In this sample, MM was not actively engaged in any aspect of her inner or outer environment, rather she was automatically completing an activity, outside of her awareness. In sample 2.3, described in detail in Not Semantic Words section above, MM was typing a colon and parenthesis (to make a smiley face) on her phone. There was nothing in her experience, not the typing, not the smiley face, not the person on the receiving end of the message. Nothing.

Noteworthy Characteristics

Dreams.

Two of MM's samples occurred while dreaming (samples 4.1 and 4.2). These samples were not counted as part of her inner experience.

Discussion

Overall MM seemed to be a motivated DES participant. She was interested in the process of exploring inner experience as well as her own inner experience. MM's inner experience is mostly characterized by sensory awareness, unsymbolized thinking, and not semantic words. MM did not have any samples of feelings or inner speech.

CHAPTER 11

"MO"

MO was an 18-year-old Hispanic female who sampled with us throughout October 2010. MO received a laterality quotient of -53 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) indicating she is left-handed. She received a GSI raw score of 0.37 (a T-score, compared to nonpatients, of 55) on the Symptom Checklist-90-R (SCL-90-R; Derogatis, Lipman, & Covi, 1973; Derogatis, 1994), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

MO sampled on five separate occasions, collecting a total of 30 samples. Because Sampling Day 1 is considered training for the participants, and because MO chose to skip discussion of one sample (on Sampling Day 2), 23 of MO's samples will be considered when counting her inner experience characteristics. Sensory awareness, occurring somewhere between 17 and 19 samples (74% and 83%), dominated her experience. No other feature of her experience came close to the sensory awareness degree of salience: unsymbolized thinking occurred in 3 or 4 samples (13% or 17%); inner speech occurred in 2 samples (9%); inner hearing occurred in 2 samples (9%); inner seeing occurred in 2 samples (9%); feeling occurred in 2 samples (9%); and not semantic words occurred in 2 samples (9%).

Sensory Awareness

Sensory awareness was the most frequently occurring characteristic in MO's inner experience and occurred substantially more than the other characteristics (the next frequently occurring characteristic occurred four times); 17 of her 23 inner experience

samples involved clear sensory awareness characteristics. In two of her samples, it was difficult to definitively determine whether or not a sensory awareness existed. Thus the count of her sensory awareness samples ranges from 17 to 19 (74% to 83%). The frequency of her sensory awareness samples, on average, occurred 78% of the time (18/23).

MO's sensory awarenesses were remarkably specific and differentiated. Here is an example:

> Sample 2.6. MO's bare feet were touching the floor. At the moment of the sample, MO was experiencing constant coldness on the bottom surface of both feet. She was experiencing more coldness on her toes. That is, there was a range of coldness. She was not experiencing the floor as being cold. All that was in her experience was the coldness of her feet.

In this sample, rather than experiencing the floor as being cold, MO was specifically experiencing the bottom surface of her feet (not her whole foot) and her toes as being cold. Here is another example:

> Sample 4.4. MO was noticing that that the upper part of her back (in between her shoulders) and the bottom surface of her feet (but not her toes) were warm. The warmth in her back seemed to be deeper than the warmth in her feet. There was nothing else in her experience.

In this sample, MO was experiencing a sensation in the specific areas of her upper back and bottom surface of her feet. Additionally, there was specificity to the degree of warmth—that is, MO was able to differentiate between the degree of warmth on her back, which seemed to be deeper, than the warmth in her feet.

In 12 of MO's sensory awareness samples, including samples 2.6 and 4.4 just described, MO's experience was exclusively sensory awareness (in some cases multiple sensory modalities). Here are other examples:

Sample 4.5. MO was tired. At the moment, she was experiencing pressure on the back of her eyes and eyelids. The direction of the pressure seemed to be pushing from the bottom of the back of her eyes up towards her eyelids.

Sample 5.5. MO had just bitten into a piece of ice. At the moment of the sample, she was feeling the coldness on the left surface and left side of her tongue. She also may have been feeling the texture of the ice. The coldness was most salient in her experience (an estimated 90:10 compared to the texture).

As previously mentioned, in some of her samples (four), MO attended to multiple sensory modalities. For example, in sample 4.6, she was both hearing and feeling:

Sample 4.6. She was hearing the sound of her air conditioning and feeling cold. She was also noticing that the sound of the air conditioning is associated with the coldness. This was a thought present without words, images, or any symbolic representation.

Here are other examples:

Sample 2.3. MO was biting her lip. In her experience was both the action of the biting and the pressure on her lip as a result of the biting. She was also tasting metallic (which she later knew to be blood).

Sample 5.3. She was drinking pink lemonade through a straw. In her experience, she was tasting the flavor and feeling the coldness of the pink lemonade in her mouth. The tasting and cold feeling seemed to be part of the same experience.

She was attending to the sensory qualities of the pink lemonade and not the pink lemonade itself. She was also feeling the straw on the left side of her mouth, though this was less salient in experience (an estimated 80:20).

On one occasion, MO had an imaginary sensory awareness. It seems as though sensory awareness is such a salient part of MO's inner experience that it does not only occur as she surveys the external world, MO also attends to sensory stimuli she has created. Here is the sample:

Sample 3.5. MO had been craving a salad with wontons. At the moment of the sample, she was innerly hearing the crunching of a salad and wontons. The crunching sound was as if she were eating a salad herself. She was also tasting a salad. It was as if she were tasting the scent of the salad and not the salad directly. The tasting seemed to be in her mouth, though she recognized she did not actually have the taste of the salad in her mouth.

In this sample, MO had been craving a salad. At the moment of the sample, she was experiencing the sensory characteristics associated with eating a salad (e.g., hearing of the crunching and tasting) as if it were actually happening.

In four of her samples, MO was experiencing a growing or spreading of sensory awareness. All four samples involved pain. In these samples, MO was experiencing the spreading of the pain at the moment—that is, there was an awareness of the spreading at the moment of the sample. Here are the examples:

Sample 2.5. MO had gotten a paper cut. At the moment of the sample, she was experiencing pain on the tip of her left index finger as a result of the paper cut. She was experiencing the pain across the tip of her finger (from side to side). The

pain was differentiated such that it was less painful to the sides of the actual cut and more painful on the cut itself.

Sample 4.2. MO had been trying to figure out where her headache was localized. At the moment of the sample, she was noticing the pain pushing out in her temples. The notion *oh, its in my temples* was also present. This was a thought without words, images, or any other symbolic representation.

Sample 4.3. Her lips were chapped from the weather and she had been eating Lays potato chips. At the moment, she was feeling a surge of pain on the left part of her bottom lip. This pain was not instantaneous like a light switching on and off, it was more of a gradual pain happening quickly.

Sample 5.6. MO had cut her left index finger over the weekend. Before the sample, she had hit her left index finger against something. At the moment of the sample, she was experiencing pain spreading throughout the entire cut, both surface and depth, but the pain had not yet completely filled the cut yet. There was nothing else in her experience.

In these samples, MO was experiencing movement or spreading of her sensory awareness experiences.

Here are two examples where it was difficult for us to be confident whether MO was experiencing a specific thematic sensory awareness:

Sample 2.1. She had been staring at her iced tea bottle. At the moment, she was thirsty. She also may have been thinking that she was thirsty, but we were highly skeptical. If it existed, it was a mental phenomenon, a knowing that she is thirsty that was present without words, images, or any symbolic representation.

In this sample, it is unclear if MO's experience of being thirsty involved a sensory awareness. It was difficult to determine if MO was experiencing the sensory aspects of being thirsty and, if so, were they experienced as a function of being thirsty or simply for the sensory qualities or both. Here is the other example:

> Sample 5.2. She was hungry. At the moment, she was innerly saying "What should I eat?" quickly. MO was also hearing her stomach growling. This was more an auditory thing (90%) though she may have also felt the growling (10%).

In this sample, it is unclear whether the hearing of her stomach growling is attended for its sensory qualities or for its meaning of being hungry.

Sensory awareness dominated MO's inner experience, occurring at a much higher frequency than the other characteristics. All of her sensory awareness samples were specific and differentiated. In the majority of her samples (12), sensory awareness was the only phenomenon.

Unsymbolized Thinking

Unsymbolized thinking, thinking without the presence of any words, images, or any other symbolic representation, occurred in 3 or 4 of MO's 23 samples (13 or 17%). All of MO's samples of unsymbolized thinking were related to or noticing a sensory awareness. One example, sample 4.2, has already been described in detail in Sensory Awareness section above. In this sample, MO was noting the location of her headache. Here is another example:

> Sample 5.1. MO was hearing a sound to the left of her from outside the room she was in. At the moment, she was hearing the sound and was wondering what it was. The wondering of what it was was more salient in her experience than the

sound itself. She later recognized it to be a lawnmower but that was not in her experience at the moment.

It was difficult determining if one sample included an unsymbolized thought. Sample 2.1, described in detail in Sensory Awareness section above, may or may not have included an unsymbolized thinking. MO was thirsty and whether or not there was an additional and separate thought about being thirsty is unclear.

Inner Speech

MO's inner experience involved inner speech in two of her samples (9%). Both of MO's inner speech samples were in her own voice. Additionally, both samples involved a question MO was asking herself. In sample 5.2, described in detail in Sensory Awareness section above, MO was innerly saying, "What should I eat?" Here is the other example:

Sample 4.1. MO was innerly saying, "Hmm, I wonder when this is going to beep?

In this sample, similar to sample 4.1, MO was innerly asking herself a question.

MO's inner speakings were similar in nature to her outer speakings. For example, in one of her samples, MO was speaking aloud to herself. The speaking aloud to herself had the same features as inner speaking except that the words were actually being produced:

Sample 3.2. The beeper had not sounded for a while and MO was wondering if the beeper was working. At the moment, MO was saying, "is this thing working?" out loud to herself. MO was also experiencing confusion and humor. The confusion and humor were both related to the words she was saying. The

confusion was experienced as an asking of self the question. The humor was experienced as a smiling while asking the question. This was a bodily humor experienced in MO's mouth and cheeks.

Inner Hearing

Inner hearing occurred twice in MO's inner experience samples (9%). One of MO's inner hearing samples involved the repetition of the same innerly heard phrase:

Sample 3.6. She had been watching a video on anorexia in her Psychology course. Before the moment of the sample, MO had been innerly seeing Joanna, a character in the video she was watching about anorexia, standing against a white background. MO had also been innerly saying the words *could you imagine not eating*. The words MO was innerly speaking, could you imagine not eating, appeared in the innerly seen image as she was saying them. The words appeared written with an arch above Joanne. At the moment, MO was innerly seeing an image with the words "Could you imagine not eating?" written in black lettering. The words were written in an arch (upside down u). She was also innerly seeing Joanne standing underneath the words, in the middle of the arch. She was seeing Joanne's whole body directed to the left. The image was seen in black, white, and grey colors on a white background. MO was also innerly hearing her voice repeating the words *could you imagine not eating*. She differentiated the innerly heard words at the moment from the innerly spoken words before the sample. The inner seeing was most salient in her experience (70:30).

In this sample, MO was innerly hearing her voice repeat the words *could you imagine not eating*. This sample was not counted as inner speech because the innerly spoken words occurred before the moment of the sample.

MO's other sample which was counted as inner hearing consisted of an imaginary event that included inner hearing. In sample 3.5, described in detail in Sensory Awareness section above, MO was innerly hearing herself eating a salad which was a creation of her imagination—that is, she was not really eating a salad. She was innerly hearing a crunching sound as if she were eating the salad wontons, though she was not actually chewing anything. In both samples, the inner hearings were MO's production—that is, her innerly heard voice and her innerly heard chewing.

Inner Seeing

Inner seeing occurred in two of MO's samples (9%). One of her inner seeing samples involved a transition from one innerly seen image to another:

> Sample 3.1. Her friend, Tracy, had been next to MO reading a magazine article on Kenny Chesney. MO had been innerly seeing Kenny Chesney's face. At the moment, MO's experience was in transition from innerly seeing Kenny Chesney's face to innerly seeing Kenny Chesney's whole body. It was as if MO's experience was incorporating Kenny Chesney's body into it. In her experience, MO was focused on Kenny Chesney's face, but she was also aware of the presence of the rest of his body (though she was not attending to it). MO was seeing Kenny Chesney in color with a green background. This was a still image. MO's other inner seeing sample involved innerly seeing words. In sample 3.6,

described in detail in Inner Hearing section above, MO was innerly seeing an image with the words “Could you imagine not eating?” written in black lettering in the shape of an arch.

Feeling

MO had very little affect in her inner experience samples. In fact, only two of her samples involved some form of affect or emotion. It was difficult determining if these samples were experienced feelings. Depending on how they are counted, MO’s experience of feelings ranged from 0% to 9%. Either way, she had very little experience of emotion. In sample 3.2, described in detail in Inner Speech section above, MO was experiencing confusion and humor, both related to the words she was saying aloud to herself (“is this thing working?”). The confusion was experienced in the question and the humor was experienced as smiling. Although confusion and humor were somehow present, it is difficult to determine whether this confusion/humor should be considered a feeling.

MO’s other feeling sample involved a mental feeling that had been leftover from a previous moment:

> Sample 3.3. MO had been wearing new jeans and her legs were tingling. At the moment, MO was experiencing a tingling sensation from the knee to the hip areas of both legs. She was experiencing the sensation only on the top surface of her legs (from one side seam to the other). This sensation was a tingly, prickly sensation as if she had “sequins” in her legs. At the moment, the sensation was only experienced on the top layer of her skin. Before the moment of the sample, she had been irritated about the tingling sensation. At the moment, she knew

herself to still be irritated, however, to a much lesser degree. This was a mental irritation. The tingling sensation was more salient in her experience than the irritation.

It was clear that the tingling sensation was still present; it was clear that she had felt irritated prior to the sample; it was clear that the sensation was still irritating; but whether this irritation was actually felt at the moment of the sample was unclear.

Thus none of MO's moments included a substantial experiential apprehension of emotion. Whether humor or confusion (Sample 3.2) should be called an emotion is questionable, and extent to which the irritation of Sample 3.3 was present is also questionable. That is, none of MO's samples included as a more-or-less dominant aspect any of the experiences that are generally taken to be feelings: anxiety, anger, sadness, and so on.

Not Semantic Words

In two of her samples, a symbol was present in MO's experience; however, the meaning or function of that symbol was not directly in her experience (9%). Here is the first example:

> Sample 3.4. MO had been taking a test. She was unsure of the details of her inner experience at the moment of this sample because she could not turn away from her test to note her experience. To her best recollection, MO had been seeing an *x* written by her instructor on the exam sheet. At the moment of the sample, MO was both seeing the *x* and noting the ugliness of the *x*. That is, she was noticing the appearance of the *x* and not its function.

In the other example, sample 3.6, discussed in detail in Inner Hearing section above, MO was innerly seeing the words "Could you imagine not eating?" In this example, the meaning of the words was in MO's experience. However, the words were innerly seen as written in an arch and the archedness of the words was at least as important as the words themselves. That is, even when the meaning of the words are present in her experience, MO also attends to or, in this case, creates some sensory quality to the words (e.g., presented in an arch).

Discussion

MO seemed to be a motivated participant. She expressed interest in DES and appeared to have gained clarity and self-awareness from the process. MO seems to attend to the sensory aspects or mere presence of stimuli without additional characteristics in her experience. Sensory awareness is her most frequently occurring inner experience characteristic.

CHAPTER 12

"KA"

KA was a 21-year-old Biracial (Middle Eastern/Caucasian/Black) female who sampled with us in December 2010. KA received a laterality quotient of -53 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) indicating she is left-handed. She received a GSI raw score of 0.71 (a T-score, compared to nonpatients, of 61) on the Symptom Checklist-90-R (SCL-90-R; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

KA sampled on five separate occasions, collecting a total of 27 samples. Because Sampling Day 1 is considered training for the participants and KA chose to skip two samples, 21 of KA's samples counts her inner experience characteristics. The following characteristics will be discussed: inner seeing, occurring in 13 samples (62%); inner hearing, occurring in 7 samples (33%); not semantic words, occurring in 5 samples (24%); multiple experience, occurring in 4 samples (19%); inner speech, occurring in 3 samples (14%); doing of, occurring in 3 samples (14%); sensory awareness, occurring in 2 samples (10%); emotion, occurring in 2 samples (10%); infrequently occurring characteristics; and noteworthy characteristics.

Inner Seeing

Inner seeing was the most frequently occurring phenomenon in KA's inner experience, occurring in 13 of KA's 21 samples (62%). Five characteristics emerged in KA's inner seeing samples: 1) KA's seeings "populated themselves"—that is, assembled slowly; 2) KA saw a light coming from the left; 3) KA saw herself; 4) KA saw people

other than herself; and 5) KA's seeing was related to something ongoing in her external, physical world.

Five of KA's seeings involved the coming together or self assembly of the innerly seen image. In these samples, KA's innerly seen images did not appear whole and all at once. Instead, these images populated or came together at the moment of the sample. Here is an example:

> Sample 2.2. KA was talking to her boyfriend, Sam, on the phone. Sam had said he wanted to teach art. At the moment, KA was innerly seeing Sam as an art instructor. She was seeing this from her own perspective, as if she was in the classroom. Sam was standing, facing his left so KA was seeing the right side of his face and body. Sam was moving his arms. There were other students in the classroom to both sides of Sam so that he was in the center. KA had an art board in front of her with a paper taped on it so that she was only seeing Sam's thigh, buttock, and upper body. KA was also seeing sunlight coming through from the left. The seeing was detailed and in color (the tile was beige, the walls were white, Sam's hair was black). KA understood this to be a memory. It took KA a few seconds to create the image, it did not appear at once. She was also still hearing and attending to what Sam was saying but the image was most salient in her experience.

In this sample, the image was not wholly in KA's experience at once. Rather the image took KA time to create. .

Six of KA's inner seeing samples involved innerly seeing light coming from the left, including sample 2.2 just described. In these samples, KA was paying particular attention to the light that was illuminating her seeing. Here is another example:

> Sample 4.3. KA was finishing writing about sample 4.2 when the beep for sample 4.3 sounded. In her experience she was innerly seeing her friend Ramona and three other girls. It was as if KA was present in the scene and seeing the other girls. KA was seeing the girls standing in a half circle at her middle school. Ramona was positioned in exactly the same stance as she was in sample 4.2. There was one girl, Tina, standing behind Ramona and two girls, Sarah and Joanne, standing next to Ramona. Ramona and Tina were facing the same direction towards Sarah and Joanne. Sarah and Joanne were both facing Ramona and Tina. KA's perspective was from beside Sarah and Joanne. KA was seeing the girls from the hips up. Ramona was seen the most vividly though she was less clear than she was in sample 4.2. Ramona was wearing a black tank top and black bottoms. KA was also seeing concrete on the ground and a couple of trees. KA saw the sunlight coming from the upper left of the scene. The writing was not in KA's experience at the moment of the sample.

In this sample, KA saw the sunlight coming from the upper left of the scene.

Two of KA's inner seeing samples involved innerly seeing herself. Here are examples:

> Sample 3.2. This sample occurred shortly after sample 3.1 while KA was writing down her experience from sample 3.1 in her notebook. At the moment of this sample, KA was innerly seeing herself sitting and writing. She was seeing herself

from the back such that she was seeing her back and the back of her head and hair from the waist up. KA was seeing herself sitting on a bed though she was only seeing the top of the bed. Her body was hunched over and she was writing. KA was also seeing the TV in front of her. KA was wearing blue plaid pajamas but she was not paying particular attention to the blueness or plaidness. She was seeing this image slightly to the left. The seeing was dark but there was illumination from the TV screen. All that KA was seen clearly was herself and the TV, though she could not tell what was on the TV screen. There were other items in the room but she could not identify what they were. KA referred to this as a frozen image; whether that meant a still image or a moving image where there was no motion was difficult to determine.

Sample 3.4. KA was innerly saying "I'm going to sleep" in her own voice. She was also innerly seeing an image of herself sleeping. KA was seeing herself from the waist up with her head lying on a white pillow. Her hands were clasped together, prayer style, on the pillow and her head was on her hands with her eyes closed. KA was seeing her head to the right and her body to the left. She was seeing herself diagonally such that her body was angled towards her. KA was not seeing a bed but her body was level. She was not seeing a lamp; however, there was light coming from the left corner. KA was not seeing anything beyond herself and the pillow. The bed and the room were not her own or anyone else's that she knows of. This image was called "frozen" as in sample 3.2.

In these samples, light was coming from the left as well.

Seven of KA's inner seeing samples involved seeing people other than herself. Here is an example:

> Sample 3.6. KA was driving. She had seen a billboard that had a picture of a DJ and said "I'm a scam artist." She had been innerly hearing "Scam artist, I don't get it" in her own voice referring to the billboard. At the moment, KA was experiencing the tail end of that inner hearing. KA was also hearing a song and innerly seeing the head of her ex-boyfriend. It was as if the notion of the scam artist was leaving her experience and the song and ex-boyfriend were taking over. The song and the inner seeing were somehow directly related. KA was seeing the head of her ex-boyfriend diagonally such that his head was directed slightly to his right (KA's left). KA was unable to see the details of his face clearly as if his face was covered by a cloudy or foggy glass. KA was able to see his shiny black and spiked hair clearly. The inner image of KA's ex-boyfriend's head "populated itself," came together slowly in her experience, that is the pieces of this seeing were flying into place. Despite happening slowly in KA's experience, KA was under the impression that if they could be clocked in the external world the coming together of the pieces happened rapidly so that, at the moment of the sample, KA was already seeing his whole head. KA was under the impression that the population was done in the sense that the unclearly seen face of the ex-boyfriend would remain unclear.

In addition to being an inner seeing of a person other than herself, this sample also had two other interesting characteristics: 1) the innerly seen image was unclear and 2) the inner image came together slowly, that is the image did not appear all together at once in

KA's experience, rather, as her seeing took place, she saw the pieces of the image come together or elaborate themselves.

In five of her samples, KA was seeing an image related to something ongoing in the physical world at the moment. Here is an example:

> Sample 4.4. KA had been intensely looking at a dream catcher directly in front of her. KA was innerly seeing a dream catcher her boyfriend had drawn. The innerly seen dream catcher initially appeared automatically; however, it quickly became a produced version. KA was struggling to create the seeing of her boyfriend's dream catcher. This was a mental phenomenon, a trying to figure out what she could do to create the seeing. As the struggle was occurring, the innerly seen dream catcher was morphing into different versions. KA was innerly seeing a dream catcher; however, the specific details were undefined. At the moment of the sample, KA was at the tail end of her focusing on the real dream catcher and the automatic version of the innerly seeing dream catcher had just turned into the produced version.

In this sample, KA's innerly seen image (a dream catcher drawn by her boyfriend) was related to her seeing of an actual dream catcher in her environment.

One of KA's inner seeing samples involved the inner seeing of a word. Here is the example:

> Sample 2.1. KA had been filling out the McNair Scholarship Application. At the moment, she was shuffling the McNair Application papers. KA was attending to the shuffling and making sure the papers were in the correct order. KA was also innerly seeing the word "McNair." KA was seeing the word in Times New

Roman font against a black background. KA knew the background to be rectangular; however, she was not seeing the borders of the rectangle. The letters were white and had a black border with a red shadow. KA was attending to the shuffling of the papers more (an estimated ration of 90:10).

One of KA's inner seeing samples involved an inner seeing indicating a sensation she was experiencing on her physical body. Here is the example:

Sample 2.6. KA was experiencing a pain sensation on the lower, right part of her back. She was also innerly hearing "My back is strained." This was in her own voice. Simultaneous to the innerly heard words, KA saw a flash of a black background with a reddish-orangeish slanted blob going across the background indicating the area where her back is strained. The innerly seen image occurred very quickly and ceased when the innerly heard words were completed.

The innerly seen flash was related to the sensation KA was experiencing in her back.

One of her inner seeing samples involved innerly seeing a picture. Here is the example:

Sample 4.2. KA had been writing something about her friend, Ramona, from middle school. At the moment, KA was innerly seeing an image of Ramona, a boy named Sam, and herself. It was as if KA was looking at a picture of herself with Ramona and Sam. KA was seeing Ramona to the left, Sam in the middle, and KA to the right, seen in profile looking at the left. The seen KA was cut off (she said it was cut off like at the edge of the visual field) such that all that was seen was her hair and part of her nose. Ramona was standing with her body directed forward and her face turned to the left. Ramona was the most vividly

seen, followed by KA, and Sam last. KA was seeing them from the knees up. KA did not innerly hear anything, though it appeared they were talking. Sam was sitting on the hood of a car behind them and KA was leaning on it. The writing was not in KA's experience at the moment of the sample. The scene was illuminated by light coming from the upper left; this light was part of KA's experience at the moment. The light seemed to come from a lamp post light, but the lamp post itself was not seen.

Although the innerly seen image was like a picture, this sample involved three other inner seeing characteristics described above, including light coming from the left, a seeing of herself, and a seeing of others.

Inner Hearing

Seven of KA's samples involved inner hearing (33%). All of KA's inner hearing samples consisted of her own voice. One example has already been discussed in Inner Seeing section above. In sample 2.6, KA was innerly hearing "My back is strained" in her own voice. Here is another example:

Sample 3.1. KA had been watching a scene from the show *Family Guy*, in which Peter, a character, was trying to scare a bird out of his beard by playing loud music. In her experience, she was innerly hearing "Could a bird really get scared and leave?" in her own voice. KA was also attending to the show on the TV. KA was laughing; however, as best we could ascertain that was not in her experience at the moment.

In this example, KA's innerly heard words involved a question or trying to understand something that was ongoing in the external, physical world. This occurred three other

times in KA's inner hearing samples. In sample 3.6, discussed in detail in Inner Seeing section above, KA was innerly hearing "Scam artist, I don't get it" referring to a billboard she had seen. Here is another example:

> Sample 3.5. KA had been reading an article about vegans who cheat on their diet by eating eggs, etc. At the moment, she was innerly hearing the phrases: 1) "Vegan conferences? Where are those?"; 2) "How can you tell one's cheated?"; and 3) "Do they know you know?" KA was innerly hearing the phrases in her own voice. The phrases were happening one after the other. In KA's experience, the phrases were heard in a normal, natural pace. However, she was under the impression that if they could be clocked in the external world they were happening so fast it seemed they all happened at the moment of the sample.

In this sample, KA was innerly hearing several phrases which she experienced as happening one after the other. In sample 2.4, KA heard the same phrase repeated three times but with different inflections each time:

> Sample 2.4. KA had seen the words "DE contact form" on the computer screen. KA was having a visual experience of "DE contact form" at the moment. However, she was unsure if she was seeing the words on the screen, innerly seeing the words, or innerly seeing the words AND seeing them on the screen at the moment. KA was also innerly hearing DE contact form. The words were in her own voice. The words were repeated three times with a different inflection each time. The second time, the words were formed as a question. KA's sense was that the words were coming from the left side of her head.

This sample of inner hearing is also unique for KA in that KA was experiencing the words coming from the left side of her head.

One of KA's samples involved simultaneously innerly hearing her innerly spoken words:

> Sample 5.1. KA had been sticking pictures in a frame. At the moment, she was concentrating on the position of the picture. She was mentally making sure the picture was straight on the glass. At the same time, KA was both innerly speaking the words and simultaneously innerly hearing herself say "it hasn't beeped yet, of course on the last day it's going to take forever." KA referred to herself as "hearing herself say" even though she confidently said she experienced herself as saying the words as if into a tape recorder. We worked hard at understanding what this meant, eventually agreeing with some confidence that KA simultaneously experienced something like two KA's, or two points of view, one speaking and the other hearing herself speak. On those samples where KA said she was just innerly hearing, she had the hearing KA but not the speaking KA. KA said that when she speaks out loud (as to us in the interview room) she is experiencing only the speaking and not hearing herself speak.

KA had difficulty conveying her experience at the moment of the sample. Although she initially reported she was "speaking into a tape recorder," KA consistently described this inner dialogue as "hearing myself say." When asked "is the experience primarily one of hearing or primarily one of speaking?" she said "in this experience it's primarily of speaking"; however, she continued on to say "it's almost like there's two different mes…two separate mind entities. The one that's speaking and the one that's

hearing…I'm hearing it as I'm saying it." Thus the investigators concluded, along with KA, that this sample is both an example of inner speech and inner hearing.

Not Semantic Words

In five of KA's samples (24%), words were somehow present; however, the words themselves or meaning of the words were not in her experience. For example, in sample 3.2 described in detail in Inner Seeing section above, KA was trying to formulate words to write. In this sample, words did not come naturally to KA rather she had to put forth effort. In sample 2.1, described in detail in Inner Seeing section above, KA was innerly seeing the word "McNair." The meaning of the word or what the word represents was not in her experience, however. In samples 4.2 and 4.3, described in detail in Inner Seeing section above, KA was writing; however, the writing was not in her experience at the moment. Here is the other example:

> Sample 4.6. KA had been writing in her journal. At the moment of the sample, she was innerly seeing an image of herself in black space. There was nothing behind her, to the sides of her, or beneath her. The innerly seen KA was facing her left side. She was wearing a white banner with black writing that read, "I'm the best." The innerly seen KA had her hands on her hips. There was no light source; however, the image was lit. There was nothing else in her experience.

Similar to samples 4.2 and 4.2, KA was writing in sample 4.6; however, the writing was not in her experience at the moment.

Multiple Experience

Four of KA's inner experience samples involved multiple experiences (19%). In all samples, KA was attending to various, unrelated phenomena. Here is an example:

Sample 5.3. KA had been looking at an advertisement for boots on the internet and was seeing a picture of brown leather boots. The words next to the picture said "style sophisticate." At the moment, there were four separate experiences happening quickly and sequentially in KA's inner experience. First, KA was innerly hearing the words "style sophisticate?" in her own voice. KA was innerly seeing her friend Gina, seen from the waist up (KA was seeing Gina's left side). KA was seeing Gina's black hair and face though Gina's face was not fully articulated; that is KA was not seeing the details of Gina's face. Gina was wearing a white top. There was a light background as if Gina was shopping or something of the sort. The details of the background were not articulated. KA was seeing this image at eye level. Third, KA innerly saw Gina's boots and legs, from the knees down. KA was seeing Gina's legs in profile as well, apparently in the same position as the upper seeing. Gina's left foot was off the ground as if she were walking. KA was mostly attending to the brown, knee high boots Gina was wearing. There was a black background. This image was positioned lower than the upper body image in KA's experience—that is, KA looked more or less straight ahead at the upper portion of Gina, but looked somewhat down at the foot portion of Gina. The upper Gina and the lower Gina had the same body position, as if KA had shifted her gaze from the upper part of the body to the lower part, but that was *not* how KA experienced it. Instead, there was first a seeing of the upper part, then a seeing of the lower part. Furthermore, the backgrounds of the upper seeing (light) and lower seeing (dark) were not the same. KA herself found this mixture of the same/different to be rather curious or remarkable. Fourth, KA

innerly saw KA in a Steve Madden shoe store. The seen KA was seen standing to the left and facing to the right, trying on brown boots (the same brown boots Gina was wearing the previous innerly seen image, which were also the same boots seen in the internet advertisement). KA was seeing the profile of KA; she was seeing the right side of her body. The seen KA was wearing jeans, a black jacket and boots, and her right leg was off the ground as if she was posing. The real KA was also innerly hearing the imaginary KA say, "I don't like these." In real KA's experience, she was only innerly hearing the words. The innerly heard words were more salient than the inner seeing of imaginary KA.

In this sample, KA was attending to multiple and separate experiences simultaneously. She was innerly hearing the words "style sophisticate?" in her own voice, innerly seeing her friend, innerly seeing her friend's boots and legs, innerly seeing herself (KA) in a Steve Madden shoe store, and innerly hearing her imaginary self say, "I don't like these."

Inner Speech

KA's inner experience involved inner speech in three of her samples (14%). All of KA's inner speech samples were in her own voice. One sample has already been described in the Inner Seeing section above. In sample 3.4, KA was innerly saying "I'm going to sleep" in her own voice while she was innerly seeing an image of herself sleeping. Another example, sample 5.1, has already been described in detail in Inner Hearing section above. In this sample KA was simultaneously innerly saying and innerly hearing the phrase "it hasn't beeped yet, of course on the last day it's going to take forever." Here is KA's other sample of inner speech:

Sample 3.3. KA had been looking at her boyfriend, Kyle. At the moment of the sample, she was innerly saying "I love him so much." KA was saying this in her own voice. She was also experiencing a ticklish/tingling butterflies sensation in the middle of her stomach, inside her body.

KA consistently said that the "I love him so much" was understood as being said, rather than heard as in sample 3.1. However, she also consistently referred to this expression as "I heard myself say" (or maybe it was "I heard myself to say"). The investigators pressed her on the distinction between hearing and saying, and she was confident and believable that 3.3 was more said than heard and 3.1 was more heard than said. RTH was not sure that that distinction is the same as, for example, his own.

Doing Of

Three of KA's inner experience samples (14%) involved the effortful, directed completion of an activity. These examples have already been discussed above. In sample 2.1, described in detail in Inner Seeing section, KA was attending to the shuffling of papers and making sure the papers were in the correct order. In sample 4.4, described in detail in Inner Seeing section above, KA was trying to create an innerly seen image of a dream catcher her boyfriend had drawn. This was the only sample of inner seeing in which an attempt to create an inner image occurred. In sample 5.1, described in detail in Inner Hearing section, KA was concentrating on positioning a picture straight in a frame. In this example, KA was trying to create an innerly seen image.

Sensory Awareness

KA's inner experience consisted of two sensory awareness samples (10%). Both examples have already been described in detail above. In sample 2.6, described in Inner

Seeing section above, KA was experiencing a pain sensation on the lower, right part of her back. In sample 3.3, described in Inner Speech section above, KA was experiencing a ticklish/tingling butterflies sensation in the middle of her stomach. The investigators worked hard but unsuccessfully at trying to discern whether this was a feeling (love) that manifested itself in part by the butterflies; or whether the love was a fact of KA at the time, but not of KA's experience; and the experience was of butterflies, which on retrospection was understood to be related to love. Her characterization of this seemed to be more consistent with the latter interpretation, that love was ongoing but not directly or clearly in experience.

Emotion

Emotions occurred infrequently in KA's inner experience. In two of her samples, there was the presence of an emotion; however, KA was not directly experiencing the emotion at the moment (10%). In sample 3.1, described in detail in Inner Hearing section above, KA was watching a scene from the show *Family Guy* and laughing. Despite her laughter at the moment, KA was not directly experiencing an emotion. In KA's other sample of emotion, sample 3.3 discussed in Inner Speech and Sensory Awareness sections above, KA was not feeling love; however, she was innerly saying "I love him so much" and experiencing a ticklish/tingling butterflies sensation in the middle of her stomach. In KA's experience, love was ongoing but not directly in her experience.

Infrequently Occurring Characteristics

Feeling.

KA only had one sample of feeling (5%). Here is the example:

Sample 5.5. KA was setting the alarm and opening the door to her house. This was happening automatically. She was also experiencing a mental stress.

This sample involved a mental feeling—that is, KA did not describe any aspects of the feeling other than that it was a mental experience

Just doing.

In one of KA's inner experience samples (5%), she was simply engaged in the automaticity of an activity, there was nothing else in her experience:

Sample 4.4. KA was watching TV and was absorbed in the television show she was watching. There was nothing else in her experience.

Nothing.

In one of KA's samples (5%), there was nothing in her experience. Unlike the Just Doing section above, in this sample KA was neither absorbed in any activity nor attending to any stimuli:

Sample 2.5. KA had nothing in her experience.

Noteworthy Characteristics

Leftness.

Seven of KA's inner seeing samples involved a leftness attribute (33%). For example, in three of her inner seeing samples, a light source was coming from the left. In three of her inner seeing samples, KA was innerly seeing herself where the innerly seen KA was facing the left. In sample 2.4, described in detail in Inner Hearing section above, KA was innerly hearing "DE contact form" and had a sense that the words were coming from the left side of her head.

Words.

KA had substantially more inner hearing samples than inner speaking (33% compared to 14%). Additionally, in one of KA's samples, she experienced words both innerly heard and innerly spoken (sample 5.3 described in Inner Hearing section in detail). KA's inner experience included samples in which she used inner speech to aid in her understanding of external stimuli, these samples were described in detail in Inner Speech section. Outside of her innerly heard or spoken words, KA did not have any other experience of words.

Discussion

Overall, KA seemed to be a motivated DES participant. She was interested in the process of exploring inner experience as well as her own inner experience. KA's inner experience is mostly characterized by inner seeing and inner hearing. KA only had one sample of feeling.

CHAPTER 13

"JS"

JS was a 19-year-old Caucasian female who sampled with us in September and October 2010. JS received a laterality quotient of -50 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971), indicating she is left-handed. She received a GSI raw score of 0.511 (a T-score, compared to nonpatients, of 58) on the Symptom Checklist-90-R (SCL-90; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

JS sampled on five separate occasions, collecting a total 30 samples. Because Sampling Day 1 is considered training for the participants, 24 of JS's samples count towards her inner experience characteristics. The following characteristics will be discussed: sensory awareness, occurring in 5 samples (21%); inner seeing, occurring in 5 samples (21%); words present, occurring in 4 samples (17%); not semantic words, occurring in 3 samples (13%); happening of, occurring in 3 samples (13%); anticipation, occurring in 2 samples (8%); listening with comprehension, occurring in 2 samples (8%); and infrequently occurring characteristics.

Sensory Awareness

No feature of JS's inner experience occurred at a high frequency. Sensory awareness and inner seeing were the most frequently occurring characteristics in JS's inner experience, each occurring in five of her samples (21%). Four of her samples were typical examples of sensory awareness. Here are the examples:

Sample 2.4. JS was looking at a picture on her phone her boss had sent her of JS and four others wearing colorful Hawaiian lei necklaces made of flowers. At the moment of the sample, she was just focused on the orange, yellow, green, and blue colors of the flowers on one person's lei in the picture (the person standing closest to the picture taker).

Sample 4.2. JS was having a conversation with her friend, Tammy, as they were waiting at the CVS pharmacy drive-thru. JS was sitting in the passenger seat and Tammy was in the driver's seat. At the moment of the sample, JS was experiencing the car shaking as a result of her friend moving her leg. JS was feeling the whole car shaking (not her body shaking in the car). She was hearing Tammy talk and registering what she was saying, but that was not in her experience at the moment of the sample. Her eyes were aimed at Tammy's leg but that was not in her experience at the moment of the sample. All that was in her experience was the shaking of the car.

Sample 4.4. JS was watching a scene of the movie *The Last Song* in which the two main characters were talking on the beach. She was mostly attending to the movie's music. She was drawn to the sound of the music and not the significance of the music. JS was also attending to the dialogue of the movie although this was much less in her experience than the music.

Sample 5.3. JS had been watching a TV show and the screen zoomed in on two female characters hugging. At the moment of the sample, JS was noticing the light brownness of one of the characters' eye color. JS was focused on the brownness of the eyes and not the eyes themselves.

One of her samples involved the sensory awareness of an innerly seen image:

Sample 2.2. JS was reading about the Mechanics in Plato's and Aristotle's cosmology. At the moment of the sample, she was innerly seeing her dad's auto mechanic shop, seeing the garage with the orange garage door almost, but not complete, open, seeing a man working on a car inside the garage. The seeing was in color although, the colors were dull. Despite the dullness of the colors, something about the orangeness of the garage door stood out to her. The innerly seen image was blurry, not in focus. She was seeing the garage straight ahead, as if she was really there. The seeing was in motion but nothing was moving at the moment of the sample. Note that the inner seeing illustrated the word "mechanics" which had a different meaning from Plato's use that she was reading in her notes, as if the seeing was connected to the word itself, not to the meaning of the word in context.

In this sample, JS was innerly seeing her father's auto mechanic shop and was drawn to the orangeness of the garage door.

Inner Seeing

JS experienced inner seeing in five of her samples (21%). Four of her five innerly seen images were seen as blurry and in dull colors. One example, sample 2.2, has already been described in detail in Sensory Awareness section above. In this sample, JS was innerly seeing her father's auto mechanic shop in dull colors. Additionally, the innerly seen image was blurry. Here is another example:

Sample 2.6. JS had been looking at an older picture of herself and her friend, Jim, who moved to New Hampshire. At the moment of the sample, she was

wondering how Jim is doing in New Hampshire with regard to his employment. She was also innerly seeing a narrow, empty highway going straight ahead, which she took to be an illustration of New Hampshire, although she had never been in New Hampshire. She was seeing grass closer to the road and trees in the distance. The seeing was blurry and in color; however, the colors were dull, similar to all the other inner seeings on this day (samples 2.1 and 2.2). The seeing was still like a snapshot in the sense that she did not have a sense of herself being there.

JS's innerly seen images also had variability in the degree of dullness in the colors. In sample 5.6, the colors were so dull it was almost like a black and white seeing:

Sample 5.6. JS had been talking to her friend, John, who works at the Vans store. At the moment of the sample, she was innerly seeing the Vans store. She was seeing the whole store and parts of the surrounding stores. She was seeing the store as if she were standing in front of it. The inner seeing was blurry, but the Vans store was less blurry than the other stores. She was seeing the store in dull colors, almost as if it were a black and white image with some dull colors. The seeing was a moving image.

Two of her inner seeing samples involved the seeing of motion. In sample 2.2, described in detail in Sensory Awareness section above, JS was innerly seeing her father's auto mechanic shop. The seeing was in motion; however, nothing was moving at the moment of the sample. The other example is sample 5.6, just described.

One of her inner seeing samples was seen from an aerial perspective:

Sample 2.1. JS had been reading what her friend wrote on Facebook regarding leaving the mall. At the moment of the sample, she was innerly seeing the Guess

store in the mall. She was seeing the Guess store from an aerial perspective (one which she had never taken, and which is impossible in reality to take). The seeing was blurry, not in focus. Although the seeing was in color, the colors were dull and less vibrant than in reality. She also had some sense that she was going to the mall on Sunday.

Similar to the examples described above, this sample was also innerly seen as blurry and in dull colors.

One of her inner seeing samples involved innerly seeing a word:

Sample 2.3. JS had been searching through her notes for something about the Greek polis. She had come to a sentence with the word "polis" in it before the sample. At the moment of the sample, she was innerly seeing the word "polis" as if it stood out from the other words, and was saying "polis" in inner speech. This speech was somehow extended in time in a way that external speech cannot be. It was as if she had said "polis" a few seconds ago and was still saying it, not in any drawn out way (not "pooollllliiiiis") and not repetitive (not "polis polis polis"), and not an echo. She was innerly saying polis, which seemed to have the same vocal characteristics of external speech, and yet was extended in time.

Words Present

Four of JS's inner experience samples involved the presence of words (17%) that did not have any perceptual characteristics. In these samples, specific words or letters were present in her experience; however, the actual words were not seen or spoken or heard or read—the words were simply there. Here are examples:

Sample 4.1. JS had just finished reading a text message her friend, Patricia, had sent her asking, "Who said that, Danny?" At the moment of the sample, JS was thinking the words "Ha ha, how did you know" which was what she was about to type in response to the text. The words came sequentially; that is, they were present one after the other in JS's experience. However, they were not experienced as innerly heard or said and did not have any other voice characteristics. They were also not experienced as innerly seen. Thus these exact words were experienced as being produced without any of the characteristics typically associated with word production, hearing, or seeing.

Sample 5.4. JS had been talking on the phone and just said *bye*. At the moment of the sample, the word *bye* was still present in her experience without any perceptual representation. That is, *bye* was somehow present, but it was not spoken, heard, or seen.

In one of these samples, a name was present:

Sample 5.2. JS was scrolling through her touch screen cellular phone, searching for her friend's name, Rita, in her contact list. At the moment of the sample, the name Rita was present in her experience without being articulated. JS was aware of the name Rita and was looking for it but had not yet found it. JS was also seeing the names in her phone as she scrolled through them. The physical act of scrolling was not in her experience.

Not Semantic Words

In three of her samples, JS was not experiencing the meaning of the words present in her experience at the moment (13%). In sample 2.3, described in detail in the Inner

Seeing section above, JS was both innerly seeing and innerly saying the word "polis." However, the meaning of the word "polis" was not in her experience at the moment. The seeing and saying of the word continued in her experience after the semantic value of the word had passed. Sample 2.2, described in detail in Sensory Awareness section above, seems related to the non-semantic topic. In that sample, JS was reading about Aristotle's "mechanics," meaning the science of physics, but at the same time innerly seeing her father's automobile mechanic shop. Thus the relationship between the inner seeing and the outer context was through a clang association, rather than a semantic association. Here is the other example:

> Sample 5.5. JS was watching a baseball game on TV that was between innings and had heard the announcer say the word *Minnesota*. At the moment of the sample, she continued to hear the announcer's articulation of the word *Minnesota* even though it was no longer being said and no longer had any specific meaning. She was also seeing the pitcher on the screen warming up on the pitcher's mound.

Happening Of

In some of the other participants, the investigators noticed a characteristic described as the "happening of" experience: action that is occurring without a sense of being produced or created. There were three samples (13%) where JS did not experience herself as being the agent of her actions. Here is an example:

> Sample 3.4. JS was walking down the aisle in the grocery store when her mom had asked her if she could get rice. At the moment of the sample, JS was saying "brown?" This questioning word seemed to be rolling out unbidden; it was *not* as

if JS had the sense of wondering what kind of rice to buy, *not* as if there was an inner seeing of rice packages, and so on.

In this sample, JS's saying "brown?" The questioning word seemed to be rolling out. Here is another example:

Sample 3.2. JS and her mom were driving to the store; mom was driving. JS had just finished telling her mom she wanted to wait for her in the car. At the moment of the sample, she was looking at her mom as she was driving. She was idly seeing her mom but not paying particular attention to any feature of her mom.

Sample 4.6. JS had been conversing with her friend, Barbara. Barbara had said something funny and both Barbara and JS had started laughing. JS's laugh was somewhat amplified because she always found the manner of Barbara's laugh annoying, so that seemed to contribute to an increase in JS's own laughter, even though none of that was directly in her experience. At the moment of the sample, JS was simply laughing. There was nothing else in her experience, not the content of their conversation nor Barbara's annoying laugh.

Anticipation

Two of JS's samples (8%) involved anticipating finding something. In sample 5.2, described in detail in Words Present section above, JS was searching for her friend's name, Rita, in her contact list on her touch screen phone. Here is the other example:

Sample 4.3. JS was preparing to continue watching the movie, *The Last Song*, that she had seen before until a certain point (she had not seen the end). At the moment of the sample, she was fast forwarding the movie to find the part she had not seen. In her experience, JS was somehow processing the duration of the fast

forward (she was intermittently stopping the DVD to see whether she had already seen that part). JS was also seeing her friend, Tammy, standing to the right of her folding clothes. JS was more focused on the folding of the clothes than any particular aspect of Tammy. JS's report of seeing Tammy during the expositional interview involved gesturing with her left hand to her left side as if she had seen Tammy folding clothes to her left at the moment of the sample.

In this sample, JS was searching for the part of the movie she had not seen.

Listening With Comprehension

In two of her inner experience samples (8%), JS was listening with comprehension. In these samples, JS was comprehending the words spoken to her. Here are the samples:

Sample 3.1. JS had been getting ready to go to the grocery store with her mom. At the moment of the sample, she was hearing her mom say, "should we leave him in or out?" regarding their dog. JS was listening and absorbing what her mom was saying. There was nothing else in her experience.

Sample 3.3. JS was at the grocery store with her mom. JS was walking ahead of her mom. At the moment of the sample, JS was hearing her mom say to her, "slow down!" in an angry tone. JS was listening and absorbing what her mom was saying. There was nothing else in her experience.

Infrequently Occurring Characteristics

JS had six characteristics that each occurred once (4%) in her inner experience.

Focus on words (rather than sentences).

In one of her samples, JS was focused on a word rather than a sentence. In sample 2.3, described in detail in Inner Seeing section above, JS was innerly seeing the word "polis" (part of a sentence). JS was not attending to the rest of the sentence. "Polis" was the only word in her experience at the moment.

Emotion.

JS did not experience any feelings in any of her samples. However, during one sample, there may have been an ongoing emotion. In sample 4.6, described in detail in Happening Of section above, JS was laughing in an amplified way at something funny her friend had said; however, she was not directly experiencing a feeling (e.g., happy, humorous, annoyed) at the moment.

Doing of.

In one of her samples, JS was planfully involved in the completion of an activity. Here is the example:

> Sample 5.1. JS was text messaging her friend and, at the moment of the sample, was texting the word *class*. Before the sample, JS had thought the letter *c* and then pushed the key *c* in her phone, followed by thinking the letter *l* and then pushing the key *l* in her phone, followed by thinking the letter *a* and then pushing the key *a* in her phone. In her experience, JS was thinking the letter *ss*. The letters *ss* were present in her experience as a unit. She was not innerly saying *ss*, innerly hearing *ss*, or innerly seeing *ss*. JS was confident that in this experience there was an explicit thinking followed by a texting of each letter; think-text-think-text-think-text.

Inner Speech.

JS experienced inner speech in one sample. In sample 2.3, described in detail in Inner Seeing section above, JS was innerly saying the word "polis." In her experience, the innerly spoken word seemed to be extended in time in a way that external speech is incapable of, and had no meaning whatsoever.

Reading with comprehension.

In one of JS's samples, she was reading with comprehension. Here is the example:

> Sample 4.5. JS was reading the text message, "Are you home yet?" her mom had just sent her. In her experience, she was simultaneously looking at the text message and recognizing the meaning.

Unsymbolized thinking.

Unsymbolized thinking occurred once in JS's inner experience samples. Here is the example:

> Sample 3.5. JS was outside with her mom while her mom was cooking burgers on the grill. At the moment of the sample, JS was hearing her mom say "flip it" with regard to the burgers. JS was thinking, without words or images or other symbols, that she needed to go get the spatula and then flip the burgers. Even though this thought described a sequence of actions, the thought itself was not sequential—the notion of getting the spatula and then flipping was all present at the same time. JS was not sure whether there was also an inner seeing at the moment of the sample. It seems likely that this is a presupposition: that she always thinks in images.

Discussion

Overall, JS's samples of inner experience suggest that she is experiencing sensory awareness and inner seeing much of the time. Words were present only rarely in her inner experience, and, when they were present, her overall experience with them was unusual. JS had one sample of inner speech, one of the most frequent forms of words in experience. JS did not have any samples that included feelings.

CHAPTER 14

"TS"

TS was a 35-year-old Caucasian male who sampled with us in May and June 2011. TS received a laterality quotient of -45 on the Edinburgh Handedness Inventory (EHI; Oldfield, 1971) indicating that he is moderately left-handed. He received a GSI raw score of 0.316 (a T-score, compared to nonpatients, of 55) on the Symptom Checklist-90-R (SCL-90; Derogatis, 1994; Derogatis, Lipman, & Covi, 1973), suggesting the absence of clinically significant psychological difficulties.

Characteristics of Inner Experience

TS sampled on five separate occasions, collecting a total of 28 samples. Because Sampling Day 1 is considered training for participants, samples from this day were omitted and 24 of TS's samples were considered as reflecting his inner experience characteristics. The following characteristics of his inner experience will be discussed: sensory awareness, occurring in 17 samples (71%); multiple experience, occurring in 16 samples (67%); feeling, occurring in 11 samples (46%); inner seeing, occurring in 3 samples (13%); doing of, occurring in 3 samples (13%); anticipation, occurring in 3 samples (13%); emotion; occurring in 2 samples (8%); not semantic words, occurring in 2 samples (8%); and unsymbolized thinking, occurring in 1 sample (4%).

Sensory Awareness

Sensory awareness was the most frequently occurring characteristic in TS's inner experience, occurring in 17 of TS's samples (71%). Here is an example:

> Sample 5.4. TS was sitting on his couch eating a sandwich. At the moment of the sample, he was seeing his living room though he was not paying attention to any

particular aspect of the living room. He was feeling the sandwich in his left hand; this was a pressure against his hand, not the feeling of the roughness or softness of the bread. He was also feeling pressure in his cheeks, roof of mouth, and weight on his tongue from a bite of sandwich in his mouth. He was also tasting the saltiness and sweetness of the corned beef on pumpernickel of the sandwich.

In this sample, TS was experiencing multiple sensory awareness aspects all related to the act of eating his sandwich. In fact, all that was in his awareness was the sensory aspects of this activity. Including sample 5.4, TS had four samples in which sensory awareness was the only phenomenon present in his inner experience—that is, TS was not paying attention to anything other than the sensory aspects of his inner or outer environment. Here is another example:

Sample 2.2. TS was in the bathroom getting ready for the day. He had been positioning a contact lens onto the middle finger of his left hand with his right hand in preparation for inserting it into his eye. At the moment of the sample, he was feeling the contact lens on his left middle finger. He was also seeing the contact lens; simultaneously, he was also seeing the mirror, sink, and other items on the bathroom counter. These other items were as individually distinctly seen as was the contect lens; they were not merely part of the background of the contact lens activity. Thus, even though he was performing a very localized task (positioning the contact lens), he was also simultaneously seeing as part of his direct experience much that was irrelevant to the task.

Five of TS's sensory awareness samples involved the sensory awareness of words. Here is an example:

Sample 2.1. TS was on the social networking site Facebook on his computer. He was clicking on the link *profile* with the intention of removing an unflattering picture of himself. At the moment, he was trying to complete the aforementioned task. There was an active, conscious trying to get it done in his experience. That is, he was not idly or automatically accomplishing the task. He was also seeing the word *profile* on the computer screen, the rest of the computer, and the desk surrounding. The word *profile* was the center of his visual experience though he was not attending to the word for its meaning; that is, *profile* is seen as a visual object rather than a semantic word. He was also seeing all the irrelevant-to-the-task stuff on the computer screen. He was also feeling the mouse in his right hand. He was interested in the feeling of the mouse in his hand rather than manipulating the mouse.

In this sample, TS was not interested in the word *profile* for its meaning.

One of TS's sensory awareness samples involved the seeing of nothing. In this sample, TS was having a visual experience; however, the experience was of seeing blackness which happened to be an absence of light or nothing. Here is the sample:

Sample 4.2. TS had just lain down on the couch and closed his eyes. At the moment, he was seeing a fuzzy blackness that uniformly filled his visual field, like a black screen; however, he described the blackness as like an absence of light. He experienced himself to be seeing something (the blackness) though there was nothing to be seen. That is, he experienced himself to be seeing but not seeing anything. He was also experiencing a mental relief/relaxation/good

feeling. This mental relief/relaxation/good feeling was ongoing in his direct experience but not felt bodily.

In this sample, TS experienced a sensory awareness even when there was "nothing to be seen."

Sensory awareness was the most frequently occurring phenomenon in TS's inner experience. In such situations, it is reasonable to ask whether TS simply uses a language that sounds like sensory awareness rather than sensory awareness being a frequent phenomenon. The investigators note that during the expositional interviews, he confidently distinguished between experiences that did and did not include sensory awareness. Here is an example that does *not* contain sensory awareness:

> Sample 3.5. TS was sitting at his desk with his eyes directed at his desk, though he was not seeing the desk at the moment. He had been thinking about how he does not plan on telling his parents about his upcoming motorcycle trip until he returns from the trip. He had been (and perhaps still was) wondering what he will tell his parents when he returns from the trip—wondering how he will say it—but it seems that this wondering, while perhaps cognitively ongoing, was not experienced at the moment. At the moment, he was experiencing a rising sense of obligation, a mental experience that could not be further described. He also may have been experiencing an awareness of the ongoing thought process regarding how and what he will tell his parents, but he was not experiencing the thought itself.

In this sample, TS's eyes were aimed at the desk, but he was not seeing the desk at the moment.

Multiple Experience

Sixteen of TS's samples involved multiple experiences (67%). In these samples, TS was attending to a welter of environmental stimuli (inner and outer) despite the relevancy to the target of his experience at the moment. Here is an example:

> Sample 3.1. TS was brushing his teeth. At the moment, he was tasting the minty flavor of the toothpaste; feeling the bristles of the toothbrush in his mouth; feeling the hard plastic of the toothbrush in his mouth; and feeling the hard plastic of the toothbrush in his left hand. The act of brushing his teeth was not in his experience. He was also seeing the bathroom mirror, his reflection in the mirror, counter, and surrounding wall. He was attending to the visual seeing at a low level. He was not paying attention to any particular aspect of the bathroom. All the sensory aspects of this—both the physical sensations and the visual—were understood to be somehow unified; one thing with several aspects.

In this sample, similar to other samples of TS's inner experience, TS was not interested in any one aspect of brushing his teeth. Rather, he was interested in multiple sensations that were coming at him equally more or less. Similarly, TS was attending to multiple visual stimuli, granted at a low level in this particular example, rather than focusing on one relevant visual stimulus. This is consistent across TS's inner experience. The same can be said of TS's feeling samples, discussed below. Rather than directly experiencing one salient feeling, a variety of emotions, both positive and negative, come at TS. After weighing all of them, he is able to say whether the overall experience was negative or positive, depending on the weight of each. It is as if TS experiences the ingredients that

make up his inner and outer environments and present themselves to him rather than seeking out a stimulus to focus on and experience.

Six of TS' multiple experience samples include one or more sensory awareness along with a feeling. The other combinations of multiple experiences occurred with lower frequency. Here is an example of sensory awareness/feeling:

> Sample 4.4. TS was sitting on the couch, changing the channels. At the moment, he was feeling the controller sitting on his right hand and feeling his right thumb resting on the up-channel button. At the same time, he was seeing the TV program, an episode of *South Park*. TS was not directly attending to the *South Park* scene, but rather he was attending to the visual aspects of the *South Park* display. He was also, but somewhat less distinctly, seeing the rest of the TV screen, the TV cabinet, and the adjacent parts of the living room. He was enjoying the *South Park* episode, which he had been watching for perhaps a minute as he channel surfed, and he was experiencing in some way this enjoyment even though he was particularly attending to the visual aspect of *South Park* rather than its story line or content. He was also experiencing a mental indecisiveness and curiosity--he was curious about what else was on TV. The investigators questioned him carefully about the degree to which the off-center visual characteristics (TV cabinet, living room, etc.) were present, and as carefully as could be ascertained, he was indeed directly experiencing these things. It was not merely that they were present and could be looked at in response to the beep.

In this example, TS was feeling the controller (sensory awareness), feeling his right thumb resting on a button (sensory awareness), seeing the visual presentation of the TV (sensory awareness), and experiencing a mental indecisiveness or curiosity (feeling). He was attending to separate experiences (the feeling of the controller and his thumb, the visual presentation of the show, and a mental indecisiveness/curiosity) simultaneously.

Feeling

Eleven of TS's samples (46%) involved his experience of feeling. None of TS's samples of feeling involved a physical representation of the feeling. Six of his samples involved mentally experiencing the feeling. Here is an example:

> Sample 5.5. TS was sitting on the couch. He was debating on whether or not he should apply for another job or call it a night, but this cognitive debate was not in his experience. At the moment, he was seeing his living room. He was also experiencing a mental state of tension and indecisiveness. [It was his sense that this tension/indecisiveness arose from his cognitive debate, but that is an inference.]

Including sample 5.5, just described, there were five samples where TS was experiencing some kind of mental tension or pressure. Here are other examples:

> Sample 3.3. TS was sitting at his desk, looking out the window. He was experiencing a sense of indecisiveness or tension, a mental pressure about having to make a decision. The indecisiveness/tension/pressure was regarding whether or not he should wait until his next oil change to check his brakes, but this content (the brakes) was not directly in his experience at the moment. [It was as if the brake-decision process was taking place somewhere in TS outside of his

awareness, leaving in its wake, so to speak, the indecisiveness/tension/pressure which was directly experienced.] He was also seeing (directly in his experience) the window, shades, and surrounding wall in his bedroom.

Sample 3.6. TS was sitting at his desk. At the moment of the sample, he was seeing the words *St. Francis U* written in red ink on a notepad. TS was seeing the words both for their sensory qualities (red ink against a white background) and as a reminder of wanting to apply to schools. TS was also seeing the rest of the notepad, the desk, and rest of the bedroom at the same time. He was also experiencing a mental pressure of needing to complete certain tasks today.

Sample 5.2. TS was driving on South Eastern towards a grocery store, Albertsons. He saw through his windshield the street, cars ahead, and stores. He simultaneously saw the instruments and window inside the cabin of his vehicle. He was not focused on any particular aspect of the seeing; in particular, he was not seeing the street or the cars with any more focus or attention than the objects inside the car. He was also hearing the humming of his jeep. He was also feeling the pressure of the steering wheel against his hand; this was a felt pressure on his hand, not a sensation of the steering wheel itself. He was experiencing a mental sense of tension and impatience.

Similar to TS's other feeling samples discussed below, it is not clear whether tension and pressure should be called feelings. Certainly they are not typical of the feelings that other DES participants experience.

There were four samples where TS seemed to be undergoing a simultaneous collection of unintegrated positive and negative states that were perhaps slightly

differentiated, but which do no cohere or coalesce into a feeling or a feeling that DES finds in other subjects. Here are examples:

> Sample 2.5. TS was sitting at his desk. At the moment, he was innerly seeing a photograph of his girlfriend, Carla. That is, he was not innerly seeing Carla— he was seeing a photograph of Carla. He was seeing Carla's head from the neck up. Carla's head was slightly tilted to her right such that he was seeing the left side of her face. He was seeing this in color. He was seeing the neckline of her yellow shirt, blue sky, and a little bit of clouds. The innerly seen Carla-photograph was, as far as he could tell, an accurate representation of the real photograph. He was also experiencing an undifferentiated multitude of positive and negative mental emotions including uncertainty, attraction, pressure to make a decision regarding the relationship, ambivalence, and a sense of security. The valence of this experiencing was, on balance, positive, but the individual ingredients were both positive and negative. He did not experience any of the feelings separately or distinctly, but rather felt an undifferentiated *valenced something* that could be said to include uncertainty, attraction, pressure to make a decision regarding the relationship, ambivalence, and a sense of security.
>
> Sample 4.5. TS was sitting at his desk submitting a job application to the University of Limerick in Ireland. At the moment of the sample, he was focused on the word *Limerick* as it was displayed on the screen. However, this focus was not on *the word* "Limerick" but on the visual display "Limerick." That is, he was *not* seeing *a word*; he was seeing a visual display. He was also seeing the rest of the webpage, computer, desk, and rest of his room to a lesser degree. He was

experiencing a host of positive and negative sensations related to the potential of living and working in Ireland, which he described as including apprehension and excitement. Overall, the sensation was more excitement and apprehension thus the general sensation was more positive.

Sample 5.3. TS was sitting at his desk looking at the computer screen. At the moment of the sample, he was focused on the *biesieda* part of the e-mail address michael.biesieda@unlv.edu. He was still seeing the rest of the e-mail address, the computer screen, desk, and part of his bedroom; however, biesieda was central in his visual experience. He was not attending to biesieda as a word or name or email address; rather he was attending to its visual presentation. To a lesser degree, he was attending to the blackness of the letters against the white background. He was also experiencing a sense of happiness, relief, uncertainty, and the urge to get answers to questions, all one "ball" of experience with those aspects. Some of these aspects were positive, some negative; the overall sense was more positive than negative.

There does not seem to be a clear answer to the question of whether these experiences should be called emotional. The samples contain *bits of* things that might be called emotion or feeling (uncertainty, attraction, etc.), but even those are not unequivocally an emotion: should uncertainty, attraction, pressure to make a decision be called emotions? And even if they are called emotions, they are not coherent emotions or even several coherent emotions, much less coherent feelings—his experiences are more like the ingredients of emotion/feeling rather than the emotion or feeling itself. And even if it is

accepted that they are feelings, they are only a minor aspect of his experience, typically the third or less salient aspect.

There were three samples where TS was experiencing some kind of uncertainty, interest, or anticipation. Here are the samples:

Sample 2.6. TS was sitting at his desk, applying for jobs. At the moment of the sample, TS was apprehending where he will be living and what he will be doing. This was not a cognitive process, however. TS was experiencing a sense of uncertainty, opportunity, and anticipation. This seemed to be a mush of emotions that were, taken together, more positive than negative.

Sample 3.2. TS was lying on his bed, reading a book. At the moment, he was seeing the word *Kolya*, the name of a male character in the book. He was also seeing the words surrounding Kolya, the rest of the book, and his room. The word Kolya was clear. The visual seeing became progressively less clear the further removed from *Kolya*. He was not attending to the word Kolya in context, and, at the moment, he was unaware of the rest of the sentence, paragraph, etc. He was also wondering what Kolya was going to do next. This sensation involved an interest and curiosity surrounding what will happen next with the character. This was a state of curiosity and interest rather than a cognitive thought process.

Sample 4.4. TS was sitting on the couch, changing the channels. At the moment, he was feeling the controller sitting on his right hand and feeling his right thumb resting on the up-channel button. At the same time, he was seeing the TV program, an episode of *South Park*. TS was not directly attending to the *South*

Park scene, but rather he was attending to the visual aspects of the *South Park* display. He was also, but somewhat less distinctly, seeing the rest of the TV screen, the TV cabinet, and the adjacent parts of the living room. He was enjoying the *South Park* episode, which he had been watching for perhaps a minute as he channel surfed, and he was experiencing in some way this enjoyment even though he was particularly attending to the visual aspect of *South Park* rather than its story line or content. He was also experiencing a mental indecisiveness and curiosity--he was curious about what else was on TV. The investigators questioned him carefully about the degree to which the off-center visual characteristics (TV cabinet, living room etc.) were present, and as carefully as could be ascertained, he was indeed directly experiencing these things. It was not merely that they were present and could be looked at in response to the beep.

Here again, it is not clear whether we should call uncertainty, interest, or anticipation feelings or emotions. Certainly they are not typical of the feelings that other DES participants experience.

There were two samples where TS was experiencing happiness or a good feeling. One of those was just described: at sample 4.4 he was enjoying the *South Park* episode. In sample 4.2, described in detail in Sensory Awareness section, TS was seeing blackness. He was also experiencing a mental relief/relaxation/good feeling.

Inner Seeing

TS's inner experience featured inner seeing in three of his samples (13%). One example, in sample 2.5, has already been described in Emotion section above. In this example, TS was innerly seeing a photograph of his girlfriend Carla. He was seeing

Carla's head from the neck up. In the innerly seen photograph, Carla's head was tilted and TS was seeing the left side of her face. It is worth emphasizing that TS was not seeing Carla; he was seeing a photograph of Carla. Here is another example:

> Sample 3.4. TS was sitting at his desk with a pair of jeans draped over his legs. He had been thinking of how to sew the hole in the crotch of these jeans. At the moment, he was seeing the physical jeans, his legs, the chair he was sitting on, and the carpet. At the same time, he was seeing an imaginary needle in his left hand and green thread dangling from the thread. He was also seeing a few imaginary strands of green thread sewn into his real blue jeans as if he were halfway done sewing them. The strands were seen as messy and uneven. He was unable to differentiate whether there was an explicit, additional thought process regarding how to sew the jeans or if the imaginary needle and thread represented such thought process.

In this sample, TS was projecting an innerly seen or imaginary image onto the physical world. His seeing involved a mixture of seeing the external world and inner seeing combined together into one coherent seeing. Although TS has a small percentage of inner seeing in his experience, when he does experience inner seeing, it is as if he blends his inner images with his outer world.

Doing Of

In three samples of TS's inner experience (13%), TS was experientially involved in the deliberating and directing of the mental processes or physical actions. This phenomenon is called "doing of." One example has already been discussed in Sensory Awareness section above. In sample 2.2, TS was concentrating on the task of putting a

contact lens in his eye. He was consciously adjusting the lens with his right hand. Here is another example:

> Sample 5.1. TS was walking towards his mailbox, outside in his apartment complex, to get his mail. At the moment, he was seeing the street, mailboxes ahead, apartment buildings, Sunset Road, and the airport; he saw all these simultaneously in his direct experience. He was also experiencing motion or his movement through space. He was feeling directed pressure on the bottom of his feet as part of the motion, feeling the contribution of his feet to his motion. That is, he was not merely moving through space; he was directly experiencing that movement.

Anticipation

Three of TS's samples of involved an anticipatory state (13%). One, sample 2.3, discussed in the Emotion section below, involved anticipating feeling carefree, but not actually experiencing the carefree-ness. Here is another example:

> Sample 4.3. TS was standing in his kitchen raising a shot glass of whiskey in his left hand. In his experience, he was feeling the shot glass in his left hand, but he was not paying any particular attention to any of its aspects—not, for example, to the smoothness or hardness, or coldness of the shot glass. He was also seeing the yellowish-brownish liquid inside the shot glass, which he knew to be whiskey. He was more attending to the yellowish-brownish of the liquid than to its whiskeyness. He was also anticipating the sensory aspects of the about-to-take-place drink: the sweet taste, the feel of the liquid, the burning sensation, etc. There seemed to be some evaluation of these sensations. Some were positive

(taste, feel, etc.) and some were negative (burn). The positive and negative anticipated sensations were bundled up together and the resulting anticipation was, "on balance," more positive than negative.

One of TS's anticipation samples involved some kind of searching. In this sample, TS was actively involved in looking for some specific thing. This looking was more than a sensory awareness or perceptual experience of seeing the stimuli. Here is the example:

> Sample 4.1. TS was sitting on the couch reading a book. At the moment, he was seeing the word *aberration*. He was focused on that word but was also seeing the sentence of which it was a part, *"What aberration?"* including the quotation marks, question mark, and *What* were in his experience to a lesser degree. He was also seeing the blackness of the print against the yellowish-white pages of the book, the rest of the book, and his legs, couch, and carpet. The seeing decreased in focus the further away from *aberration*. Equal or perhaps slightly more in his experience he was also "mentally scanning" or recalling what the definition of the word aberration is. This involved a recalling of the dictionary-type definition of *aberration* as well as what that word meant in the present context (more on the definition). This scanning was a mental search or waiting-for, not a visual process.

This is the only occasion in which explicit words with meaning appeared in TS's inner experience. In this sample, TS was seeing the word *aberration* and mentally scanning for the definition. When TS does, for whatever reason, call for the meaning of a word he seems to actively seek out and search for the definition.

Thus TS on occasion anticipated feeling, finding, or sensing something.

Emotion

In DES (and many others') terminology, "emotion" refers to an ongoing process that might be called affective, and typically includes sadness, anxiety, fear, anger, and so on. "Feeling" is the experience of emotion. Emotional processes may well be occurring but are outside of direct experience; those are emotions but not feelings. TS had two samples (8%) which might be said to involve emotion, depending on how the term "emotion" is defined, but none which might uncontroversially be said to include feeling (see Feeling section above). Here is an example:

> Sample 2.3. TS was innerly seeing a motorcycle as if he were sitting on it, seeing the gas tank, instruments, his forearms, hands, (straight) highway, and surrounding desert. The intricacies of the motorcycle were seen clearly but not greatly detailed. He was innerly seeing this in color (the motorcycle was grey). He was also anticipating feeling carefree and thrilled, but the carefree-ness and thrilled-ness were not experienced. That is, he was directly experiencing anticipation, and the anticipation was of feeling carefree and thrilled, but he was not feeling carefree or thrilled.

In this sample, TS was anticipating a feeling but he was not directly experiencing that feeling at that moment.

TS's other sample of emotion involved the recollection of a feeling though he was not directly experiencing the feeling at the moment:

> Sample 4.6. TS was lying on the couch, watching the movie *Star Wars* on TV. He was seeing the space craft and desert on the TV screen. He was also seeing

the rest of the TV and living room within his visual field. He was also recalling having experienced a sense of excitement, being challenged, competition, winning, and frustration during a time he played the video game version of the movie. He was not directly experiencing those sensations at the moment, he was recalling having experienced them.

This sample is, in a sense, opposite from his anticipation of a feeling sample. Rather than having his attention directed at the future, his attention is focused on the past. In both samples, however, the notion of a feeling is present though TS is not directly experiencing a feeling.

Not Semantic Words

Words were present in five of TS's inner experience samples. In all five samples, TS was attending to the visual characteristics of the words. In two of these samples (8%), TS was only attending to the visual presentation of the word and not attending to the word in context or for meaning. One example has already been described in detail in Sensory Awareness section above. In sample 2.1, TS was seeing the word *profile* on the computer screen. TS was not attending to the word for its meaning. Here is the other example:

Sample 5.6. TS was sitting on his couch with a map of Washington on his lap. He had been planning his upcoming trip and trying to decide on a path to take. At the moment, the notion that surface streets have a long list of directional changes which aren't easy to memorize and difficult to look up when on a motorcycle was present to him without words, images, or any other symbolic presentation. He was also seeing the word *Seattle* on the map, the words and lines on the rest of the

map, his legs, couch, and carpet around him. The word *Seattle* was central in his visual experience; however, he was not attending to the wordness of the word. Rather it was as if he was seeing a visual display which happened to involve semantic symbols.

In these samples, it is as if TS is able to separate words from their meaning and attend to their visual display. At any given moment, words in TS's experience do not appear to hold communicative characteristics; they are viewed as objects rather than semantic carriers. Meaning sometimes seemed to pass through TS without his paying much if any attention to it.

Unsymbolized Thinking

Unsymbolized thinking occurred in one of TS's samples (4%). This example has already been described in detail in Not Semantic Words section above. In sample 5.6, the notion that that surface streets have a long list of directional changes was present without words, images, or any other symbolic representation.

Discussion

Overall, TS's samples of inner experience suggest that he experiences sensory awareness (71%), multiple experience (67%), and feeling (46%) much of the time. It is noteworthy to mention that, although TS experienced feeling much of the time, his samples of feeling are not typical samples that other DES participants experience. Words occurred only rarely in TS's inner experience, and his overall experience with words was unusual. Meaning did not seem directly connected to words, that is meaning could be absent when words were present.

CHAPTER 15

ACROSS-PARTICIPANTS RESULTS AND DISCUSSION

The previous 10 chapters were dedicated to describing the experience of the 10 participants (AH, BP, CL, DH, NT, MM, MO, KA, JS, TS). Each chapter provided an idiographic description of each participants' inner experience. In this chapter, the collection of samples across all participants will be considered and the characteristics, patterns, and tendencies that emerged will be discussed.

The present study was designed with three objectives in mind: 1) to explore the inner experience of left-handers; 2) compare the inner experience of the 10 left-handed participants to the inner experience of the left-handed participants in Mizrachi (2010); and 3) to compare the inner experience of left-handers to the inner experience of the general population. The investigators were interested in the inner experience of left-handers not because they themselves are left-handed (both of the two investigators happen to be right-handed); however, given the research surrounding implications of left-handedness, the investigators were interested in possible inner experiential differences between left- and right-handers. Results are divided into five sections. The first section presents the participants' frequently occurring characteristics. The second section discusses other observations found across participants. The third section reviews the present results compared to the literature. The fourth section reviews the overall findings of the present study. The last section of this chapter discusses the limitations of this study and directions for future research.

The across-participants results are based on a total of 217 samples of inner experience from 10 left-handed participants. Their characteristics are shown in Table 2.

The table is arranged by participants' scores on the Edinburgh Handedness Inventory (EHI), a quantitative assessment of handedness administered to evaluate handedness laterality. As evidenced by the participants' EHI scores ranging from -100 (strongly left handed) to -45 (moderately left-handed), all of the participants were moderately to strongly left-handed. As can be seen in Table 2, degree of laterality, at least within this fairly narrow range of laterality, does not seem to impact frequency of characteristics of inner experience in the 10 participants. Therefore, the results discussed below apply to the left-handed participants as a group, not merely to the more extremely left-handed participants. Nonetheless, the table is arranged by decreasing EHI scores.

Table 2

Frequently occurring or otherwise noteworthy characteristics of inner experience

	Participant											**Comparison[a]**	
Characteristic	AH	BP	CL	DH	NT	MM	MO	KA	JS	TS	All	Mizr. 2010	H&H 2008
EHI	-100	-75	-75	-73	-68	-67	-53	-53	-50	-45	-66	-74.5	
Age	18	18	18	18	28	18	18	21	19	35	21.1	18.5	
Gender	M	F	F	M	M	F	F	F	F	M			
Number of samples	20 9%	20 9%	18 8%	24 11%	23 11%	20 9%	23 11%	21 9%	24 11%	24 11%	217 100%	101 100%	
Sensory Awareness[b]	**14 70%**	**5 25%**	**7 39%**	**11 46%**	**16 70%**	**12 60%**	**18 78%**	**2 10%**	**5 21%**	**17 71%**	**107 49%**	**35%**	**22%**
Multiple Experience	6 40%	1 5%	1 6%	4 17%	10 43%	2 10%	0 0%	4 19%	0 0%	16 67%	44 20%	16%	
Inner Seeing	**2 10%**	**0 0%**	**6 33%**	**9 38%**	**2 9%**	**0 0%**	**2 9%**	**13 62%**	**5 21%**	**3 13%**	**42 19%**	**24%**	**34%**
Not Semantic Words	3 15%	5 25%	1 6%	4 17%	10 43%	5 25%	2 9%	5 24%	3 15%	2 8%	40 18%	*5%*[c]	
Unsymbolized Thinking	**13 65%**	**3 15%**	**1 6%**	**7 29%**	**3 13%**	**7 35%**	**4 17%**	**0 0%**	**1 4%**	**1 4%**	**40 18%**	**20%**	**22%**
Inner Speech	**4 20%**	**8 40%**	**2 11%**	**7 29%**	**0 0%**	**0 0%**	**2 9%**	**3 14%**	**1 4%**	**0 0%**	**27 12%**	**9%**	**26%**
Feeling	**3 15%**	**0 0%**	**6 33%**	**1 4%**	**1 4%**	**0 0%**	**2 9%**	**1 14%**	**0 0%**	**11 46%**	**25 12%**	**4%**	**26%**
Doing Of	0 0%	1 5%	0 0%	3 13%	8 35%	3 14%	0 0%	3 14%	1 4%	3 13%	22 10%	8%	
Inner Hearing	3 15%	2 10%	1 6%	1 4%	0 0%	1 5%	2 9%	7 33%	0 0%	0 0%	17 8%	4%	
Emotion	4 20%	0 0%	2 11%	3 13%	2 9%	0 0%	0 0%	1 5%	1 4%	2 8%	15 7%	*5%*[c]	

Note. [a]Frequencies from Mizrachi (2010) and Heavey and Hurlburt (2008). [b]Main characteristics from Heavey & Hurlburt (2008) are in **bold face**. [c]Frequencies of Not Semantic Words and Emotion were not reported in Mizrachi (2010), italicized frequencies presented in table were reconstructed from her data.

As shown in Table 2, each participant contributed approximately ten percent of the total number of samples: AH contributed 20 of these samples (9%), BP 20 (9%), CL 18 (8%), DH 24 (11%), NT 23 (11%), MM 20 (9%), MO 23 (11%), KA 21 (9%), JS 24 (11%), and TS 24 (11%). Sampling began in September 2010 and was completed in June 2011.

Three participants completed sampling within one month of beginning participation (MM, KA, and MO) and seven participants completed sampling within two months (AH, CL, JS, NT, BP, DH, and TS). Each participant participated in five sampling days, collecting an average of five (range: three to seven) samples on each of those days. Within 24 hours of collecting samples, each participant participated in an expositional interview; thus there were five expositional interviews per participant. Data from the first sampling day and its expositional interview was excluded from the idiographic analysis for each participant as well as from the collective pool of samples across all participants; therefore four sampling days and expositional interviews were included in the results and discussion.

Frequently Occurring Characteristics

The frequently occurring characteristics of the inner experience of the participants are presented in Table 2 in descending order. The rightmost column of Table 2 shows for comparison the frequencies of the main five characteristics reported by Heavey and Hurlburt (2008). The main five characteristics reported by Heavey and Hurlburt (2008) are shown in bold face in Table 2: sensory awareness, unsymbolized thinking, inner seeing, feeling, and inner speech. Overall, the findings of the present study suggest that the characteristics of inner experience in left-handers are quantitatively and qualitatively

different from the characteristics of inner experience in the general population, as described by Heavey and Hurlburt (2008).

The results of the present study exploring the inner experience of left-handers are in agreement with the results of Mizrachi (2010), which also explored the inner-experience of left-handers. Both found sensory awareness in left-handers to occur nearly twice as much as the frequency reported by Heavey and Hurlburt (2008) in the general population. Similarly, the present study and Mizrachi (2010) both found about a 20% frequency of inner seeing in their left-handers, which is slightly more than half that reported by Heavey and Hurlburt (2008). The present study and Mizrachi (2010) both found unsymbolized thinking occurring around a frequency of 20% in left-handers, as did Heavey and Hurlburt (2008). Inner speech occurred at a frequency of around 10% in both the present study and Mizrachi (2010), less than half of the frequency of inner speech reported by Heavey and Hurlburt (2008). The frequency of feeling in both the present study and Mizrachi (2010) was less than half the frequency found in Heavey and Hurlburt (2008). Thus it is concluded that the inner experience of left-handers differs from the inner experience of the general population, as described by Heavey and Hurlburt (2008).

Sensory Awareness

Sensory awareness is the experience of paying particular attention to some sensory aspect of the internal or external environment. In such experiences, participants do not merely attend to an object or stimulus for its functional use, they directly focus experientially on some particular sensory quality of the object. As shown in Table 2, sensory awareness was the most frequently occurring characteristic of inner experience

across participants in the present study (49%), and all 10 subjects experienced it at some point in their sampling. Moreover, sensory awareness was the most frequently occurring characteristic in 8 of 10 participants' inner experience (MO, TS, NT, AH, MM, DH, CL, JS). Thus sensory awareness was the highest frequency experiential category both across participants and within most participants. There was variability in sensory awareness frequency across participants, ranging from 10% to 78%.

This result replicates the finding of Mizrachi's (2010) study of left-handers: sensory awareness was the most frequently occurring phenomenon there as well, where it occurred at a frequency of 22%. Sensory awareness was the most frequently occurring characteristic in 3 of her 6 participants' inner experience (Mizrachi, 2010). On the other hand, sensory awareness was the least frequent of the main five characteristics (tied with unsymbolized thinking) in Heavey and Hurlburt's stratified random sample (Heavey & Hurlburt, 2008). Although sensory awareness was the most frequently occurring characteristic across participants, one participant, KA, reported only two sensory awareness samples in her inner experience. Of the 10 participants, KA was the only participant who had substantially fewer sensory awareness samples than did the average participant in Heavey and Hurlburt (2008). KA's inner experience differed from the other nine participants in three other ways. She was the only participant who did not have any samples of unsymbolized thinking, and she experienced both inner seeing and inner hearing more than did the other participants. Of the female participants, KA experienced multiple experience substantially more than did the others.

The majority of instances of sensory awareness described by participants were similar in nature and content to those reported by Heavey and Hurlburt's general

population (Heavey & Hurlburt, 2008). However, three noteworthy patterns of sensory awareness emerged in participants' inner experience samples: sensory awareness of words or letters; spreading of sensory awareness; and sensory awareness of an imaginary stimulus.

Five participants (TS, BP, NT, DH, AH) had samples of the sensory awareness of words and/or letters (total of 20 out of 107 sensory awareness samples). TS, BP, and NT all had five samples of sensory awareness of words. DH had three samples, and AH had two. In these samples, the participants were attending to the visual or auditory characteristics of seen or heard words rather than attending to the meaning of those words. For example, in sample 5.1, NT was seeing fuzzy black shapes against a white background. Those fuzzy shapes happened to be letters in a textbook; however, he was not recognizing them as letters at the moment. This is an example of attending to the visual qualities of seen words. In sample 4.1, BP's grandmother was talking. At the moment of the sample, BP was hearing the vocal/auditory characteristics of her grandmother's voice; what the grandmother was saying (that she did not want Sarah Palin's daughter to be on *Dancing with the Stars* any more) was not in her experience. As mentioned before, the participants were not attending to the functional quality or semantic meaning of the letters and words in these samples, they were instead experiencing their sensory quality.

The sensory awareness of words was also found in Mizrachi's (2010) left-handed participants. For example, one of Mizrachi's (2010) participants, NH, was attending to the sensory aspect of the letter "F" in the word "Forever." Sensory awareness of words was not reported by Heavey and Hurlburt (2008). It is Hurlburt's impression (personal

communication, 2010) that sensory awarenesses of words are rare in the general population. See also the Not Semantic Words section below.

Three participants' sensory awareness samples involved the experienced spreading of a sensory phenomenon (total of 11 samples). Six of AH's sensory awareness samples involved movement or spreading. For example, in sample 4.5, AH was experiencing throbbing originating in the inner portion of his head and extending outwards towards his skull. MO experienced spreading of sensory awareness in four of her samples, all four of which involved pain. For example, in sample 4.2, MO was feeling a surge of pain on the left part of her bottom lip. MM also experienced the spreading of pain in one of her samples. For example, in sample 4.6, she was experiencing oscillating stomach pain and discomfort spreading throughout the trunk of her body. In these samples, the participants' were attending to some internal sensation that, at the moment, involved some type of movement.

The third characteristic that emerged in five participants' sensory awareness samples was the sensory awareness of imaginary stimuli (CL, AH, JS, MO, NT) for a total of seven samples. CL and AH both had two samples of sensory awareness of imaginary stimuli. JS, MO, and NT all had one sample. In these samples, the participants were attending to the sensory qualities of some imaginary stimulus. Each sample involves an inner seeing, inner hearing, or imaginary tasting. For example, in sample 2.3, CL was attending to the ugliness of the whitish/yellowish wall color of an innerly seen classroom. In sample 2.1, AH was innerly hearing an imaginary, "faded version" of a text message notification sound, and he was particularly attending to the faded sensory aspects of this sound. In sample 3.5, MO was tasting a salad; however, she

was not actually eating a salad and did not have any part of a salad in her mouth at the moment.

Thus the first general conclusion, the result of replication but with the caveat that the present findings are based on small samples, is that sensory awareness is a frequent phenomenon in left-handers, more frequent than in right-handers. The instances of sensory awareness of words or significance for words suggest that left-handers may have an unusual way of dealing with letters or words in their experience. The instances of spreading of sensory awareness suggest that sensory awareness in left-handers is specific and differentiated. Lastly, sensory awareness of imaginary phenomenon may suggest that sensory awareness is so central in the inner experience of left-handers that it also occurs during imaginary experiences. This finding applies to most but not all left-handers.

Multiple Experience

Multiple experience consists of two or more separate, different, but simultaneous experiences. Multiple experience occurred at a relatively high frequency across participants (20%), with eight participants experiencing samples of multiple experience. Mizrachi (2010) found a similar frequency of multiple experience in her left-handed participants (16%) (Mizrachi, 2010). Heavey and Hurlburt (2008) did not provide a specific frequency for multiple experience except to say that no characteristic other than the main five had a frequency higher than 3%. Thus it is tentatively concluded that left-handed participants may have a higher frequency of multiple experience than do those in the general population.

As mentioned above, 8 of 10 participants had samples of multiple experience in their samples. TS's inner experience included the most frequent multiple experience samples. Fourteen of his 16 multiple experience samples involved sensory awarenesses, five of which involved multiple sensory awarenesses. For example, in sample 5.4, TS was feeling the pressure of a sandwich against his left hand. He was also feeling pressure in his cheeks, roof of mouth, and weight on his tongue from a bite of sandwich in his mouth. He was also tasting the saltiness and sweetness of the corned beef on pumpernickel of the sandwich. The most frequently occurring combination of his multiple experience samples included one or more sensory awarenesses along with an emotion. For example, in sample 4.5, TS was focused on the word *Limerick* as it displayed on his computer screen. He was attending to the word's visual characteristics and not the meaning of the word. He was also experiencing a host of positive and negative sensations related to the potential of living and working in Ireland. TS's inner experience stood out from the other participants in that he also experienced substantially more feeling than the other participants (see Feeling and Emotion section below). His feeling samples make up nearly half the total feeling samples in the study. TS also experienced not semantic words with a lower frequency than the other participants.

NT's inner experience featured multiple experience in 10 of his samples. Nine of his samples involved sensory awarenesses, three of which involved multiple sensory awarenesses. For example, in sample 4.4, NT was chewing a pastry. In his experience was the sweetness and chewyness of the pastry. He was also simultaneously looking at jars of brown caramel and experiencing the brownness of the jars. He was also thinking about the vivid sensory awarenesses in the inner experience of schizophrenics (a thought

without any symbolic representation). Thus there were three separate strands of experience present simultaneously.

AH also had a high frequency of multiple experience in his samples. Four of his six multiple experience samples involved sensory awareness. For example, in sample 3.5, he was drawn to the gloomy, gray colors of the clouds. He also smelled the rain. He was also feeling relaxed and calm. He may also have been thinking, *I love this weather*. The rest of the participants experienced multiple experience substantially less than TS, NT, and AH, with a frequency of 19% or less.

The frequency of multiple experience in the present study and Mizrachi's (2010) left-handed participants (20% and 16%, respectively) compared to the frequency of 3% or less in Heavey and Hurlburt (2008) leads to the tentative conclusion that left-handers' inner experience includes more multiple experience than the general population. This finding applies to most but not all left-handers.

Inner Seeing

Inner seeing is the experience of innerly seeing things that are not immediately present in the external environment. As shown in Table 2, inner seeing was the third most frequently occurring characteristic of inner experience across participants (19%).

Similar to the present findings, Mizrachi (2010) found an inner seeing frequency of 24% in her left-handed participants. The frequency of inner seeing in the present study is roughly half the overall inner seeing frequency of 34% found in Heavey and Hurlburt's participants (Heavey & Hurlburt, 2008). Furthermore, inner seeing was the most frequently occurring main characteristic in Heavey and Hurlburt's participants (Heavey

& Hurlburt, 2008). Thus inner seeing appears to occur less frequently in left-handers than the general population, as reported by Heavey and Hurlburt (2008).

In the present study, eight participants experienced inner seeing at some point in their sampling (KA, DH, CL, JS, TS, AH, MO, NT). Some samples of inner seeing were similar to Heavey and Hurlburt's sample (Heavey & Hurlburt, 2008). Some inner seeings were of things previously seen in actuality (similar to Heavey & Hurlburt, 2008); some were of things not previously seen (similar to Heavey & Hurlburt, 2008).

The left-handed participants in this study did not experience inner seeing much of the time; however, one participant (KA) did experience inner seeing frequently. KA's inner seeing frequency of 62% is triple the average frequency of 19% found across left-handed participants and double the inner seeing frequency of 34% found in Heavey and Hurlburt's participants (Heavey & Hurlburt, 2008). Even though KA experienced many inner seeing samples, her samples were not straightforward.

Two noteworthy and atypical characteristics emerged in KA's inner seeing samples: 1) her seeings "populated themselves" or assembled slowly; and 2) she saw light coming from the left. For example, in sample 3.6, KA was innerly seeing the head of her ex-boyfriend diagonally such that his head was directed slightly to his right (KA's left). She was unable to see the details of his face clearly as if his face was covered by a cloudy or foggy glass. The inner image of KA's ex-boyfriend's head "populated itself," came together slowly in her experience—that is, the image did not appear all together at once in KA's experience. Despite happening slowly in KA's experience, KA was under the impression that if they could be clocked in the external world the coming together of the pieces happened so rapidly so that, at the moment of the sample, KA was already

seeing his whole head. KA was also under the impression that the population was done and the unclearly seen face of the ex-boyfriend would remain unclear. In sample 4.2, KA was innerly seeing an image of her friend Ramona, a boy named Sam, and herself. The scene was illuminated by light coming from the upper left; the light was part of KA's experience at the moment. The light seemed to come from a lamp post light, but the lamp post itself was not seen. As previously mentioned, KA's inner experience also differed from the other participants' in that she was the only participant who did not experience unsymbolized thinking. Among the female participants, KA experienced multiple experience substantially more.

As evidenced by the differences in frequencies between left-handers and the general population reported above, inner seeing occurs at a substantially lower frequency in left-handers. And, when inner seeing does occur, it occurs differently from the inner seeing found in the general population. For example, KA who experienced the highest frequency of inner seeing samples did not have typical and straightforward samples of inner seeing. Rather her samples involved a slow assembling of the inner image. The occurrence of not fully developed innerly seen images was also found in three other participants' inner experience samples.

Including KA, four participants' (KA, JS, DH, MO) inner seeing samples involved an incomplete image, including a not fully developed innerly seen image or some type of coming together of the image. In these samples, participants were not immediately seeing an image the way most people see it, the inner image was incomplete in some way. Either the inner image had not completely formed in experience (KA, MO) or the colors of the inner image were somehow incomplete (JS, DH). The images in

these samples took time to form. As discussed above, four of KA's inner seeing samples involved a slow assembling or coming together of the innerly seen image.

Four of JS's samples involved innerly seeing images in dull colors. For example, in sample 2.1, she was innerly seeing the Guess store in the mall. The seeing was in color; however, the colors were dull and less vibrant than in reality. There was also range in the degree of dullness of color in JS's samples. For example, the image in sample 5.6 (a Vans store) was so dull it was almost like a black and white seeing. In these samples, the innerly seen images do not appear in full, vibrant colors. Rather, it is as if extra time and energy is needed to build the colors—that is, it takes effort and time to build up her visual experience.

Similar to JS's dull images, DH had one inner seeing sample that was incompletely colored. In sample 5.6, DH was innerly seeing a scene from the movie *Saving Private Ryan* in which a man in a green suit laying on top of another man trying to stab him with a knife. The only colors DH was seeing were the green uniforms and the pale white faces of the men. The whiteness of their faces was unrealistic and more pale in nature than what would be in real life. It was as if the seeing was incompletely colored, not that he was focused on the incompleteness but that most of the scene was in black and white except for the green of the uniforms.

MO had one inner seeing sample that involved a transition from one innerly seen image to another. In sample 3.1, MO had been innerly seeing Kenny Chesney's face. At the moment of the sample, MO's experience was in transition from innerly seeing Kenny Chesney's face to innerly seeing Kenny Chesney's whole body. It was as if MO's experience was incorporating Kenny Chesney's body into it.

Two participants experienced inner seeing of words (MO and JS). For example, in sample 3.6, MO was innerly seeing an image with the words "Could you imagine not eating?" written in black lettering in an arch. In sample 2.3, JS had been searching through her notes for something about the Greek polis. Before the sample, she had come to a sentence with the word "polis." At the moment of the sample, she was innerly seeing the word "polis" as it stood out from the other words.

Similar to the inner seeing frequency of 19% in the present study, Mizrachi (2010) found an overall inner seeing frequency of 24% in her left-handed participants. Mizrachi (2010) did not report a slow coming together or dullness in color of innerly seen images in her left-handed participants; however, she did report inner seeing involving words or parts of words in two of her participants. It is Hurlburt's impression (personal communication, 2010) that the inner seeing of words is rare in the general population.

The frequency and quality of inner seeing in the present study along with Mizrachi's (2010) suggest that inner seeing may be a somewhat less frequent characteristic in left-handers than in the general population. The nonimmediate, slow coming together of images and the presence of words or symbols in the inner seeing of left-handed participants suggests left-handers may have an uncommon slow building of experience and unusual experience with words.

Not Semantic Words

In many samples (40 out of 217), words were present at the moment of the sample but were not attended to for their meaning. This phenomenon, which the investigators called not semantic words, was the fourth most frequently occurring characteristic in the

participants (18%). This category includes the sensory awareness of words that was discussed in the previous section.

Mizrachi (2010) did not identify a not semantic words category in her study. However, she did provide high fidelity written descriptions of each of her participants' samples of inner experience. These descriptions from Mizrachi (2010) were reviewed and reconsidered to examine if the not-semantic-words phenomenon occurred there as well. After review of the samples, a frequency of 5% of not semantic words was discovered across Mizrachi's participants, as best can be reconstructed from the written descriptions (which may well be lower than the actual percentage that might have been identified from the interviews themselves). Examples will be discussed below. Heavey and Hurlburt (2008) did not mention instances of not semantic words, and the codebook Heavey and Hurlburt (2010) provided does not mention not semantic words (Heavey & Hurlburt, 2008; Heavey & Hurlburt, 2010).

In the not semantic words samples, participants were attending to words; however, the words were not attended to for their semantic nature at the moment. For example, in sample 3.1, NT was attending to the sensory qualities of a road sign (dull silver color, white color, and black etchings within a metal square). Even though NT's eyes were aimed at the sign, the words did not penetrate his experience. He was not attending to the signness, postness, wordness, or letterness of the sign. All that was in his experience was the silverness, whiteness, and blackness of the etchings (which happened to be letters). In sample 5.4, BP was listening to her professor talk about the government being a hard job. In her experience, BP was tracking the vocal expression patterns of the words he was saying. She was not tracking the meaning of the words. She had somehow

zeroed in on the words "hard job" but recognized them as objects of emphasis and not for content. In these samples, and the rest of the not semantic words samples, the meanings of the words were not in the participants' experience no matter their presentation (written, heard, read, or thought).

As mentioned above, upon review of Mizrachi's (2010) data, a frequency of not semantic words of 5% was discovered. These samples were similar in nature to the not semantic words samples from the present study. For example, one participant, KC, was seeing the written words "guitar hero" on her paper calendar. She was attending to the visual presentation of the words and taking in some aspect of the shape of the words. She was interested in the words for their sensory quality and not for their meaning or function. In one sample, NH was reading an essay and was focused on the letter "F" in the word "Forever." He was paying particular attention to the letter "F" which appeared to be larger than the other letters. Even though he was reading, the meaning was not in his experience at the moment (Mizrachi, 2010).

Thus the next general conclusion, with the caveat that the present findings are based on small samples, is that not semantic words is a frequent phenomenon in left-handers, more frequent than in the general population. This finding applies to most but not all left-handers.

Unsymbolized Thinking

Unsymbolized thinking, the experience of thinking without the presence of words, images, or any other experienced symbols, was the fifth most frequently occurring main characteristic across participants (18%). Nine participants (AH, MM, DH, MO, BP, NT,

CL, JS, TS) experienced it. Unsymbolized thinking was not the most frequently occurring characteristic in any participants' inner experience.

Similar to the present results, Mizrachi (2010) reported an overall unsymbolized thinking frequency of 20% in her left-handed participants (Mizrachi, 2010). Heavey and Hurlburt (2008) reported an overall unsymbolized thinking frequency of 22%. Unsymbolized thinking (along with sensory awareness) was the least frequently occurring of the main characteristics in Heavey and Hurlburt's sample (Heavey & Hurlburt, 2008). The present findings suggest that left-handers experience unsymbolized thinking at a frequency relatively equivalent to the general population.

The majority of the unsymbolized thinking samples in the participants were straightforward and similar to Heavey and Hurlburt's (2008) participants. However, one participant experienced unusual unsymbolized thinking samples. Although AH experienced unsymbolized thinking frequently and substantially more than the other participants, he did not have any clear and typical examples of unsymbolized thinking. His unsymbolized thinking samples were either secondary to something else (usually sensory awareness), included the presence of multiple possibilities, or involved some idea of what to do next. For example, in sample 2.4, AH was looking for a pair of pants. At the moment of the sample, he was wondering *where could they possibly be?* This was a thought experienced without words or images. There was a notion present of the places they could be (in his closet, in his mother's house, in his father's house, and so on); however, the specific places were not present in his experience at the moment.

One participant, KA, did not experience unsymbolized thinking. As discussed in Inner Seeing section above, the majority of KA's samples consisted of inner seeing (62%) which she experienced more than the other participants.

The frequency of unsymbolized thinking in the participants is similar to the frequencies reported in Mizrachi (2010) and Heavey and Hurlburt (2008), suggesting left-handers experience unsymbolized thinking at about the same rate as the general population. Although the present findings are both quantitatively and qualitatively consistent with Heavey and Hurlburt's (2008) study, it is important to mention that, whereas in Heavey and Hurlburt's (2008) sample, sensory awareness and unsymbolized thinking were the least frequent characteristics among their main five, they both are among the most frequently occurring of the main characteristics in this study and Mizrachi's (2010).

Feeling and Emotion

Feeling and emotion are discussed in this section. Emotion is a process whereas feeling is an experience. For example, in 15 of the participants' samples, emotions (affective processes) were ongoing, as noted by the immediately occurring retrospection; however, they were occurring outside of direct experience (7%). Unlike emotion, "feeling" is direct affective experience. Thus, samples that involved emotion without the direct affective experience were labeled "emotion," whereas samples that involved the direct experience of emotion were labeled "feeling" and were not counted as emotion. Feeling occurred nearly twice as much as did emotion in the participants (12%). However, both feeling and emotion occurred infrequently.

Although the frequency of feeling is slightly higher in the present left-handed participants than Mizrachi's (2010), the present findings are consistent with Mizrachi (2010) in that feeling occurred infrequently in both studies. Mizrachi (2010) found a 4% frequency of feeling in her participants. Mizrachi (2010) did not identify a separate category of Emotion; however, review of Mizrachi's (2010) data shows that 3 of her 6 left-handed participants described emotional samples similar to the emotion samples described in this study, as best can be reconstructed (5%). These samples were not feelings as DES (and many others) use the term—that is, the participants were not actually experiencing an emotion at the moment. There were, however, emotional aspects to the experience (Mizrachi, 2010).

Unlike the low frequency of feeling found in the present study and Mizrachi's (2010), Heavey and Hurlburt (2008) found a frequency of 26% of feeling in their participants. The left-handed participants in the present study experienced feeling less than half of Heavey and Hurlburt's participants (2010). Additionally, Heavey and Hurlburt (2008) did not report instances of emotion. Thus it is tentatively concluded that left-handers experience feeling substantially less than the general population and, in some cases, left-handers have a unique experience with emotion—that is, emotion may be ongoing without their direct experience of it.

Seven participants (TS, CL, AH, MO, DH, KA, NT) had samples of feeling in their inner experience. TS experienced feeling substantially more than the other participants. His 11 feeling samples make up nearly half of the 25 total samples of feeling. Seven of his samples involved a mental experience of the feeling. For example, in sample 5.5, he was sitting on the couch and debating on whether or not he should

apply for another job. At the moment, he was experiencing a mental state of tension and indecisiveness. Four of his feeling samples involved the balancing of positive and negative feelings. In these samples, he was experiencing a multitude of feelings which, on balance, were either positive or negative. For example, in sample 2.5, he was innerly seeing a photograph of his girlfriend. He was also experiencing an undifferentiated multitude of positive and negative mental emotions, including uncertainty, attraction, pressure to make a decision regarding the relationship, ambivalence, and a sense of security. The valence of his experience was, on balance, positive but the ingredients were both positive and negative. None of his samples involved a physical representation of the feeling.

Although TS had a lot of feeling samples, his feeling samples were not straightforward. It was difficult to determine whether or not his experience involved a true feeling. Rather than experiencing a salient feeling, TS seemed to be influenced by a collection of unintegrated emotional states that were somehow differentiated. In terms of outstanding characteristics, in addition to feeling, TS experienced multiple experience more than the other participants.

Second to TS, CL also experienced feeling substantially more than the other participants. Her feeling samples make up about one-quarter the total feeling samples across the participants (6 of 25 total feeling samples). Four of her feeling samples were experienced mentally. For example, in sample 2.1, CL was worried. This was a powerful mental experience that was contained within the mental realm. CL understood herself to be feeling and not thinking. Her other two feeling samples involved a bodily experience of the feeling. For example, in sample 2.4, she was experiencing relief

through the release of tension from her upper body, as if a weight had been lifted off of her shoulders. Aside from her elevated frequency of feeling, CL's inner experience did not exhibit other outstanding characteristics.

The rest of the participants experienced feeling infrequently, 15% or less. Including TS and CL's samples, four characteristics emerged in the 25 feeling samples. Fifteen of the samples were experienced mentally. For example, in sample 5.5, KA was experiencing mental stress. She was also setting the alarm and opening the door to her house, which was happening automatically. Four of the feeling samples were experienced bodily. For example, in sample 2.3, AH was feeling nervous which he experienced as multiple tingling sensations along and near his spine. Four of the samples involved a multitude of feelings. For example, in sample 4.2, TS was experiencing a mental relief/relaxation/good feeling. One feeling sample was related to words spoken out loud. In sample 3.2, MO was experiencing confusion and humor, both related to the words "is this thing working?" she was saying out loud to herself. The confusion was experienced in the question and humor was experienced as smiling.

As mentioned above, 15 participants' samples involved emotions or ongoing affective processes that where occurring outside direct experience (7%). Six of the emotion samples involved speaking with an emphatic tone. Four of those six were AH's emotion samples, where words were innerly present (either spoken or heard) with an emphatic tone. Despite the emphatic tone, AH was not directly experiencing the emotion at the moment. For example, in sample 3.1, he was innerly saying "He's escaping!" with an emphatic tone, though he was not experiencing an emotion at the moment. Two of DH's samples also involved an emphatic tone. In both samples, DH was innerly

speaking. For example, in sample 3.2, DH was innerly saying, “Why aren’t you!?!?” in a powerful, almost yelling, tone which represented frustration though he was not feeling frustrated at the moment.

The remaining nine samples of emotion involved a variety of characteristics, including the following: thinking an emotion but not feeling it (e.g., in sample 3.2, DH was thinking *how sad,* though he was not feeling sad at the moment); conveying an emotion through words but not feeling it (e.g., in sample 3.3, KA was innerly saying “I love him so much” but she was not experiencing love or loving feelings at the moment); laughing with no experience of feeling; emotion suspended in time (e.g., in sample 4.1, CL had been overtaken by a wave of pure fear, at the moment she was in a suspended, frozen state); a lingering experience of emotion from a previous moment (e.g., in sample 3.3, NT was experiencing a lingering negative valence from a thought he had previously); anticipating a feeling (e.g., in sample 2.3, TS was anticipating feeling carefree and thrilled, but the carefree-ness and thrilled-ness were not in his experience); a recollection of a feeling (e.g., in sample 4.6, TS was recalling having experienced a sense of excitement, being challenged, competition, winning, and frustration though he was not experiencing those sensations at the moment).

Both the left-handed participants in the present study and Mizrachi’s (2010) experienced feeling at a substantially lower frequency than that reported by Heavey and Hurlburt. Even if the frequencies of feeling and emotion in the present study are counted together (25 + 15 = 40 of 217 samples, or 18%), the frequency is still less than the 26% frequency of feeling alone reported by Heavey and Hurlburt (2008).

Samples of feeling in the present study were infrequent. Furthermore, at times, left-handers may have ongoing affect that is not directly in their experience. The low frequency of feeling in this study, the low frequency in Mizrachi's (2010), along with the much higher frequency in the general population (Heavey and Hurlburt, 2008), leads to a speculation that feeling is infrequent in the inner experience of left-handers. It is emphasized that this speculation is based on very few participants and is need of additional investigation. In a preliminary study such as this, there is no way of knowing whether emotion is merely an accidental or random occurrence or a robust characteristic of the inner experience of left-handed individuals.

Inner Speech

Inner speech was the sixth most frequently occurring characteristic of inner experience across participants, occurring in seven participants' samples (BP, DH, AH, KA, CL, MO, JS). Inner speech was the most frequently occurring characteristic in one participant, BP, who experienced it more than did any of the other participants.

The inner speech frequency of 12% in this study is similar to Mizrachi's (2010), who also found inner speech to occur at a relatively low frequency (9%) (Mizrachi, 2010). These inner speech frequencies are substantially lower than the frequency of 26% found in Heavey and Hurlburt's (2008) study. Thus, it is tentatively concluded that inner speech occurs substantially less in left-handers than the general population.

Of the 10 participants, only two (BP, DH) experienced inner speech with a frequency of greater than the inner speech average reported by Heavey and Hurlburt (2008). All of BP's inner speech samples were typical examples similar to those described by Heavey and Hurlburt (2008). All samples were in her own voice and

involved some inner comment or question. For example, in sample 2.4, BP was innerly saying, "I was focusing on the wrong triangle." BP's inner experience did not differ substantially from the other participants aside from her inner speech frequency.

Second to BP, DH also experienced inner speech frequently. All of DH's samples were in his own voice as well. However, 2 of his 7 inner speech samples had an unusual characteristic. In these samples, his inner speech was just happening. For example, in sample 4.3, DH was innerly saying, "50 vision" (meaning that 50% of his attention had been aimed at the image); however, the inner speaking was happening automatically. That is, he had little or no experience of the creation of the speaking (even though the speaking itself was in his experience). The remaining five participants experienced inner speech in four or less of their inner experience samples.

There were four unique characteristics that emerged across the inner speech samples of our left-handed participants. Four participants (AH, DH, KA, CL) had inner speech samples that involved an emotion or emphatic tone, for a total of nine samples. For example, in sample 5.6, DH was innerly saying, "You're nuts" in an irritated, comical way. Heavey and Hurlburt's (2008) samples have emotion in their inner speakings as well; however, considering our left-handed participants experience feeling substantially less than Heavey and Hurlburt's (2008) participants, it is remarkable that, despite the low frequency of feeling, left-handed participants have emotion in their inner speakings.

Four participants' inner speech samples involved some commentary on a bodily process (AH, KA, CL, MO). All four participants had one sample of this phenomenon. In these samples, the participants were actively surveying and commenting on a bodily

process rather than automatically integrating the process as part of their experience. For example, in sample 3.3, AH was saying "I'm hungry!" and feeling his lower abdomen grumbling, moving around, and tingling. Rather than automatically processing the grumbling of his abdomen, AH commented on the process. It is Hurlburt's impression that it is unusual to have inner speech that comments on bodily processes (Hurlburt, personal communication, 2013).

Two participants (BP, KA) each had one sample in which there was an inner speech and inner hearing simultaneously occurring. For example, in sample 5.1, KA was simultaneously innerly saying and innerly hearing the phrase "it hasn't beeped yet, of course on the last day its going to take forever." Unlike KA's sample, BP's inner speaking and inner hearing were not related. She was innerly saying, "I know the beeper is about to go off" and innerly hearing a Brian McKnight song.

Two participants (DH, JS) had inner speakings in which the meanings of the innerly said words were not in their experience at the moment. In both samples, the innerly said word/s had unique characteristics. In sample 5.3, DH was saying "H e Flare" (as in helium flare). Before the sample, he had been repeating the words. At the moment, he was saying one unit of the "H e Flare" repetitions. He was attending more to the sound of the words. In sample 2.3, JS was innerly seeing and innerly saying the word "polis." In her experience, the word had no meaning whatsoever. This sample was also unique because the innerly spoken word seemed to be extended in time in a way that external speech is incapable of.

Thus, the phenomenological characteristics of inner speech described by participants in the present study were in some instances similar to but in some instances

different from those reported by Heavey and Hurlburt (2008) in that the inner speech samples in the present study were experienced to be like outer speech except they were happening internally and were experienced as being in of the participants' own voice. However, the content of the inner speech samples in the present study was quite narrow or restricted by comparison to everyday non-left-handed inner speech (Hurlburt, personal communication, 2010): mostly it was simple and directly related to the participants' ongoing experiences. For example, CL was innerly saying "I'm sneezing" in sample 3.1 as she was sneezing; KA was saying "I'm going to sleep" in sample 3.4; and MO was innerly saying "What should I eat?" in sample 5.2 in response to his physical sensation of hunger.

The prevalence of inner speech across left-handed participants in the present study, and the left-handed participants in Mizrachi (2010), suggests that left-handers experience inner speech less frequently than does the general population, and the complexity or floridness of the inner speech may be less in left-handers (Mizrachi, 2010). It should be recognized that some of the participants in Heavey and Hurlburt's (2008) sample may have been left handed— Heavey and Hurlburt did not collect that information.

Doing Of

Doing of involves the concentrated, intentional doing of some action. In these samples, participants were actively, specifically, focusedly involved in the doing of some action or activity. That is, the action or activity that we call doing of were not experienced as automatically happening. Doing of was the eighth most frequently occurring characteristic across our participants (10%).

Mizrachi (2010) described a similar phenomenon, in which she termed concentrated doing, in her left-handed participants with a frequency of 8%. Doing of/concentrated doing are not well-established DES categories of inner experience and were not reported in Heavey and Hurlburt's (2008) participants. However, this kind of experience of doing seems related to what Hurlburt (1993) called the doing of understanding which involves a deliberate and active experiential reaching out in an attempt to understand the meaning of information received (Hurlburt, 1993).

Seven participants in the present study (NT, MM, DH, KA, TS, BP, JS) experienced doing of. Doing of was not the dominant experience in any participants' inner experience but it occurred quite frequently in NT's inner experience, who experienced it substantially more than the other participants. For example, in sample 3.6, NT was writing notes and experienced a recognition of the act of writing. He was not experiencing the words that he was writing, however. NT also experienced not semantic words more than the other participants. Doing of occurred rather infrequently in the rest of the participants, with a frequency of 15% or less.

Two characteristics emerged in the doing of samples. The majority of the doing of samples involved some experiential bodily movement. For example, in sample 3.1, BP was experiencing the act of typing. She was aware of the act of typing with the intention of creating the words on the screen. Five doing of samples involved words. For example, in her only sample of doing of (sample 5.1), JS was text messaging her friend the word *class*. Before the sample, she had thought the letter *c* and then pushed the key *c* in her phone, followed by the letter *l*, and then the letter *a*. At the moment of the sample, JS was thinking the letters *ss* as a unit. She was not innerly saying *ss*, innerly hearing *ss*,

or innerly seeing *ss*. She was confident that in this experience there was an explicit thinking followed by a texting of each letter; think-text-think-text-think-text.

Inner Hearing

Inner hearing is an established DES characteristic. Inner hearing involves attending to auditory characteristics occurring innerly. Inner hearing was the ninth most frequently occurring characteristic in participants' inner experience (8%). Seven participants experience inner hearing (KA, AH, BP, MO, CL, DH, MM). Inner hearing was not the dominant characteristic in any participants' experience, though it occurred relatively frequently in KA's experience.

Similar to the present finding, inner hearing occurred at a frequency of 4% in Mizrachi (2010). Heavey and Hurlburt (2008) did not specifically report the frequency of inner hearing in their participants other than reporting that no characteristic other than the main five had a frequency of higher than 3% (Heavey & Hurlburt, 2008). Thus, it is tentatively concluded that left-handers experience inner hearing somewhat more than the general population.

KA experienced inner hearing substantially more than did the other participants. Her seven samples make up almost half of the total 17 inner hearing samples. All of KA's inner hearing samples consisted of her own voice. Four of her samples involved an attempt to understand the external world. For example, in sample 3.6, she was innerly hearing "Scam artist, I don't get it" referring to a billboard she had seen. Two of KA's samples involved multiple phrases. One involved innerly hearing three different phrases: 1) "Vegan conferences? Where are those?"; 2) "How can you tell one's cheated?"; and 3) "Do they know you know?" The innerly heard phrases were happening one after the

other. In KA's experience, they were happening in a normal, natural pace. However, if they could be clocked in the external world, they were happening so fast it seemed like they all happened at the moment. Her other sample involved repetition of the same phrase. One sample involved innerly hearing her innerly spoken words. In sample 5.1, she innerly heard herself saying "it hasn't beeped yet, of course on the last day it's going to take forever." KA referred to the phenomenon as "hearing [herself] say." One of her samples involved some commentary on a bodily sensation. In sample 2.6, she was innerly hearing "My back is strained" in her own voice. KA's inner experience differed from the other participants in that she also experienced inner seeing substantially more than the others and she was the only participant who did not experience unsymbolized thinking.

Seven characteristics emerged across the inner hearing samples of participants, including the following: three were heard in the participants' own voice; two samples involved innerly hearing a tune; two samples involved a rehearing of something that had been heard earlier; one sample involved a simultaneous inner hearing and inner speaking; one sample involved an emphatic tone; one sample involved repetition; and one sample involved innerly hearing the voice of someone else.

Other Observations

In addition to the most frequently occurring characteristics, additional observations about the inner experience of left-handed participants were made. Like the observations above, all these observations should be considered tentative, exploratory. All require corroboration by additional phenomenological observation and/or validation by so-called objective procedures.

Anticipation

Seven participants (CL, JS, MM, NT, TS, AH, MO) experienced anticipation, for a total of 15 samples (7%). In these samples, the participants were anticipating something happening or anticipating finding something.

Mizrachi's (2010) left-handed participants had samples involving anticipation to find something (Mizrachi labeled these "searching") with a frequency of 10% (Mizrachi, 2010). Anticipation is not an established category of inner experience. Heavey and Hurlburt (2008) did not mention instances of anticipation (or searching), and the Codebook Heavey and Hurlburt (2010) provide does not mention anticipation (or searching) (Heavey & Hurlburt, 2008; Heavey & Hurlburt, 2010).

In six of the anticipation samples in the present study, the participants were anticipating finding something and experientially involved in searching. In three of these samples, the participants were searching for words or definitions. For example, in sample 4.1, TS was "mentally scanning" or recalling the definition of *aberration*. The rest of these samples involved internal or external searching. For example, in sample 3.3, MM was searching her memory for the melody of a particular song (internal searching). In sample 5.2, CL was experientially searching her closet for a particular pair of shoes (external searching).

In four of the anticipation samples, the participants were anticipating some sensory stimulus (e.g., seeing, hearing, tasting, etc.). For example, in sample 4.3, TS was anticipating the sensory aspects of whiskey (the taste, feel of the liquid, burning sensation, etc.). He was not tasting the whiskey, feeling the liquid, or feeling the burning sensation of the whiskey at the moment.

In two of the anticipation samples, the participants' experience was paused, suspended, or frozen in time. For example, in sample 4.1, a wave of fear had overtaken CL. At the moment of the sample, she was frozen, waiting for something to happen. The fear was suspended at the moment so that, at the exact moment of the sample, nothing is experienced. In sample 4.1, NT had been leaving his girlfriend a voicemail message. Before the sample, he had said the word "maybe." At the moment, his mind was paused, waiting for the thoughts backed up in his mind to move forward. He was experiencing a mental sensation of something about to happen.

Two samples involved anticipation of something to come. In sample 4.6, NT was hearing his professor speaking and anticipating something to come. In sample 2.2, AH was thinking about what he had to do next. This involved some sense that he had a lot of homework to do. One sample involved anticipating a feeling, but not experiencing the feeling at the moment. In sample 2.3, TS was anticipating feeling carefree but he was not actually feeling carefree at the moment.

The present study and Mizrachi (2010) both reported a frequency of anticipation around 10%. Heavey and Hurlburt (2008) did not report samples of anticipation in their participants' inner experience. It is of course possible that anticipation is merely an occasionally occurring event that happened to be caught in flight by the random beep, with no particular significance for left-handed individuals.

Happening Of

Happening of occurred in four (JS, BP, DH, CL) of the participants' inner experience samples, for a total of nine samples (4%). In these samples, the participants had no creation investment in the experience—that is, the experience was just

happening—in situations where most people experience some sense of agency. In six of the samples, words or some other form of communication was involved. For example, in sample 3.3, she was thinking *I started it this morning*. The words were presenting themselves to BP and, experientially, she was not creating them. The rest of the samples involved a visual experience. For example, in sample 2.2, BP was waiting for the solution of a math problem to visually appear. She was not actively involved in creating the solution.

Mizrachi (2010) reported the happening of phenomenon occurring in 4 or 5 of her participants' 101 samples (4%). For example, Mizrachi reported one participant (FM) experienced the Happening of Speaking, in which he was saying words out loud without those words being directly in his experience (Mizrachi, 2010). Heavey and Hurlburt (2008) did not report happening of in their participants.

Words Present

Three participants (JS, BP, CL) had samples in which specific words or letters were present; however, the words and/or letters did not have any perceptual characteristics—that is, they were not innerly seen, heard, said, or read. For example, in sample 3.3, the words *I started it this morning* were sequentially presenting themselves to BP; however the words were not innerly spoken, innerly heard, or innerly seen. The investigators referred to this phenomenon as "words present." Words present was found in seven samples (3%).

Although words present were relatively infrequent, JS experienced it more than the other participants. Her four words present samples make up over half of the total words present samples (4 of 7).

Five of the words present samples were similar to the example provided above. Two of the words present samples were unique. One sample involved specific visual characteristics. In sample 5.3, the words *pink elephant* were present in CL's experience with visual characteristics; however, despite their visual characteristics, the words were not innerly seen, innerly heard, or innerly said. One sample involved a lingering word. In sample 5.4, JS had been talking on the phone and just said *bye*. At the moment of the sample, the word (*bye*) was still present in her experience without any presentation.

Mizrachi (2010) and Heavey and Hurlburt (2008) did not report instances of words present in their samples (Mizrachi, 2010; Heavey & Hurlburt, 2008).

Results Compared to the Literature

The present study found that the inner experience of left-handers is different from the inner experience of the general population. This section will compare the results of this study to the relevant literature on left-handers' experience. More specifically, the experience of left-handers as discovered in this study compared to the literature on left-handers' experience will be discussed.

Handedness effects have been explored in relation to divergent and convergent thinking. In 1995, Coren explored divergent thinking as a function of handedness. Coren (1995) described divergent thinking as involving the "consideration of several different directions, alternatives, or information sources" (Coren, 1995, p. 313). Divergent thinking is hypothesized to enable the development or consideration of novel solutions and is often considered as a large factor of creativity, and is differentiated from convergent thinking, the use of existing knowledge and rules to come to a single conclusion (Coren, 1995). After completion of four experiments (Alternate Uses and

Handedness; Object Synthesis and Handedness; Ideational Flexibility and Handedness; Convergent Thinking and Handedness), Coren reported a divergent thinking advantage in left-handed males by comparison to right-handed males. Coren reported a linear relationship between degree of left-handedness and divergent thinking scores in males. He reported these results may explain the number of left-handed mathematicians, chess masters, architects, and artists. He stated that, in addition to spatial ability, strong divergent thinking skills are likely a commonality among these activities. He reported there were no significant findings between handedness and divergent thinking in females. In terms of convergent thinking, Coren reported a small advantage for right-handers. Thus he concluded that improved divergent thinking skills are associated with sinistrality, being left-handed, in males (Coren, 1995).

Coren's (1995) finding might be extrapolated as suggesting that left-handers, primarily males, tend to think in more unconventional ways and consider more possibilities when problem solving than do right-handers. When compared to Heavey and Hurlburt's (2008) participants, left-handed participants in the present study did exhibit such thinking styles. For example, multiple experience was the third most frequently occurring characteristic in the present study (20%). In these samples, two or more separate but simultaneous experiences were present. Heavey and Hurlburt (2008) did not report such a high frequency of multiple experience in their participants' inner experience. The frequency of multiple experience in left-handed participants' inner experience suggests atypical thinking styles and cognitive flexibility. All four of the left-handed male participants in the present study experienced multiple experience with a frequency of greater than 15%. Only one female subject, KA, experienced it with a

frequency of 15% or higher. Using Coren's (1995) definition, the samples of multiple, simultaneous and separate experiences can be considered divergent thinking. This notion, and the notions to follow, should be considered speculative and does not have corroborating evidence at this point.

In 1998, McNamara, Clark, and Hartmann investigated the characteristics of dreams as a function of handedness. Student volunteers from introductory psychology courses were asked to complete a questionnaire, including informed consent and the Edinburgh Handedness Inventory, and write a description of a recent dream on a blank page. Only 109 of the 420 students who completed the questionnaire described a recent dream. The authors reported that, of the volunteers who completed the questionnaires, left-handers were more likely than right-handers to report a dream (79 of 359 right-handers in total sample reported a dream, 22%; 30 of 61 left-handers in total sample reported a dream, 49%). The authors found that the dream reports of left-handers included more high imagery nouns and more affective words than did the dreams of right-handers. Additionally, the authors reported that more left-handers described their dreams as not accurately reflecting their everyday life. That is, right-handers' dreams reflected their everyday lives in a more realistic way. The authors conclude that the dream reports of left-handers were more characteristic of right hemispheric related cognitive activity, including more high imagery nouns and more affective words than the dream reports of right-handers (McNamara, Clark, & Hartmann, 1998).

McNamara et al.'s (1998) findings might be extrapolated as suggesting that the dreams of left-handers may involve more imagery and affective states than do the dreams of right-handers, and then further extrapolated as suggesting that the overall inner

experience of left-handers may involve more imagery and affective states than does the experience of right-handers. Participants in this study experienced inner seeing at a frequency of 19%. Similarly, Mizrachi (2010) reported her left-handed participants experienced inner seeing at a frequency of 24%. However, that frequency was lower than the frequency of inner seeing (34%) Heavey and Hurlburt (2008) reported in the general population (Heavey & Hurlburt, 2008); thus the difference between left- and right-handers imagery is in the opposite direction as might be speculated on the basis of McNamara et al.'s (1998) study. Regarding emotion, the present study suggests a large difference between left-handers and the general population but in the opposite direction suggested by McNamara et al. (1998): participants in this study experienced feelings far *less* frequently (12%) than did Heavey and Hurlburt's (2008) subjects (26%). Similarly, Mizrachi (2010) reported a low frequency of feeling in her left-handed participants (4%). McNamara et al. (1998) reported that left-handers were more likely to report that the content of their dreams were not an accurate reflection of their daily life-experience than were right-handers (McNamara et al., 1998), so the extrapolations described above may not be valid. It may be that left-handers are actually emotional but do not directly experience feelings in their inner experience—that is, they undergo affective states but have very little feeling in their inner experience. Another explanation for the discrepancy between McNamara et al.'s (1998) finding and the findings of the present study relates to the theory of wish-fulfillment. According to Freud, the dream represents a fulfilled wish or takes the place of some action in life (Freud, 1900). It can be extrapolated from this that dreams may represent a phenomenon that is suppressed in waking life. The results of the present study could then be interpreted as showing that left-handers, who might have

ongoing emotion but suppress the experience of it, experience that emotion in dreams instead. An alternative explanation is that McNamara et al.'s participants did not carefully distinguish between the experience of emotion and emotional state.

In 2013, Schredl, Beaton, Henley-Einion, and Blagrove examined the relationship between dream recall and handedness in adolescents and adults. Unlike McNamara et al. (1998) the authors reported that right-handers and mixed-handers have a higher frequency of dream recall than do left-handers. However, they reported that handedness effects were more prominent in adolescents and were not significant in adults (Schredl, Beaton, Henley-Einion, & Blagrove, 2013). Considering the role of attention in memory, this result can be extrapolated to imply that left-handers may have less recall of dreams due to a lack of experiential involvement during dreams. This result can be further extrapolated, in light of McNamara et al.'s (1998) findings to suggest that left-handers have less experiential involvement during high imagery and affective states than right-handers. That is, imagery and affect may be ongoing in left-handers (e.g., during dreams); however, they have less direct experience of them. This extrapolation is consistent with the findings of the current study in which left-handed participants experienced inner seeing and feeling less than the general population. Additionally, the presence of ongoing affective states (emotion) was found in participants' samples without direct experiential involvement. It is also noteworthy to mention that Schredl et al. (2013) reported the handedness effect in dream recall was not found to be significant in adults. This may be extrapolated to imply that the handedness effects change over time. During the sampling phase, seven participants (AH, BP, CL, DH, MM, MO, JS) were

either 18 or 19 years-old, KA was 21, NT was 28, and TS was 35. Thus, some of the present findings may be influenced by differences in age.

Notably, the dream studies used verbal reports. It may be that left-handers perform differently in that mode of responding. Thus extrapolations made from the aforementioned dream studies may not be accurate due to the effects of verbal reports. For example, it may be that left-handers would more effectively report or recall dreams through a different mean such as drawing.

In 2010, Beratis, Rabavilas, Papadimitriou, and Papageorgiou investigated the effects of handedness on the Stroop interference effect using the Stroop Color Word Task. The Stroop effect has been suggested as providing evidence of verbal inhibition, which involves using an atypical response and suppressing an overlearned one (automatic reading) (Beratis, Rabavilas, Papadimitriou, & Papageorgiou, 2010). The authors reported that selective attention is involved in the Stroop task—that is, attending to color versus orthography (Beratis et al., 2010). The authors administered two tasks to the subjects, a neutral condition and an incongruent condition. In the neutral condition, the subjects were asked to name the ink color of strings of Xs (neutral stimuli), quickly and accurately. In the incongruent condition, the subjects were asked to name the ink color of incongruously named color words, quickly and accurately. The difficulty posed in the incongruent condition is referred to as the Stroop interference effect (Beratis et al., 2010). With regard to high functioning individuals, the authors reported a greater Stroop interference effect in right-handers than left-handers. Thus, left-handed individuals perform better on the Stroop task (Beratis et al., 2010). It might be speculated that left-handers have an advantage when completing the Stroop task because they have less

experienced connection to the semantic nature of words than do right-handers. A lack of, or less strong, attachment to the semantic nature of worded phenomenon may decrease their interference effect. Furthermore, participants in this study had a much stronger connection to colors in general (e.g., sensory awareness). This may also favor left-handers during the Stroop task in that they may have more interest in sensory aspects, like color, as opposed to the semantic nature of the stimulus. All 10 participants in this study reported samples of not semantic words, for a total of 40 samples. Twenty of these samples involved the sensory awareness of words and/or letters. For example, in sample 4.4, BP was looking at a list of songs on the computer screen as the songs were being downloaded. BP was attending to the visual characteristics of the display—that is, she was absorbed in how the list looked. Mizrachi (2010) also reported sensory awareness of words in 2 of her 6 subjects, for a total of three samples. Considering Heavey and Hurlburt (2008) did not report instances of sensory awareness of words/letters in their samples (Heavey & Hurlburt, 2008), it may be tentatively concluded that the sensory awareness of words and/or letters is a characteristic of the left-handed experience.

Inner Experience: Summary

Main Five Characteristics

Sensory awareness was the most frequently occurring of the five main characteristics in the present study, occurring at a frequency of 49%. This finding is consistent with Mizrachi's (2010) report of 35% sensory awareness in her left-handed participants. Participants in this study experienced sensory awareness substantially more than the frequency of 22% in the general population as reported by Heavey and Hurlburt (2008). The majority of sensory awareness samples in this study were similar to those

reported by Heavey and Hurlburt (2008); however, three noteworthy patterns emerged, including the following: sensory awareness of words or letters; spreading of sensory awareness; and sensory awareness of an imaginary stimulus. Thus, the present results suggest that sensory awareness may be more frequent in left-handers than in the general population. This finding is consistent with Mizrachi (2010).

Inner seeing was the next most frequently occurring main characteristic in the present study, occurring at a frequency of 19%. This is consistent with Mizrachi's (2010) report of 24% inner seeing samples in her left-handed participants. Left-handers experienced inner seeing less than the 34% in the general population reported by Heavey and Hurlburt (2008). Most of the participants' inner seeing samples in the present study were similar to Heavey and Hurlburt's sample (Heavey & Hurlburt, 2008); however, there were two noteworthy characteristics, including experiencing the creating of imagery and inner seeing of words. Thus it is concluded that inner seeing occurs less frequently in left-handers than the general population.

Unsymbolized thinking occurred at a frequency of 18% in the present study. This is consistent with Mizrachi's (2010) report of a frequency of 20% in her left-handed participants. The rate of unsymbolized thinking in the present study was about the same as the 22% reported in the general population by Heavey and Hurlburt (2008). The majority of the unsymbolized thinking samples in the present study were straightforward and similar to Heavey and Hurlburt's (2008) participants. However, one participant (AH) experienced unusual unsymbolized thinking samples. AH did not have any clear and typical examples of unsymbolized thinking. His unsymbolized thinking samples were either secondary to something else (primarily sensory awareness), included the presence

of multiple possibilities, or involved some idea of what to do next. Unsymbolized thinking appears to occur at a similar frequency between left-handers and the general population.

Inner speech occurred at a frequency of 12% in the present study. This is consistent with the frequency of 9% found in Mizrachi's (2010) left-handed participants. This is substantially lower than Heavey and Hurlburt's (2008) finding of 26%. In addition to inner speech, participants in this study experienced inner hearing. Inner hearing is an established DES characteristic. Inner hearing involves attending to the auditory characteristics occurring innerly. Inner hearing occurred in 8% of the inner experience samples. Even when taken together, inner speech and inner hearing constitute 20% of the overall inner experience samples. This figure is still lower than Heavey and Hurlburt's (2008) finding of 26%.

Feeling was the least frequently occurring of the main five characteristics found in the present study (12%). This is comparable to Mizrachi's (2010) infrequent occurrence of feeling in her left-handed participants (4%). Participants in this study experienced feeling at a much lower frequency than the 26% reported by Heavey and Hurlburt (2008). Participants expressed emotions through the tone of their speech, and understood that some of their thoughts are emotionally valenced, rather than actually experiencing an emotion. In 15 samples, an ongoing, affective state was present; however, the participants were not directly experiencing the feeling at the moment. Thus these ongoing, affective states, termed "emotion" by the investigators, occurred at a frequency of 7%. Even when the emotion and feeling samples are combined, the combined

frequency of 18% is still less than the 26% of feeling reported by Heavey and Hurlburt (2008).

Other Characteristics

In addition to the findings of the main five characteristics, other characteristics emerged across the left-handed participants in the present study. Left-handed participants' inner experience frequently included multiple experience (multiple, separate and simultaneous experiences) and not semantic worded experiences. Participants also had a relatively high frequency of doing of (carefully and concentratedly engaged in a physical activity). Other characteristics that emerged included anticipation and happening of.

Words and Lack of Meaning in Experience

A pattern that emerged across participants was the low frequency of words present. Additionally, when words were experienced, they had atypical presentations. For example, they were not explicitly attended to for their function or meaning. In 40 of 217 samples (18%), a unique presentation of words was present. In these samples, words were somehow present; however, the participants were not attending to the meaning of the words in their experience. This phenomenon, termed not semantic words, was the fourth most frequently occurring characteristic in the participants' inner experience. It occurred in all 10 subjects.

Among the not semantic words samples was the sensory awareness of words. In these samples it was as if the awareness of the subjects specifically ignored the meaning of the words in favor of their sensory aspects. Five subjects (TS, BP, NT, DH, AH) reported samples of sensory awareness for words each for a total of 20 samples (9%).

With all the usual caveats regarding small sample size, it does appear that left-handed participants experience words in ways much different from the general population: less frequent overall, and instances where the meaning of words is stripped away from

Slow Building of Experience

A characteristic that emerged across left-handed participants' inner experience samples included a slow building of experience. That is, participants in the present study seemed to have a hard time manufacturing their inner experience. Examples of this were seen in all of the main five characteristics: sensory awareness (e.g., spreading of sensation in body); inner seeing (e.g., inner image populating itself, dullness of colors, transition from one image to another); unsymbolized thinking (e.g., multiple options though the specific options not present in experience); inner speech (e.g., commenting on bodily experiences); emotion/feeling (e.g., empathic tone but no feeling, positive and negative valence simultaneously occurring). In these samples, it is as if the ingredients of the experience are present; however, they are not integrated—that is, the phenomenon was not complete at the time of appearance. Thus, these samples captured the participants in their attempt to integrate their experience.

Discussion

The present study found that sensory awareness, multiple experience, inner seeing, not semantic words, and unsymbolized thinking are frequent characteristics of left-handers' inner experience. Inner speech and feeling (the experience of emotion) were found to be infrequent characteristic in the experience of left-handers. Additionally, the present study suggests that left-handers experience words and meaning differently than the general population, supporting a right-hemispheric involvement regarding

linguistic ability. The present study is preliminary and exploratory in nature and requires further investigation.

Study Limitations and Suggestions for Future Research

The process of Descriptive Experience Sampling (DES) yields inevitable study limitations. One of the major limitations of the present study is the small sample size (N=10). DES studies are time and labor intensive both for the participants and investigators. Participants are asked to wear the beeper and collect beeps for period intervals of three hours on five separate occasions. They are also asked to meet in the DES lab on the UNLV campus within 24 hours of each beep collection interview for a 1-hour long expositional interview. The sampling phase alone results in a dedication of 20 hours from each participant. The investigators are involved in coordinating the meetings, introducing the method, training the subject, conducting the expositional interviews, digitizing the interviews, writing narrative descriptions of each sample, coding the samples, writing idiographic narrative descriptions of the inner experience of each participant, and writing a narrative description of the characteristics that emerged across participants. This time consuming and labor intensive process makes it difficult to collect data on larger sample sizes. It is noteworthy to mention, however, that this study is a replication of an earlier study of six participants (Mizrachi, 2010). Thus, there are 16 left-handed participants across both studies. The findings of the present study are similar to the findings in Mizrachi's (2010) study.

The nature of DES regarding small sample sizes contributes to the second limitation of this study. Because of the small sample sizes, statistically significant conclusions cannot be drawn from the data. In addition, data from the present study are

the samples of inner experience. These samples cannot easily be collapsed into numbers and analyzed. Frequency counts of characteristics that occurred within participants and across participants were taken; however, a larger sample of left-handers would be needed to conduct tests of statistical significance. It may be possible that the characteristics of the participants that were attributed to left-handedness may be due, by chance, to some other common characteristic.

The third limitation of the present study involves the possibility that the investigators inaccurately or incorrectly captured the participants' experience. One of the potential contributors involves presuppositions. For example, it is possible that prior knowledge or belief systems interfered with the investigators' apprehension of the participants' experience. The use of two investigators who probably do not share the same presuppositions is a way of limiting this likelihood. The possibility of incorrectly apprehending the participants' experience may also be due to the participants' presuppositions. It is possible that the participants presented their individual samples in a way that is consistent with their own belief systems about themselves. In addition, even if the experiences were apprehended accurately, they may have been categorized idiosyncratically.

The fourth limitation of the present study related to the fact that the investigators were not blind to the handedness of the participants. As mentioned before, this study is a replication of a Master's thesis (Mizrachi, 2010) and prior knowledge of the results of Mizrachi (2010) may have influenced the investigators' apprehension of the participants' inner experience. However, the emergence of novel phenomena (e.g., not semantic words) in this study when compared to Mizrachi (2010) suggests that the investigators

were not narrowly apprehending the inner experience of the left-handed participants in this study based on the results of Mizrachi (2010).

The fifth limitation of the present study relates to the fact that DES is an exploratory procedure. The aim of this study was to explore the samples of inner experience of left-handers. The rationale for this approach was that by applying DES to left-handers as a group characteristics of inner experience that were not previously discovered may emerge. Prior to conducting this study, there was only one study exploring or describing the inner experience of left-handers (Mizrachi, 2010). Because of the exploratory nature of the present study, no hypotheses were made at the outset.

Two investigators, a student and her advisor (Hurlburt, the originator of DES), collected the data together and reviewed the data independently and together. Despite this, the present study may have benefited from review from an additional rater. Thus, the sixth limitation of this study is the lack of interrater reliability. Although interrater reliability was not directly measured in this study, interrater reliability has been evaluated among DES investigators. Hurlburt and Heavey (2002) reported that interrater reliability for 19-sample averages ranges from .92 to .98 (Hurlburt & Heavey, 2002).

The findings in the present suggest that more research on left-handers' inner experience using DES would be worthwhile. Research exploring the inner experience of left-handers while taking into consideration hemispheric specialization in the brain might shed light on how the left and right cerebral hemispheres contribute to inner experience.

APPENDIX A

DEMOGRAPHIC QUESTIONNAIRE

ID:_____

Demographic Information

1. Name .....
2. Date of birth .....
3. Sex (Male / Female) .....
4. Address .....

   .....

   .....
5. Email address .....
6. Home phone number .....
7. Cell phone number .....
8. Preferred phone number .....
9. Race/ethnicity .....
10. Marital status .....
11. What is your current level of education? .....
12. Are you employed? .....
13. Which hand do you use to write with? (Right / Left) .....
14. Would you be interested in participating in the next phase of this study for

    research credits? (Yes / No) .....
15. Please provide the name and telephone number of a person who would know how to contact you in the future if you moved
    Name .....

    Phone number .....

APPENDIX B

PARTICIPANTS' SAMPLES

The following sample summaries were not included in the individual chapters:

AH's Samples (see Chapter 5)

Sampling Day 1
September 17, 2010

Sample 1.1. At the moment of the sample, AH had just begun to read a text message from his friend on his phone. During the expositional interview, AH was unsure about what was in his experience at the moment of the sample.

Sample 1.2. AH was driving and a semi-truck, with dust coming off the top of it, was coming in the opposite direction on the same road. The investigators were unable to determine with any confidence at all what he was experiencing at the moment of the sample. Perhaps at the moment of the sample he was seeing the dust, mostly focused on the dust itself; perhaps he was mostly experiencing a thought about the dust hitting his car like, *oh damn, the dust is going to hit my car.* If there was such a thought, he seemed confident that it was not experienced in words; that is, he seemed confident that inner words did not play a role in his experience at the moment of the sample. He may have also been frustrated by the fact that his car was going to get dirty, but that was not clear. The dust, or the thought or feeling thereabout, may have had a negative valence, but whether that was experientially present at the moment of the beep is unknown. He was also visually seeing the dust, but was unable to describe that experience further.

Sample 1.3. AH was using the internet on his phone and was about to click the log-in button for MySpace. At the moment of the sample, he was eager to log-on. He described the eagerness as a feeling of being overjoyed to read his messages, but whether this was a thought or feeling or something else was not entirely clear. He denied experiencing any bodily sensations related to the eagerness.

Sampling Day 2
September 24, 2010

All sample summaries from Sampling Day 2 were included in Chapter 5.
Sample 2.1. Refer to page 71.
Sample 2.2. Refer to page 75.
Sample 2.3. Refer to page 80.
Sample 2.4. Refer to page 74.

Sampling Day 3
October 1, 2010

All sample summaries from Sampling Day 3 were included in Chapter 5.
Sample 3.1. Refer to page 78.
Sample 3.2. Refer to page 75.
Sample 3.3. Refer to page 69.
Sample 3.4. Refer to page 70.
Sample 3.5. Refer to page 70.
Sample 3.6. Refer to page 73.

Sampling Day 4
October 8, 2010

All sample summaries from Sampling Day 4 were included in Chapter 5.

Sample 4.1. Refer to page 76.
Sample 4.2. Refer to page 71.
Sample 4.3. Refer to page 77.
Sample 4.4. Refer to page 83.
Sample 4.5. Refer to page 69.

Sampling Day 5
October 15, 2010

Sample 5.1. Refer to page 79.
Sample 5.2. Refer to page 73.

Sample 5.3. Occurred while AH was going to the bathroom. He declined to discuss this sample, saying it was embarrassing.

Sample 5.4. Refer to page 69.
Sample 5.5. Refer to page 79.
Sample 5.6. Refer to page 74.

BP's Samples (see Chapter 6)

Sampling Day 1
October 28, 2010

Sample 1.1. BP had been watching TV. At the moment of the sample, she was flipping through the channels and innerly saying, "Does it still come on?" referring to the show *Arthur*.

Sample 1.2. BP was on Twitter and had read an update declaring Coke as better than Pepsi. At the moment of the sample, BP was thinking that Pepsi is better than Coke. This was a thought without words, images, or any symbolic representation.

Sample 1.3. BP was innerly singing the song *Weight of my Tears.* She was also innerly hearing the music to the song. It was as if she was singing along with the music. The music was an accurate replay of the song.

Sample 1.4. BP was reading her dad's Facebook status. She was taking in the words of the status but the meaning had not yet come to her. In her experience, she was just reading the words of the page. She was not gathering the meaning of the words as she was reading. It was her understanding that, after reading the words, the meaning would present itself to her though this was not in her experience at the moment of the sample. All that was in her experience was reading the words.

Sample 1.5. BP had read her ex-boyfriend's status on MySpace and had just finished typing in her own status update as a response. The last part of her status was *yes, I went there.* At the moment of the sample, the notion that she had gone there was in her experience without words. The meaning of the rest of her status was also present but not as salient as the notion that she gone there. There were no words, images, or any other symbolic representation in BP's experience.

Sampling Day 2
November 2, 2010

Sample 2.1. Refer to page 92.
Sample 2.2. Refer to page 86.
Sample 2.3. Refer to page 91.
Sample 2.4. Refer to page 85.

Sample 2.5. BP was walking on campus. At the moment of the sample, she was innerly saying "I hope I don't see anyone that I know."

Sample 2.6. Refer to page 85.

Sampling Day 3
November 4, 2010

All sample summaries from Sampling Day 3 were included in Chapter 6.
Sample 3.1. Refer to page 89.
Sample 3.2. Refer to page 92.
Sample 3.3. Refer to page 90.

Sampling Day 4
November 9, 2010

All sample summaries from Sampling Day 4 were included in Chapter 6.
Sample 4.1. Refer to page 87.
Sample 4.2. Refer to page 85.
Sample 4.3. Refer to page 93.
Sample 4.4. Refer to page 87.
Sample 4.5. Refer to page 89.
Sample 4.6. Refer to page 89.

Sampling Day 5
November 17, 2010

Sample 5.1. Refer to page 85.

Sample 5.2. BP had been thinking that she needs to study for her Psychology test. At the moment of the sample, she was innerly saying "Today and tomorrow is homework day." There was nothing else in her experience.

Sample 5.3. Refer to page 87.
Sample 5.4. Refer to page 87.
Sample 5.5. Refer to page 85.

Sample 5.6. BP was innerly saying, "Why is he still talking about the same thing?" referring to her teacher. There was nothing else in her experience.

CL's Samples (see Chapter 7)

Sampling Day 1
September 16, 2010

Sample 1.1. CL had just finished typing the words "Chicken Fingers, Traffic," as part of the title for her English class essay. At the moment of the sample, she was trying to come up with the third and final word for the title. The notion of chicken fingers, traffic, and blank was present to her at the moment of the sample. It was as if she was waiting for something to fill in the blank. She was also skimming through the ideas of the paper inside her head to find an important word to fill in the blank. The skimming did not involve innerly seeing or reciting the essay. She was also experiencing mental frustration at not being able to come up with a word.

Sample 1.2. CL was urinating and wondering if Jesse James also adopted Sandra Bullock's child or if she adopted him alone. At the moment of the sample, she was innerly seeing Jesse James and Sandra Bullock sitting across from each other on a long table. CL was seeing this as if she was sitting at the head of the

table. Jesse James was sitting on the left and Sandra Bullock on the right. There was a woman presumed to be an attorney sitting next to Sandra Bullock and a man also presumed to be an attorney sitting next to Jesse James. CL was aware of the presence of these additional persons but she did not really acknowledge them. The inner seeing was in color. Sandra Bullock was wearing navy blue, Jesse James was wearing black, and there was a circle crest on the unattractive tan colored walls. There was a background notion of disgust present. The urinating was not in her experience at the moment of the sample.

Sample 1.3. CL was typing a text message to her sister and feeling annoyed at her sister. At the moment of the sample, she was experiencing annoyance as a physical sensation from her abdomen up to the top of her head. This sensation was deep inside her body. She was experiencing the same sensation in the trunk of her body and her head. She also experienced slight tension in her body. The typing of the text message was not in her experience at the moment of the sample.

Sampling Day 2
September 21, 2010

All sample summaries from Sampling Day 2 were included in Chapter 7.
Sample 2.1. Refer to page 97.
Sample 2.2. Refer to page 98.
Sample 2.3. Refer to page 96.
Sample 2.4. Refer to page 99.
Sample 2.5. Refer to page 107.

Sampling Day 3
September 23, 2010

All sample summaries from Sampling Day 3 were included in Chapter 7.
Sample 3.1. Refer to page 96.
Sample 3.2. Refer to page 96.
Sample 3.3. Refer to page 100.
Sample 3.4. Refer to page 98.

Sampling Day 4
September 28, 2013

All sample summaries from Sampling Day 4 were included in Chapter 7.
Sample 4.1. Refer to page 103.
Sample 4.2. Refer to page 97.
Sample 4.3. Refer to page 102.
Sample 4.4. Refer to page 104.

Sampling Day 5
October 7, 2010

Sample 5.1. Refer to page 99.
Sample 5.2. Refer to page 102.
Sample 5.3. Refer to page 105.

Sample 5.4. CL had been clicking the lock button on her iPhone with her pointer finger on her left hand. At the moment of the sample, she was seeing the picture on the screen of her iPhone of her with two of her friends. She was taking in the whole picture and not paying particular attention to any aspect of the picture, a mostly idle seeing that indicated the phone was working with no messages. She was also seeing her phone. The clicking of the lock button was happening automatically and not in her experience.

Sample 5.5. Refer to page 101.

DH's Samples (see Chapter 8)

Sampling Day 1
October 19, 2010

Sample 1.1. DH was waiting for the home page on his computer to load. At the moment of the sample, he was seeing the whiteness of the screen. He was also experiencing some anticipation of the page to come. The whiteness of the screen was more in his experience than the anticipation (an estimated ratio of 60:40).

Sample 1.2. DH was lying on the couch, focused on the spinning fan on the ceiling. In his experience was the motion of the fan. He was captured by the spinningness or blurry circleness of the fan.

Sample 1.3. DH was watching ultimate fighting on TV. All that was in his experience was the fighting action on the TV. He was following along what was happening on the screen.

Sample 1.4. DH was watching ultimate fighting on TV. All that was in his experience was the fighting happening on the TV.

Sample 1.5. DH had been making a left turn. At the moment of the sample, he was noticing the illumination of a street speed sign. He was attending to the sign for its brightness and not its speed regulation quality. All that was in his experience was the illuminated speeding sign.

Sample 1.6. DH had been watching a TV show and the movie *Valkyrie* starring Tom Cruise was mentioned. At the moment of the sample, DH was innerly seeing a black and white image of Tom Cruise wearing Nazi WWII type attire. He was seeing Tom Cruise's body directed to the left but Tom's head was facing DH's perspective (Tom Cruise's head was facing left in comparison to his body). This was a still image as if it was a snapshot of Tom Cruise; however, it did not involve a border or frame. DH was not seeing anything in the background.

Sampling Day 2
October 21, 2010

Sample 2.1. Refer to page 114.

Sample 2.2. DH was watching TV and a woman had just said she was fabulous. At the moment of the sample, DH was innerly saying, "yeah right."

Sample 2.3. DH had paused the TV until his mother returned and there was an old woman on the screen. At the moment of the sample, DH was noticing the wrinkles on the face of the old woman and her bright blue eyes. He was attending to the wrinkles more (an estimated 60:40).
Sample 2.4. Refer to page 111.
Sample 2.5. Refer to page 115.
Sample 2.6. Refer to page 108.

Sampling Day 3
October 26, 2010

All sample summaries from Sampling Day 3 were included in Chapter 8.
Sample 3.1. Refer to page 113.
Sample 3.2. Refer to page 116.
Sample 3.3. Refer to page 109.
Sample 3.4. Refer to page 110.
Sample 3.5. Refer to page 113.
Sample 3.6. Refer to page 111.

Sampling Day 4
October 28, 2010

All sample summaries from Sampling Day 4 were included in Chapter 8.
Sample 4.1. Refer to page 119.
Sample 4.2. Refer to page 118.
Sample 4.3. Refer to page 117.
Sample 4.4. Refer to page 112.
Sample 4.5. Refer to page 120.
Sample 4.6. Refer to page 121.

Sampling Day 5
November 2, 2010

Sample 5.1. Refer to page 115.
Sample 5.2. Refer to page 110.
Sample 5.3. Refer to page 115.

Sample 5.4. DH had just finished watching Pay Per View previews and was sitting on his couch looking away from the TV. At the moment of the sample, he was thinking that the movie *Gladiator* is a good movie. He was also innerly seeing a man holding a sword with his right hand. The sword was pointing down at an angle towards DH's perspective. The man was in a coliseum; however, DH was mostly attending to the man and not the coliseum. He was also seeing the sand on the ground and the man's shadow directed towards DH's perspective. The man was facing forward towards DH and his head was tilted downwards. The seeing was a still shot in sepia color. DH was unsure if it was the cover shot of the movie. The thinking that the movie *Gladiator* was good ant the inner seeing were separate experiences.

Sample 5.6. Refer to page 112.

NT's Samples (see Chapter 9)

Sampling Day 1
January 20, 2011

Sample 1.1. NT was driving and making a right turn onto Eastern Avenue. At the moment of the sample, he was visually monitoring the passing cars. He also had some sense of the cars behind him, involving a sense of felt pressure or arousal of not wanting to crash. He was also hearing a familiar song on the radio and anticipating the next beat of the song.

Sample 1.2. At the moment of the sample, NT was positioning his notebook onto the steering wheel. He was also attending to the yellowness of a car in front of him.

Sample 1.3. NT was experiencing a sense of relaxation in his waist area (the front and sides of his waist). He was seeing the whiteness of his computer screen fading out. He was interested in the whiteness of the screen. He was also hearing his computer chime, indicating Windows was logging on. He was interested in the chimeness, and not the computerness, of the sound.

Sample 1.4. NT was typing a question in an e-mail to his professor. At the moment of the sample, he was experiencing power as a physical rush in his shoulders, arms, and hands. He was also seeing the words he was typing appearing on the computer screen. The powerness was more salient in his experience (an estimated 95:5).

Sampling Day 2
January 25, 2011

Sample 2.1. NT was at a bar with his friend Shawna. At the moment of the sample, he was pointing at a chicken strip with his right hand. He was experiencing the sensation of his wrist moving, sort of flopping up and down as he rocked his finger back and forth as part of the repeated pointing at the strip. He was also seeing his right hand pointing and a part of the chicken strip basket. He was also experiencing a sense of direction or intention to give Shawna the chicken strip. Shawna was speaking at the moment of the sample, but he was not experiencing that.

Sample 2.2. Refer to page 124.
Sample 2.3. Refer to page 129.
Sample 2.4. Refer to page 136.
Sample 2.5. Refer to page 135.
Sample 2.6. Refer to page 131.

Sampling Day 3
January 27, 2011

Sample 3.1. Refer to page 124.

Sample 3.2. NT was talking to Amy, his girlfriend, about a casino in Las Vegas he thinks is classy and not very noisy, Vdara. NT was speaking at the moment of the sample. He was just talking about the Vdara, and had no experience beyond that. He was not experiencing himself as directing the words coming out of his mouth, rather the words were flowing out. NT was conveying to Amy that Vdara is a nice casino, but the actual words NT was uttering were not in his experience.

Sample 3.3. Refer to page 131.
Sample 3.4. Refer to page 124.
Sample 3.5. Refer to page 126.
Sample 3.6. Refer to page 125.

Sampling Day 4
February 1, 2011

Sample 4.1. Refer to page 134.

Sample 4.2. NT was at a café looking at the drinks in the refrigerator. At the moment of the sample, he was seeing the rows of Odwalla bottles. In his experience, he was seeing the green and beige bottles, he was attending to the bottleness of the green and beige bottles and not so much interested in the colors. He was also seeing intersecting white light rays illuminating the bottles. [He was not certain whether the rays were actually physically present. He had visual experience of them, but perhaps they were fabricated from the light and shadow portion of the bottles.]

Sample 4.3. Refer to page 126.
Sample 4.4. Refer to page 129.
Sample 4.5. Refer to page 133.
Sample 4.6. Refer to page 127.

Sampling Day 5
February 3, 2011

Sample 5.1. Refer to page 126.
Sample 5.2. Refer to page 130.
Sample 5.3. Refer to page 130.

Sample 5.4. NT was in class. He was experiencing a low level awareness of the sounds and sights in class; however, the sounds and sights were not present in his experience for what they were. That is, they were experienced in a sensory way. The sounds were voices talking, but the voiceness or the words being

spoken was not present—rather, he heard something like a hum or undifferentiated sound. The seeing was similarly undifferentiated. There was nothing else in his experience.

Sample 5.5. Refer to page 128.

MM's Samples (see Chapter 10)

Sampling Day 1
October 6, 2010

Sample 1.1. MM was on the computer website for her French homework. She was entering her username on the sign in screen. In her experience, she was making sure she was spelling her name correctly. This involved a concentrated watching of the letters appearing on the screen. MM was attending to the visual presentation of the letters on the screen, making sure the spelling was accurate.

Sample 1.2. MM's roommate, Erica, had been telling MM she would take a nap the same time MM does. At the moment of the sample, MM was innerly saying, "she sleeps too much." The inner speech was in MM's own voice. MM was also tracking what Erica was saying and her eyes were aimed at Erica eating a sausage; however, this was not in her experience at the moment of the sample. All that was in her experience was her inner speech.

Sample 1.3. MM had been doing her French homework. At the moment of the sample, she was writing the word "l'huile" (French for "oil"). In her experience, MM was seeing the messiness of the word and thinking that her handwriting is messy. MM's thoughts consisted of the idea that she writes messy; however, this thought did not involve words, images, or any other symbolic representation. The meaning of the word was apparently not present to her at the moment of the sample.

Sample 1.4. MM had been studying French vocabulary about automobiles, looking at a picture of an automobile in her French course book. At the moment of the sample, MM was searching her memory for a way to relate the part of the car she was seeing and the corresponding English word. In her experience, she was trying to figure out if the French
word and English counterpart had any letters in common, as if the similarity of letters would provide the key to translation. [MM reported that in general she experiences words letter by letter sequencing and typically isolates individual letters from the rest of the word. For example, she often counts the number of letters in words; for example, in encountering this sentence, she would think 3 – 7- 3 – 5 – 6 – 3 – 6 – 2 – 7 – 2 – 5 and so on.]

Sampling Day 2
October 8, 2010

All sample summaries from Sampling Day 2 were included in Chapter 10.
Sample 2.1. Refer to page 142.
Sample 2.2. Refer to page 139.
Sample 2.3. Refer to page 145.
Sample 2.4. Refer to page 145.
Sample 2.5. Refer to page 143.
Sample 2.6. Refer to page 145.
Sample 2.7. Refer to page 146.

Sampling Day 3
October 13, 2010

All sample summaries from Sampling Day 3 were included in Chapter 10.
Sample 3.1. Refer to page 139.
Sample 3.2. Refer to page 139.
Sample 3.3. Refer to page 144.

Sampling Day 4
October 15, 2010

Sample 4.1. MM was sleeping. She had been dreaming about her and her brother, Caleb. In her dream, MM had spit her gum out and it landed in Caleb's nose. At the moment of the sample, in her dream, MM was seeing her brother's face as he was screaming and MM was laughing out loud.

Sample 4.2. MM was sleeping. In her dream, MM was sitting at her desk tapping a pencil and humming. The humming was a random kind of thing—not a melody. All that was in her experience at the moment of the sample was the tapping of the pencil and the humming.

Sample 4.3. In bed but awake. MM had been thinking about her roommate, Katie, telling MM about how Katie's mother gets upset when Katie spends time at her aunt's house because Katie's mother thinks they are starting a new family. At the moment of the sample, MM was innerly hearing Katie say the words "I don't like Vegas" the way Katie's mother had said them. The innerly heard words were of Katie mimicking her mother. This was an inner rehearing of something that had happened before.

Sample 4.4. Refer to page 141.
Sample 4.5. MM chose to skip this sample.
Sample 4.6. Refer to page 141.

Sampling Day 5
October 20, 2010

Sample 5.1. Refer to page 146.
Sample 5.2. Refer to page 143.
Sample 5.3. Refer to page 147.
Sample 5.4. Refer to page 141.
Sample 5.5. Refer to page 142.
Sample 5.6. Refer to page 139.

Sample 5.7. MM's Psychology instructor had been talking about research finding in which 75% of males consented to bring a female back to their room to have sex if asked. MM was waiting for her instructor to say what the percentage of females would bring a male back to their room for sex if asked. MM had read about the study the night before so she knew the percentage was zero. At the moment of the sample, MM was waiting for her instructor to say the answer. This was a mental waiting and impatience. The concept *zero* was also somehow present in MM's experience without words, images, or any other symbolic representation.

MO's Samples (see Chapter 11)

Sampling Day 1
October 12, 2010

Sample 1.1. MO had been running late to class. She had just opened her classroom door and taken two steps in. At the moment of the sample, she was seeing the student teacher teaching the class. She was experiencing a visual noticing of the teacher. There may have been other aspects; thinking the student teacher was cool, that it would be a fun class, nervous about being late, looking for a place to sit, etc. MO wasn't sure.

Sample 1.2. MO was hearing the repetitive, intervallic tapping of a pen to her right side. The noise was annoying, but MO was not sure whether the annoyance was experienced.

Sample 1.3. MO's teacher had been talking about civil rights and had said the name *Ruther B. Hayes*. At the moment of the sample, MO was innerly saying "who would name their kid Ruther?" The inner speech was drawn out and in her own voice, just as she would have said it out loud.

Sample 1.4. MO was in class seeing her friend Lita look quizzically at her. MO was wondering why Lita was looking at her in that quizzical way. This notion was present in MO's experience without words, images, or any symbolic representation. It turned out that MO's beeper had sounded but she did not hear it, even though she was using the earphone, and even though the beep was loud enough through the back of the earphone that Lita could hear it. Lita's quizzical look therefore turned out to be about the beep which MO had not yet heard.

Sample 1.5. MO was still in class and her beeper had again sounded but she had not heard it yet. Her friend, Lita, had heard the beep and looked at MO. At the moment of the sample, MO was seeing her friend and thinking that Lita must be looking at her because the beeper is beeping. MO was also hearing a faint sound that would later turn out to be the beeper. The beep seemed to ramp up, gradually at first but then faster. We asked MO to ask Lita about what she heard, and Lita said she heard the beep sound immediately loud, just as the beep is designed.

Sample 1.6. MO was hearing the repetitive tapping of a pen. This time she was just beginning to hear the pen and was not yet annoyed.

Sampling Day 2
October 13, 2010

Sample 2.1. Refer to page 154.

Sample 2.2. MO's hands were resting on the table in front of her. She was experiencing the sweatiness of her hands. She was feeling the sweatiness of each hand independent of the other.

Sample 2.3. Refer to page 152.
Sample 2.4. MO chose to skip this sample.
Sample 2.5. Refer to page 153.
Sample 2.6. Refer to page 151.

Sampling Day 3
October 19, 2010

All sample summaries from Sampling Day 3 were included in Chapter 11.
Sample 3.1. Refer to page 158.
Sample 3.2. Refer to page 156.
Sample 3.3. Refer to page 159.
Sample 3.4. Refer to page 160.
Sample 3.5. Refer to page 153.
Sample 3.6. Refer to page 157.

Sampling Day 4
October 21, 2010

All sample summaries from Sampling Day 4 were included in Chapter 11.
Sample 4.1. Refer to page 156.
Sample 4.2. Refer to page154.
Sample 4.3. Refer to page 154.
Sample 4.4. Refer to page 151.
Sample 4.5. Refer to page 152.
Sample 4.6. Refer to page 152.

Sampling Day 5
October 26, 2010

Sample 5.1. Refer to page 155.
Sample 5.2. Refer to page 155.
Sample 5.3. Refer to page 152.

Sample 5.4. MO had finished eating and was sitting in her car in the parking lot with her windows open. She had been hearing cars drive by her. At the moment of the sample, she was hearing the contrast between a diesel truck and the rest of the cars. MO was attending to the auditory characteristics of the truck and the cars, and attending to the difference between them. The fact that it was a diesel truck was not in her experience at the moment of the sample.

Sample 5.5. Refer to page 152.
Sample 5.6. Refer to page 154.

KA's Samples (see Chapter 12)

Sampling Day 1
December 1, 2010

Sample 1.1. KA had realized that her hair appointment was scheduled at 11:00 am on January 11, 2011. Before the moment of the sample, she was experiencing a rising tide of feelings that preceded a thought. At the moment of the sample, she was thinking about how the synchronicity of the numbers (11:00 on the 11th in the year 2011) made her feel good and connected to the universe.

Sample 1.2. KA was wondering if she had written her Narcotics Anonymous steps the best way. This was a thought about the uncertainty of how she wrote the steps. She was also feeling doubtful about how adequately she wrote the steps. This was a mental emotion.

Sample 1.3. KA was thinking that she was sleepy but she was not going to sleep. She was also experiencing a bodily sensation of tiredness.

Sample 1.4. KA was innerly hearing "Your hair doesn't look good, you're not going to have a good day." The words were said in a fast and condescending manner. They were in KA's voice. She was also feeling frustrated.

Sampling Day 2
December 2, 2010

Sample 2.1. Refer to page 167.
Sample 2.2. Refer to page 163.
Sample 2.3. KA chose to skip this sample.
Sample 2.4. Refer to page 170.
Sample 2.5. Refer to page 177.
Sample 2.6. Refer to page 168.

Sampling Day 3
December 7, 2010

All sample summaries from Sampling Day 3 were included in Chapter 12.
Sample 3.1. Refer to page 169.
Sample 3.2. Refer to page 164.
Sample 3.3. Refer to page 175.
Sample 3.4. Refer to page 165.
Sample 3.5. Refer to page 170.

Sample 3.6. Refer to page 166.

Sampling Day 4
December 9, 2010

Sample 4.1. KA had been talking to her friend, Melissa, about an art walk Melissa had attended in Arizona. At the moment of the sample, KA was innerly seeing a park. She was seeing fluffy, green trees in the upper right of the image and grass underneath the trees. She was seeing a walkway going across diagonally. There were people on the walkway in walking positions but they were not detailed. The people were small so KA was aware she was not very close to the image. It was as if she was looking at a scene in which she was not herself present. Sunlight was coming from the upper left corner; however, the day appeared cloudy. KA was not seeing a sun or cloud. KA also saw art booths to the sides of the walkway but she was not noticing any particular piece of art. Most of her attention was directed at the scenery. KA was scanning the image from right to left. This scene was an illustration of what Melissa had been talking about.

Sample 4.2. Refer to page 168.
Sample 4.3. Refer to page 164.
Sample 4.4. Refer to page 167.

Sample 4.5. KA was watching TV and was absorbed in the television show she was watching. There was nothing else in her experience.

Sample 4.6. Refer to page 172.

Sampling Day 5
December 14, 2010

Sample 5.1. Refer to page 171.

Sample 5.2. KA had been talking to her boyfriend on the phone about his laundry. At the moment of the sample, KA was hearing her boyfriend talk. KA was also innerly seeing her boyfriend's room. She was mostly attending to a green towel on the floor but she was not paying particular attention to the greenness of the towel. KA was seeing the towel from a perspective slightly elevated from the floor. She was also seeing his bed, comforter, and the dresser behind the towel; however, the towel was the most clear in her inner seeing. KA was seeing this as if she was looking at a still picture. Unlike previous images, KA was not interested in the seeing of the light. She said the light source was to the upper left, and that that was indeed a fact of her boyfriend's room, so the illumination was realistic, but she was not particularly attending to the light source in this sample.

Sample 5.3. Refer to page 173.
Sample 5.4. KA chose to skip this sample.
Sample 5.5. Refer to page 177.

JS's Samples (see Chapter 13)

Sampling Day 1
September 21, 2010

Sample 1.1. JS had been reading a book for her History class. At the moment of the sample, she was hearing the jingle of her dog's collar.

Sample 1.2. JS had been peeing. At the moment of the sample, JS was expecting that the beeper was going to beep. This expectation was an intimation, a sense, that did not involve words, images, or any other symbolic representation.

Sample 1.3. JS was driving to work to drop her keys off to her boss, Lucy. At the moment of the sample JS was wondering if Lucy would ask her to stay and work. JS had some sense of Lucy's asking her, but the words were not present. The driving (car in front of her, etc.) was not in her experience at the moment of the sample.

Sample 1.4. JS had been sitting across from her dad as he was reading the newspaper. Her dad was telling her that there was an arrest warrant out for Lindsey Lohan, but, JS was not paying close attention to his speaking. Rather, she was tracking the auditory characteristics of her dad's speaking, and then the name "Lindsey Lohan" stood out from the rest of her dad's sentence. JS's sense was that now that she *heard* "Lindsay Lohan," she could backtrack and retrieve the meaning from the rest of the sentence that her dad had uttered, even though she was not aware of that meaning as he was speaking. She was also seeing her father sitting across from her. He was visually part of her experience (unlike the car of 1.3), but she was not paying particular attention to any aspect of him.

Sample 1.5. JS had been reviewing her homework. At the moment of the sample, JS was innerly saying, "I don't know how I am going to finish this by Thursday." This speaking seemed to be in her own voice, naturally inflected.

Sample 1.6. JS had been talking on the phone to her friend Barbara and they decided to go to the gym. At the moment of the sample, she was innerly seeing the inside of the whole gym including equipment and people from an aerial perspective. The seeing was in motion and color. The seeing was a realistic recreation of the real gym but from a perspective that she had never actually seen.

Sampling Day 2
September 23, 2010

Sample 2.1. Refer to page 182.
Sample 2.2. Refer to page 181.
Sample 2.3. Refer to page 183.
Sample 2.4. Refer to page 180.

Sample 2.5. JS had been writing a paper when her mom knocked on her door and asked "How is it going?" At the moment of the sample, JS's focus had moved away from her paper and was moving towards her mom. JS's attention was in transition from her paper to her mom. She was aware of what her mom was saying but it was not yet the focus of her attention.

Sample 2.6. Refer to page 181.

Sampling Day 3
September 29, 2010

Sample 3.1. Refer to page 187.
Sample 3.2. Refer to page 186.
Sample 3.3. Refer to page 187.

Sample 3.4. JS was walking down one of the aisles in the grocery store when her mom had asked her if she could get rice. At the moment of the sample, JS was saying "brown?" There was nothing else in her experience: no thought about kinds of rice, no image of rice packages, etc.

Sample 3.5. Refer to page 189.

Sample 3.6. JS was sitting next to her parents on the computer looking for hotel rooms in New York for Thanksgiving. Her dad had asked her how much they cost. At the moment of the sample, JS was saying "739," referring to the price of the room. There was nothing else in her experience.

Sampling Day 4
October 5, 2010

All sample summaries from Sampling Day 4 were included in Chapter 13.
Sample 4.1. Refer to page 184.
Sample 4.2. Refer to page 180.
Sample 4.3. Refer to page 186.
Sample 4.4. Refer to page 180.
Sample 4.5. Refer to page 189.
Sample 4.6. Refer to page 186.

Sampling Day 5
October 7, 2010

All sample summaries from Sampling Day 5 were included in Chapter 13.
Sample 5.1. Refer to page 188.
Sample 5.2. Refer to page 184.
Sample 5.3. Refer to page 180.
Sample 5.4. Refer to page 184.
Sample 5.5. Refer to page 185.
Sample 5.6. Refer to page 182.

TS's Samples (see Chapter 14)

Sampling Day 1
May 23, 2011

Sample 1.1. TS was standing, putting on his watch. He was feeling a low level of anxiety about wasting time. He was to pick up his friend from the airport and did not want to be early to waste his own time, but did not want to be late to waste hers. It was difficult to tell how this anxiety/pressure presented itself to him at the moment.

Sample 1.2. TS was lying on his bed, tired but not able to sleep. He clearly innerly saw three books on the counter of Reprographics, arrayed diagonally away from him. He saw the shirt of the worker at Reprographics. This was an accurate replay of a scene from earlier when the Reprographics worker had shown him examples of bound dissertations, asking him what color title he preferred. TS was anticipating a feeling of pride/excitement that he would feel when he picked up his bound dissertation, but it was not clear whether this feeling actually existed at the moment or was merely somehow anticipated.

Sample 1.3. TS had seen a bag that belonged to his roommate, Samantha, next to a pair of shoes. The seeing of the bag triggered a realization that Samantha had not yet unpacked. At the moment of the sample, the notion that Samantha had not yet unpacked AND that TS would have were present in his experience. The two ideas were sequential with the latter overlapping the first. They were not conveyed in words, images, or any other symbolic representation.

Sample 1.4. TS was sitting at his desk, updating his cover letter. He had been pressing the backspace button. At the moment of the sample, he was experiencing a pressure to get the cover letter right, to not make any mistakes. This was experienced as a mental discomfort. There was nothing else in his experience

Sampling Day 2
May 24, 2011

Sample 2.1. Refer to page 193.
Sample 2.2. Refer to page 191.
Sample 2.3. Refer to page 206.

Sample 2.4. TS was sitting on the couch nearly finished eating his cereal. He had a spoonful of cereal in his mouth (without the spoon). At the moment of the sample, he was tasting the sweetness of the cereal, feeling the grainy/nutty texture of the cereal, and feeling the coldness of the milk in his mouth. He was also seeing the living room including the wall, shelf, TV, couch, and carpet. This seeing was part of his direct experience at the moment of the sample, but he was not paying any particular attention to any aspect of the living room--all items were visually equal in his experience. He was also experiencing a pleasant sensation of satiation in his stomach, a physical sensation.

Sample 2.5. Refer to page 199.
Sample 2.6. Refer to page 201.

Sampling Day 3
May 25, 2011

All sample summaries from Sampling Day 3 were included in Chapter 14.
Sample 3.1. Refer to page 195.
Sample 3.2. Refer to page 201.
Sample 3.3. Refer to page 197.
Sample 3.4. Refer to page 203.
Sample 3.5. Refer to page 193.
Sample 3.6. Refer to page 198.

Sampling Day 4
June 2, 2011

All sample summaries from Sampling Day 4 were included in Chapter 14.
Sample 4.1. Refer to page 205.
Sample 4.2. Refer to page 193.
Sample 4.3. Refer to page 204.
Sample 4.4. Refer to page 196.
Sample 4.5. Refer to page 199.
Sample 4.6. Refer to page 206.

Sampling Day 5
June 3, 2011

All sample summaries from Sampling Day 5 were included in Chapter 15.
Sample 5.1. Refer to page 204.
Sample 5.2. Refer to page 198.
Sample 5.3. Refer to page 200.
Sample 5.4. Refer to page 191.
Sample 5.5. Refer to page 197.
Sample 5.6. Refer to page 207.

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