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Descriptive experience sampling interactive multimedia training tool

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DESCRIPTIVE EXPERIENCE SAMPLING
INTERACTIVE MULTIMEDIA
TRAINING TOOL

by

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A dissertation submitted in partial fulfillment
of the requirements for the

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ABSTRACT

Descriptive Experience Sampling Interactive Multimedia Training Tool

By

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The present study developed a multimedia training tool to teach skills necessary to recognize two phenomena identified by the Descriptive Experience Sampling method: sensory awareness and unsymbolized thinking. The training tool was developed by subjecting successive versions to critical feedback provided by focus groups. Then training provided by this new training tool was compared with the training provided by extant literary materials on the two phenomena. Results suggest that the training tool was more effective in teaching the student to recognize sensory awareness and unsymbolized thinking than were essay-based training materials. The multimedia training tool methodology offers a promising, portable method of training that could further our understanding and skill of recognizing inner experience phenomenon identified by DES.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	vii
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 MODERN EXPERIENCE SAMPLING METHODS	5
Experience Sampling Method	5
Ecological Momentary Experience	11
Think Aloud.....	17
Articulated Thoughts in Simulated Situations.....	20
Thought Listing	22
Diary Method.....	23
Descriptive Experience Sampling	29
Specific Focus on Experience at the Moment of the Beep.....	31
Iterative.....	32
Bracketing Presuppositions	33
Performance Art	36
Focus Groups.....	38
Qualities of a Moderator.....	39
Advantages and Disadvantages of Focus Groups	41
Interactive Training Tools	42
The Present Study	43
The Descriptive Experience Sampling Interactive Multimedia Training Tool	43
Development Phase	45
Validation Phase.....	45
CHAPTER 3 METHOD.....	47
Development Phase	47
Overview	47
Participants	47
Apparatus.....	48
Procedure.....	48
Validation Phase.....	51
Overview	51
Participants	51
Training Materials	52
Test Materials	52
Procedure.....	53

CHAPTER 4 RESULTS.....	54
Development Phase	54
Interface Alterations to Both Training Tool Modules	54
Content Alterations to Both Training Tool Modules	55
Table 1 Number of Alterations to Modules as a Result of Focus Group	55
Validation Phase	56
Sensory Awareness.....	56
Table 2 Sensory Awareness Concept Mastery Test Scores.....	57
Unsymbolized Thinking	57
Table 3 Unsymbolized Thinking Concept Mastery Test Scores	58
CHAPTER 5 DISCUSSION	59
The Development Phase	59
The Validation Phase.....	60
Limitations.....	62
Suggestions for the Future.....	64
Implications	65
APPENDIX A INTRODUCING FOCUS GROUPS TO THE STUDY.....	67
APPENDIX B.....	68
REFERENCES	74
VITA.....	84

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CHAPTER 1

INTRODUCTION

Psychology began, 130 years ago, with an interest and eagerness to understand consciousness. Early psychologists attempted the systematic study of consciousness using introspection (Boring, 1952; Hurlburt & Heavey, 2001). However, early introspective studies were heavily focused on theoretical inferences. In addition they required highly trained subjects and used regimented stimuli to look at or for supposed elements of consciousness rather than simply to explore directly an individual's awareness (Hurlburt & Heavey, 2006).

In addition, early introspective research was inconsistent in its findings. For example, the Cornell group of researchers and the Würzburg school disagreed on whether thoughts consisted always of images. The Cornell group insisted that thoughts could not exist without images, whereas the Würzburg school adamantly defended the existence of imageless thoughts. This debate about the existence of fundamental elements of thinking lasted more than 20 years and remained unresolved. The inability of introspective researchers to agree on the basic constituents of consciousness was widely understood to disqualify introspection as a productive tool for the exploration of psychological issues (Danziger, 1980). Meanwhile, and partially as a result, behaviorism was gaining momentum. The behaviorists disapproved of the subjective nature of introspective research and criticized the slow and insufficient growth of consciousness studies

(Danziger, 1980, Lieberman, 1979). In addition, the rise of psychoanalysis and Freud's emphasis on the importance of the unconscious clashed with introspection's focus on exploring what is in the person's consciousness and further dampened the importance of introspective research (Lieberman, 1979). Unable to respond to such criticisms from both within and without, the introspective study of consciousness was largely abandoned by mainstream psychology.

There are indeed good reasons to question the reliability of introspective reports (Paivio & Yuille, 1967). For example, individuals may have limited ability to discriminate among internal states, may forget their experience and not report it accurately, or may provide inferences about their behavior rather than report on their actual internal states (Lieberman, 1979). Skinner (1974), while not denying the existence of mental events, questioned the accessibility of mental events for scientific analysis because it may be difficult or impossible to teach an individual to make verbal discriminations of inner states.

However, introspective observations provide critical access to an individual's consciousness (Schooler & Fiore, 1997) and about "the knowledge a person has about his current condition" (Skinner, 1974, p. 209). Hence, a complete exclusion of introspection from the study of psychology "throws the baby out with the bath water" (Hurlburt & Heavey, 2001, p. 114). A constructive strategy would be to build an advanced method that avoids the pitfalls of early methods, improves the accuracy of introspective reports and provides reliable and replicable results (Hurlburt & Heavey, 2006).

Modern methods of exploring inner experience—the experience sampling method, ecological momentary assessment, automatic thoughts in simulated situations, thought listing, diary method, and descriptive experience sampling—are advancements over early

introspective methods and may avoid several flaws inherent to turn of the century methods (Monson & Hurlburt, 1993). These methods may provide an avenue to explore systematically the constituents of an individual's inner world and provide unique insights into the nature and composition of the individual's inner experience otherwise unavailable to traditional methods in psychology (Hurlburt, 1997).

The current study focuses on one of those modern experience sampling methods: Descriptive Experience Sampling (DES), which was developed by Hurlburt in the 1970's. DES uses a beeper to cue introspective observations in natural environments and seeks to provide faithful descriptions of those observations. Hurlburt and Heavey (2003) claimed that such observations and descriptions were not impossible but also were not easy, requiring a substantial amount of knowledge, skill, and practice. *Exploring Inner Experience* (Hurlburt & Heavey, 2006) is a book that attempted to advance the acquisition of the DES skill and knowledge. However, the print medium, including Hurlburt and Heavey (2006), is necessarily limited in its ability to convey the details of an interview method that seeks to describe moments of lived experience, as does DES. Because of this unavoidable shortcoming, the present study seeks to complement the printed accounts of the characteristics of DES and its findings.

In particular, this study is aimed at developing two parts of a technologically advanced multimedia training tool that provides instruction on and experience in recognizing concepts that are central to DES. The multimedia training tool for the present study included two training modules: sensory awareness and unsymbolized thinking. These modules were first developed by presenting them to a focus group and then validated against extant training available in written form.

This dissertation has three sections. First, it provides a critical review of modern methods of experience sampling. Next, it provides a rationale for developing and evaluating the DES interactive multimedia training tool. Finally, it evaluates the two modules of the training tool.

CHAPTER 2

MODERN EXPERIENCE SAMPLING METHODS

Experience Sampling Method (ESM)

The dissatisfaction with data obtained using retrospective measures formed the impetus for developing the Experience Sampling Method (ESM: Csikszentmihalyi & Larson, 1987). A variety of other sources contributed to the need for ESM, such as the interest in understanding the sequence or stream of behavior, the relationship between behavioral and situational variables, and a need to study behaviors in an ecologically valid manner (Hormuth, 1986). Csikszentmihalyi and Larson (1987) designed the Experience Sampling Method to capture systematically daily events and experiences in people's lives. Such data helped provide an understanding about how people typically behaved or the type of activities they routinely engaged in, and how people psychologically and behaviorally responded to intervening situational events.

ESM uses a signaling device such as a wrist watch alarm or a pager to alert participants at quasi-random intervals during waking hours over the course of a week. In response to each signal, participants are required immediately to fill out a self-report questionnaire called an experience-sampling form (ESF), which takes approximately 2 minutes to complete. This immediate reporting of experience in response to a signal is a major advantage of the Experience Sampling Method because it reduces retrospective errors while reporting experience. The underlying goal of the ESF measure is to obtain a

broad coverage of the respondent's internal state and external situation at each signaling moment. The exact content of the scale may vary depending on the interviewer's interests. However, in general, the measure includes a variety of open ended questions about the respondent's thought content, social context, location, and time at which the measure was filled out. The measure also contains Likert scales that ask participants to provide ratings about their affect, level of activation and cognitive efficacy. The use of both closed- and open-ended questions to assess the details of the participant's experience yields much more complex data than obtained by previously considered methods (Csikszentmihalyi & Larson, 1987). ESM is able to uncover unique and fine grain information about the underlying structures of behaviors which is difficult to obtain using standard psychological methods (Klinger & Kroll-Mensing, 1995).

Csikszentmihalyi, Larson, and Prescott (1977) used ESM to study the types of activities in which teens generally spent their time during the week, their reasons for engaging in such activities, and how they felt about these activities. Twenty-five adolescent volunteers were beeped 5-7 times a day at quasi-random intervals between 8am and 11pm. At each beep, the participants filled out a measure that asked about contextual variables such as "where were you" in an open-ended format and close-ended questions about why participants engaged in the activity. A rating scale about how much the participants enjoyed these activities was also included. The study found that activity engagement was based on age, gender, and SES; however, for a majority of the adolescents, peer interaction was their main context of socialization. Adolescents reported engaging in peer interaction-related activities more often and enjoyed them more than other activities in which they engaged. The authors explained the implications of these findings by speculating that ESM helped map the adolescents' activities and

experiences, which provided cues into the social and psychological forces that potentially shape their behavior patterns (Csikszentmihalyi et al., 1977).

Csikszentmihalyi and Hunter (2003) used ESM to study variations in emotional states over time in 6th, 8th, 10th, and 12th graders. Immediately following the beep, participants filled out a form containing open-ended questions about their activity at the moment of the beep, close-ended scales addressing a wide range of feelings, and conditions associated with that moment. Overall findings from this study suggested that the level of happiness experienced by adolescents relied on a complex combination of activity type, the person with whom one does these activities, engaging in obligatory activities, peer interaction, and situational conditions. Two findings in particular highlight ESM's reach into factors that would be difficult to obtain using conventional methods. For example, paradoxically, although studying was listed as an activity lower in happiness than most other activities, teens who studied more were happier. The authors explained this finding by suggesting that ESM had a unique ability to separate "the immediate context of happiness from more long term conditions" (Csikszentmihalyi & Hunter, 2003, p. 198). Another counterintuitive study finding was the lack of a positive relationship between happiness and financial affluence. The study found that teens from working class and impoverished backgrounds were happier than teens from affluent, upper-middle class backgrounds. Study of adolescent experiences has been an important focus in ESM research.

Csikszentmihalyi and Graef (1980) explored the perceived degree of freedom people experienced in their daily lives. The study used a sample of 106 working men and women from the Chicago area. Immediately following the beep each participant filled out a questionnaire that contained an open-ended question ("what was the main thing that you

were doing?") and a close-ended, forced-choice question ("why were you doing this activity?"). In addition, participants were asked to rate their skill on the activity they were engaged in on a 10-point scale ranging from *low* to *high* and provide a degree of their intrinsic motivation by answering the question "do you wish you had been doing something else?" on a 10 point scale ranging from *not at all* to *very much*. Interestingly, the study found that activities typically considered compulsory in laboratory studies (such as work) were perceived as voluntary 15% of the time, whereas leisure activities that are typically considered as voluntary (such as socializing, watching TV) were seen as compulsory 30% of the time. Several other ESM studies have explored and discovered unique insights into how personal, situational and a combination of both factors shape and govern adolescent experiences. Other ESM studies have revealed differences in the cognitions, affects, and behaviors in a variety of populations (e.g. adolescents, adults) and found differences between pathological and non-clinical populations.

Similar to standard psychological studies, ESM can be used to collect data in single case studies as well as across a large number of individuals, which would in turn provide a way to study aggregations over cases (Csikszentmihalyi & Larson, 1987). In addition ESM provides advantages over conventional methods. For instance, ESM is a flexible method that can be used with a diversity of populations. The method is not sensitive to age, education, or psychological well being. The only necessary requirements for individuals to participate in an ESM study are the ability to read, write, and agree to a viable research agreement. Given that ESM is able to collect information in the person's natural environment and to study processes that are difficult to create in the laboratory, ESM is an ecologically valid method. In addition ESM provides an avenue to study behavioral consistency in the face of situational variability. The method uses a repeated

measures design that makes it possible to collect substantial amounts of data on one subject over the course of several days (e.g. about a person's daily life experiences, typical behaviors and activities, and affect). Such data can help detect patterns or consistencies in one's daily life. Additionally, this information can help inform the debate about whether behavior can best be predicted by personality variables, situational variables or by considering the interaction between situational and personality variables in a way that conventional psychology cannot (Hormuth, 1986).

ESM does have limitations. ESM has been used primarily to study mood, quality of life, and the context of experience. It could also be used to study cognitive variables, but such uses are rare (Hurlburt, 1997). ESM is essentially a self-report measure and shares problems that are inherent to self-report measures including memory errors, recoding errors and retrospective bias (Klinger & Kroll-Mensing, 1995). For example, participants are not trained to self-monitor. Yet, ESM places a large amount of responsibility on participants to collect subjective data as well as objective data related to the time and situational variables (Hormuth, 1992). The content of the collected data is left unchecked until participants turn in their materials at the end of the week.

The open-ended questions create a conversational style that most respondents find enjoyable (Stone, Kessler, & Haythornthwaite, 1991). The responses are later coded by the experimenter into the appropriate category. However, if the researcher misunderstands the participant's response, the coding may be inaccurate. The open-ended questions allow the participants to provide responses in their own way; however, the style of responding may greatly differ from person to person. For example, some participants are telegraphic in their reporting and others may provide rich details. The participants may omit sensitive or embarrassing information because of impression management. The

researcher may experience difficulty understanding some of the response content or the importance of an event reported by the participant. Given that the researcher typically has contact with the participant only at the beginning and then at the end of the study, problems arising due to such misunderstandings and self-presentation biases remain unchecked.

The close-ended questions are easier to complete because they require only a check mark. However, close-ended questions may limit the expression of the subject's experience (Stone et al., 1991). Even the most carefully constructed checklist may not contain all the information related to outcomes of interest. The participants are unable to report on experiences or events that are not mentioned on the list, and the items present on the ESF may not be representative of the participant's experience at the moment of the beep. The participant may be forced to endorse self-statements that are similar but not identical to their thought processes (Klinger & Kroll-Mensing, 1995). It is also possible for the participant to have an interpretation of an item that does not match that of the researcher.

In addition, the researcher must limit the number of items on the ESF in consideration of the respondent's time (Stone et al., 1991). A long list of items has the potential to burden a respondent. However, a shorter list may compromise the amount of information or the type of information being recorded (Stone et al., 1991). Furthermore, the paper and pencil version of the ESF makes it difficult to ensure timely responding by the participant (Barrett & Barrett, 2001). Hormuth (1986) and Csikszentmihalyi and Larson (1984) found that up to 65% of the participants reported responding to the cued signal immediately; however, approximately 80-90% admitted occasionally to responding as much as 18 minutes later. Such delays could lead to fabrication or reconstruction of

events and be more prone to memory errors than reports that are reported immediately after the beep.

Using an electronic device such as a PDA increases the likelihood of timely reporting and provides time stamps that record whether the data was collected in a timely fashion (Barrett & Barrett, 2001). Hence, handheld devices can decrease the likelihood of the data being fabricated due to forgetfulness and identify entries that have not been filled in on time. PDA-delivered questionnaires can be presented in random order, and the program can present different questions based on previous responses. Electronic coding devices are also advantageous because they reduce data loss, data entry and coding errors (Stone et al. 1991). However, human errors are not completely eliminated because the PDA requires manual programming (Stone et al., 1991). Furthermore, PDAs require expensive software. The equipment itself is expensive and there is a risk of the participant losing costly equipment. The battery life has been found to be insufficient for longer studies. Lastly, the PDA could malfunction and lose the data if the subject uses the PDA for purposes other than for which it is programmed.

Ecological Momentary Assessment (EMA)

The Ecological Momentary Assessment (EMA) method was inspired by prior sampling methods such as ESM and hence holds a close methodological resemblance to ESM. An EMA participant is provided with a signaling device (pager, wrist watch, palm top computer) which signals at random times. As soon as the participant hears the signal s/he is required to fill out a self-report measure or record a directly measured physiological phenomenon (e.g. heart rate, blood pressure) (Shiffman, 2000). EMA has been noted for its ability to collect precise, empirical data on subjective experiences

(Stone, Shiffman, & Devries, 1999). Unlike ESM, EMA is not a strictly random time sampling method. EMA uses three types of signaling schedules: time, event, and signal contingent (Wheeler & Reise, 1991). The time protocol asks participants to provide reports at fixed, predetermined intervals (e.g. every four hours, or daily at 10 pm). The signal contingent protocol asks participants to provide a report every time the device (e.g. a beeper, wrist watch) randomly signals. The event contingent protocol asks participants to provide a report each time a target or trigger event occurs that meets the researcher's pre-established definition (e.g. pain, anxiety, social interaction etc.). The researcher chooses the schedule to suit the research question and the target event being studied (Stone & Shiffman, 1994).

EMA was developed in response to behavioral medicine's need to assess medically related phenomena in the patient's natural environment (e.g. pain perception, symptom reports, blood pressure, heart rate, respiration, hormones). However, EMA has been used with a wide range of populations, from ages 10-85 years, to study a variety of phenomena, such as coping efforts, symptom reports, activity levels, smoking, eating, alcohol consumption, and drug use. Typically, these phenomena are studied within the context of particular domains (e.g. behavior, activity, mood, or cognition) (Stone, Schwartz, Neale, Shiffman, Marco, et al., 1998).

Wegner, Smyth, Crosby, Wittrock, Wonderlich, and Mitchell (2002) studied the relationship between binge eating and affect by observing the target behavior of bingeing in the individual's natural environment. The participants were given various eating disorder-specific questionnaires that were administered on a Palm Pilot. The participants received extensive training on how to use Palm Pilot and how to self-monitor using it.

The participants were asked to fill out the following questions immediately after a binge

episode: where the binge took place, who was present, types of food eaten, degree of hunger before the binge took place, and pre- and post-binge mood ratings. In addition, the participants were randomly beeped seven times between the hours of 10am and 10pm over the course of two non-consecutive weeks. Immediately following the beeps participants were asked to fill out the above mentioned questions as well as questions about mood states, level of stress experienced and eating behaviors. Consistent with previous research, the study found that participants experienced a stable negative affect on days when bingeing occurred and that there were no significant shifts in mood before or after the binge episode. Contrary to the researcher's expectations, however, a comparison between the participant's mood before and after the binge episode suggested a more negative mood after the binge episode as opposed to before the binge. The study did not find evidence to support purported theories that bingeing was caused by an immediate or negative mood or that bingeing was done to gain relief from a negative affective state.

One of the most salient contributions of the EMA literature seems to be the systematic comparison of data obtained using momentary sampling methods and data obtained using retrospective measures. Several EMA studies have found a low correspondence between data obtained using the two different methods and have highlighted problems inherent to retrospective reporting. Stone, Shiffman, and deVries (1999) found that patients used different heuristics to summarize their experience of pain, and that their retrospective assessments were influenced by extreme and recent incidents of pain. The authors suspect that their findings could be generalized to how recent or intense states affect recall of well-being and affective states (Stone, Broderick, Kaell, & Porter, 1995).

Stone and colleagues (1998) studied cognitive and behavioral coping styles in a community sample experiencing significant work or marital stress. The study assessed the correspondence between retrospective coping reports and EMA. On average, 30% of the respondents reported coping styles on the EMA, especially cognitive coping, that were not reported on the traditional retrospective measures. Approximately 30% of the participants did not report coping styles on the EMA, especially behavioral, that were endorsed on the retrospective measures.

Farchaus and Corte (2003) measured five eating disordered behaviors (i.e., binge eating, self-induced vomiting, diuretic use, and excessive exercise) and studied the correspondence between EMA and the retrospective interview methods commonly used for measuring eating disorders. The study found that certain behaviors, binge eating and exercise, were reported more often on the standard eating disorder measure than on the EMA. As a testament to EMA's ability to record momentary experience accurately, the authors of this study claimed that EMA offered a "promising alternative to retrospective measurement of eating disorders" (p. 349).

EMA has advantages and disadvantages. It monitors target phenomena as they occur in their natural surroundings, which promotes ecological validity and real world generalizability over studies conducted in labs (Stone et al., 1999; Farchaus & Corte, 2003). For instance, EMA has the potential to understand symptoms, situations, and events in the context of daily, community life when such phenomena are difficult to study in or recreate in lab settings (Stone et al. 1999). The real time capture of an event minimizes recording errors due to memory and retrospective biases (Hufford, Shields, Shiffman, Paty, & Balabanis, 2002; Stone & Shiffman, 1994). The target phenomenon can be measured several times a day, which allows the detection of how the target

behavior varies across situations and also how different variables affect the target event (Stone & Shiffman, 1994). EMA data is typically collected using palm top computers. These instruments can provide time stamps as to when participants were beeped, improve timely recording of data since the computers give participants a set amount of time (e.g. 2 minutes) within which they are required to respond, and improve ease and accuracy for data transfer (Hufford et al., 2002). In addition, the computers record response latencies, provide periods of down time, and allow the branching of questions depending on answers to previous questions (Stone & Shiffman, 1994).

Despite such safeguards, timely reporting in EMA studies has been found to be inconsistent. Only 45% of study participants record all their data in a timely manner; approximately 15% or more admit to recording data within 2 hours of the signal (Farchaus & Corte, 2003). A two-hour delay is relatively shorter than the time delays evident in conventional, retrospective measures, and it is possible to record faithfully essential parts of the experience after short delays. However, even relatively minor delays can result in the loss of certain details related to complex experiences, and the loss of such details may in turn lead to an under- or over-estimation of the frequency the target event (Friedman & deWinstanley, 1998). This may raise questions about the accuracy and validity of the data obtained using EMA. Furthermore, the use of palm top computers requires a substantially higher level of financial commitment as well as technological knowledge on behalf of the researcher (Stone et al., 1999). The use of portable and convenient technological tools cannot prevent loss of data in cases where a participant forgets to carry the palm top, or avoids recording data due to feeling rushed to fill out the self-report amidst other commitments (Farchaus & Corte, 2003).

The repeated-measures design can be burdensome for the researcher as well as the participant. EMA studies can generate large data sets which creates a large data management task for the researcher. In addition, the lengthy nature of EMA studies requires participants to spend a large amount of time training in self-monitoring and then record data several times daily for the entire length of the study (Stone & Shiffman, 1994). Such time demands can lead to problems with attrition and selection bias (Stone et al., 1999). The repeated-measure design also raises concerns about the participant's reactance to the task. EMA is used to establish base rates for behaviors (e.g. smoking, drinking); hence, reactivity is directly related to a crucial question related to self-monitoring: "How does monitoring of behavior, affect, and cognitions influence these phenomena?" (Hufford et al., 2002). Reactivity can make it difficult to evaluate the effect of the independent variable given that reactivity can create unwanted variance in the dependent variables of interest.

The few studies that have systematically explored the effect of reactivity in EMA have found equivocal results. Certain studies found that a participant's motivation to change (i.e. reduce drinking behavior) moderated the effects of reactivity (Hufford et al., 2002). Other studies found little to no evidence of reactivity (e.g. Farchaus & Corte, 2003, Litt, Cooney, & Morse, 1998). Lastly, although the timely capture of data increases the likelihood of accurate reporting, faithful reporting of data is also dependent of the participant's willingness to disclose (Shiffman, 2000). Loss or distortion of data due to self-presentation bias is well known in the sampling literature. Farchaus and Corte (2003) found that at times participants failed to record data in EMA studies due to feeling embarrassed. This particular threat may be more significant in cases when the signal comes on when the participant is in public.

Think Aloud (TA)

The think aloud method is a type of cognitive assessment that directly and immediately accesses the content and processes of cognition while a subject is involved in a particular task (Davison, Vogel, & Coffman, 1997). The general think aloud method involves having participants verbalize the thoughts that are occurring to them while they are involved in a particular task. This externalized thought content is recorded, typically on a tape recorder, and later coded by the experimenter for subsequent analysis. The methodological need for think aloud methods grew from the need of cognitive and clinical psychologists to understand the role of thoughts in relation to affect and behavior (Davison et al., 1997).

The think aloud method has been used to explore the relations among thought, emotion, and behavior by having participants report on their thoughts in response to a variety of controlled laboratory situations (e.g. Cacioppo, Glass, & Merluzzi, 1979; Sutton-Simon & Goldfried, 1979). Barnhofer, Jong-Meyer, Kleinpa, and Nikesch (2002) used the think aloud method with 15 depressed participants to replicate findings of a previous study about categorical retrieval style in depressed patients. The study also explored temporal progression of memory retrievals. Depressed and non-depressed participants were provided with a word prime, asked to remember in as much vivid detail possible an autobiographical event and to verbalize everything that came to their mind. Practice items were administered prior to the test word primes to get participants comfortable with the TA task. The participant responses were recorded using an audio tape recorder. The study found that non-depressed people tended to produce a higher number of specific memories based on the word prime (e.g. prime: “fail”; memory: “I failed in Spanish class”). Depressed individuals tended to produce a higher number of

categorical memories that are essentially over-general statements or generic summaries of the remembered event (e.g. “I failed in school”). Depressed participants also tended to produce a sequence of consecutive categorical memories, which may contribute to the maintenance of an over-general retrieval style and is reminiscent of a ruminative process commonly seen in depressed individuals. Hence, think aloud strategies appear to have utility in assessing cognitive issues in psychopathology.

Camp, Blom, Hebert, and van Doorninck (1977) studied test performance and behavior in aggressive young boys. The researchers used the think aloud method as one component along with several other cognitive behavioral components to train aggressive boys to problem solve by playing a game called “copy cat.” The game used modeling strategies to train aggressive children to problems solve. The think aloud method was applied to phase out copy cat and have the children develop their own strategies. During the think aloud phase participants were required to respond to three basic questions: “What is my problem?” “Am I using my plan?” and “How did I do?” Hence, the children were asked to think aloud to solve interpersonal problems and addresses classroom work. Overall, study results comparing trained and untrained boys were found to be non-significant. This result was considered to be a weakness of training components other than the think aloud method.

The think aloud method has been used in education research for the assessment of cognitive processes such as attention and reading comprehensions (Davison et al., 1997), and has been found to help students improve comprehension by learning to attend to and to appraise corrective cues (e.g. Montague, 1993; Randall, Fairbanks, & Kennedy, 1986).

A major advantage of TA is the immediate recording of cognitions as they are occurring, which has the potential to reduce errors inherent to retrospective recall.

Cognitive psychologists have developed various assessment and performance measures to infer how cognitions mediate mood and behavior. Clinical psychologists have asked subject's questions such as "What was on your mind when...?" in order to help them report their thoughts by retrospective introspection. However, retrospective reporting is vulnerable to several, well noted errors; think aloud methods minimize that by capturing thoughts as they immediately occur. Similarly, the direct access to a participant's cognitions reduces the need for inferences about the participant's thought processes.

Genest and Turk (1981) criticize the think aloud method for lacking in ecological validity for being vulnerable to incomplete reporting, and for reactivity. The think aloud method experiments are conducted in a laboratory; hence, the method lacks ecological validity and real world generalizability. The requirement of having to verbalize thoughts while engaged in an activity may be a mentally cumbersome task. In addition, introspective studies (e.g. Hurlburt & Heavey, 2006) have found that people's inner experience is not just confined to verbalization—inner experience can include feelings, inner speech, inner hearing, or various sensory or perceptual experiences. Hence, asking subjects to verbalize thoughts in parallel with activities may overemphasize the reports of verbal thinking and therefore may not solicit an accurate or complete picture of the participant's inner mental life. For example, it may be difficult or impossible for a participant to describe a visual image while keeping up the pace required by the task; as a result, participants may under-report the existence of visual images.

Regarding self-presentation bias, the think aloud methods require respondents to report on their thoughts in relation to solving a particular problem or a specific simulated situation. If participants experience thoughts that are private and or that seem to be unrelated to the task, they may feel forced to censor themselves. Participants may

construct reports that mischaracterize the censored experience in order to provide responses that seem consistent with the task or in accordance to the experimenter's expectations. Participants may well not know what is actually related to the task, so this censoring/mischaracterizing can be substantially problematic.

Articulated Thoughts in Simulated Situations (ATSS)

This Articulated Thoughts in Simulated Situations (ATSS) method is a modification of the think aloud method. Like TA, ATSS is based on the assumption that people have an "inner dialogue" and that when people are engaged in a task they are able to tune into this dialog without being trained to do so (Davison, Navarre, & Vogel, 1995). ATSS exposes participants to hypothetical situations by way of video or audio recording that have a variety of emotional content. The participants are asked to imagine themselves in these situations and provide a running report of their thought processes in these imagined or simulated situations.

Eckhardt, Barbour, and Davison (1998) assessed anger-related thoughts, cognitive distortions and cognitive deficiencies during information decoding and decision-making stages in married men who are violent and those who are non-violent towards their wives. The 88 male participants were exposed to 3 audio-taped scenarios, each of which was 30 seconds long. The taped characters were performed by character actors. One of the scenarios was intended to be anger arousing and the other jealously provoking. As participants listened to the scenarios, they were asked to imagine themselves in those situations where the source of anger or jealously arousal was their wife. The control scenario was scripted so that the source of annoyance had nothing to do with the participant's wife. During parts of the tape a signal came on at which time the

participants were to articulate and record on a tape recorder their thoughts and feelings in reaction to the scenario. Study findings revealed important differences between violent men and their non-violent counterparts. For instance, violent men produced a larger number of irrational beliefs, cognitive biases, and hostile attributional biases but fewer anger-controlling statements. They also reported more negative affective arousal during the anger producing scenarios.

ATSS shares advantages with experience sampling methods in general (e.g. immediate responding and reducing retrospective errors, and direct access to the participant's thought processes). A noted advantage of the ATSS over the think aloud method is that ATSS has target-situational flexibility (Davison, Vogel, & Coffman, 1997). Davison et al. (1997) also describe the major shortcoming of the ATSS method: lack of ecological validity, reactivity and incomplete reporting. The experiments are typically conducted in a laboratory, and the participant is asked to think aloud in a hypothetical and contrived situation rather than respond to an actual event. This may reduce real world generalizability because certain situations are difficult to create/emulate in lab settings. Also laboratory simulations reduce the likelihood of catching thoughts that have a low frequency of occurrence but are high in relevance to the research question. A study design that repeatedly samples thoughts in a variety of settings may be better in that regard.

Furthermore, as suggested by Davison et al. (1997), although participants are allowed to provide an open-ended discussion of their ongoing thought processes, the collected data is analyzed and coded according to the experimenter. Misunderstandings about the subject's actual intentions may lead to the loss of the subject's experience or loss of relevant data to the experimenter's research question. Regarding reactivity, given that

participants are asked to verbalize and record their thoughts participants may be inclined to provide socially acceptable responses. This may also result in incomplete reporting of thoughts. Lastly, having to attend to a task and cue in to one's own thoughts is a demanding task.

Thought Listing

The thought listing method presents a stimulus (e.g. an audiotape or a problem to solve). Participants are instructed to list, immediately following the task, only the thoughts that occurred in response to the stimulus and that pertained to the stimulus, and to write the thoughts down in the order in which they occurred. The participants have anywhere between 45 seconds and 10 minutes to complete the task. The optimal time of reporting is noted as being around 2 minutes because too little time leads to incomplete reports and too much time increases the likelihood of listing thoughts that are unrelated to the stimulus (Cacioppo & Petty, 1981). The primary interest of the thought listing method is to gain access to the participant's internal dialogue in response to a stimulus. The speculation is that this dialogue reveals cognitive responses that occur within an individual. Hence, the dialogue can determine processes that catalyze a change or are responsible for the resistance to change in an individual (Cacioppo & Petty, 1981).

Thought listing has these advantages: thoughts are produced after the task is completed; hence, the thought listing process interferes little with the task itself (Blackwell, Galasso, Galassi, & Watson, 1985). The method is conducive to group administration. While the think aloud method has been found useful in producing thoughts related to problem solving, the thought listing method is most useful in discovering cognitions that are evaluative in nature (Blackwell et al., 1985). The

literature does not stress the need to train subjects in order to familiarize them with the procedure. Given that the memory lag between stimulus presentation and thought listing is minimal, the errors due to retrospective biases are speculated to be minimal. However, here are disadvantages: thought production after the stimulus has been presented also has the potential to increase the risk related to retrospective bias (Blackwell et al., 1985). The participant is likely to lose information related to complex experiences that may have occurred during the task presentation. This memory failure may lead the participant to reconstruct the information rather than provide an authentic report on their cognitive processes. Lastly, the thought listing method increases the possibility of post hoc rationalizations and interferences caused by new cognitions while the subject is engaged in recalling thoughts related to the task.

Diary Methods

Diary methods require a subject to provide narrative reports about subjective experiences, cognitions, behaviors or social interactions related to the passage of time (Breakwell & Woods, 1995). Obtaining accurate mapping of experiences of everyday lives is an important and necessary component to psychological science. “Diary method allows for the gathering of an individual’s perceptions, thoughts, and feelings about their behavior and contexts” (Hektner & Csikszentmihalyi, 2002, p. 234). Historically, the diary method is rooted in various psychological models such as behaviorism and psychoanalysis (Thiele, Laireiter, & Baumann, 2002). Behaviorists use diary methods or logs to self-monitor behaviors, assess the frequency of target behavior and environmental factors controlling the target behaviors. Psychoanalysts used client’s diaries about their nightly dreams as important components in therapy.

Inner experience studies use the diary method to ask participants to provide frequent reports on their daily life experiences at designated times during the day (Bolger, Davis, & Rafaeli, 2003). The protocol includes one or more sheets of paper that have pre-defined contents and categories in line with the researcher's interest. Depending on the question being investigated, participants are asked to fill out their diaries in terms of interval, signal-contingent, or event-contingent protocols. The interval protocol asks participants to provide a diary entry at fixed, predetermined intervals (e.g. daily for four weeks). In a signal-contingent protocol, the participant provides a diary entry every time a signaling device (e.g. a beeper, wrist watch) randomly comes on. In an event-contingent protocol, the participant provides a report each time a target or trigger event occurs that meets the researcher's pre-established definition (e.g. pain, anxiety, social interaction etc.).

Diary research is most effective when the research's question and the design are complementary. Well-designed studies can inform the researcher about aggregates of experiences over time, temporal patterns of experiences, and the factors that affect changes in these experiences. For each type of question, diary studies can provide information about the average person, between-person variability, and predictors and determinants of this variability (Bolger et al., 2003). Diary methods provide a reliable avenue to study a variety of private and public aspects of people's lives (Larson & Csikszentmihalyi, 1983).

Waugh and Bulik (1999) studied a commonly stated notion that children of mothers with past or current diagnosis of eating disorders are potentially at increased risk for developing eating disorders. The authors studied children (aged 1-4 years) of women with a current or past diagnosis of eating disorders in comparison to controls on five

domains that may contribute to the development of an eating disorder in children: health and development, temperament, body satisfaction, nutritional status, and mealtime interaction patterns. The nutritional status domain was assessed using the diary method. All mothers participating in the study were asked to record a food diary over a course of three days about all food and drinks consumed by their child. The analysis of the micro and macro nutrients based on the food diary found that children of the eating disordered mother consumed significantly less sodium and thiamin than children belonging to mothers who did not have eating disorders. According to the authors, the reason for these deficiencies was difficult to interpret because several “junk” and over-processed foods tend to contain high amounts of sodium and thiamin. But thiamin is also contained in meats, legumes and vegetables. The study found that a sizable number of children in both groups fell below the minimal dietary allowance for iron and vitamin E. Hence, contrary to the common theories, the study did not find differences between the diets in children of mothers with a history of eating disorders and the control group.

Diary methods have been used in cross cultural studies investigating the environments and activities that people spend their waking hours. For example, Szalai and colleagues (1972) found that American and European adults spent significantly less time relaxing or doing leisurely activities than do adults in any other country in the world. Robinson (1987) described the diary method as a micro-behavioral method that helps to understand the context of people’s daily behaviors. Robinson asked participants open-ended questions about each activity they performed. The activity accounts were kept over short time periods such as a day or week; however, diary accounts could be kept for longer periods of time. The open ended nature of diary accounts made it possible for participants to report on activities that were unanticipated by the researcher.

Robinson (1965, 1975) conducted a national time study to collect data on societal trends in time expenditure. The participants received a daily diary log that asked them to provide information on what activity they were involved in, the time the activity started and ended, if the activity was planned, a rating of how much they liked the activity, where they were, with whom, and what other activities they were involved in. The study found structural changes in the nature of daily activities, where increased time spent doing one activity meant spending less time on other activities. For example, declines in paid work time in American men and family care time in women resulted in an increase in time spent engaging in self care activities (e.g. television, sleep and grooming). The study also found that activities that were previously considered to be non-standard or deviant (e.g. television) became more commonplace.

Robinson (1977) found differences between diary data and the data obtained with conventional, retrospective report methods where participants were asked to provide a general affective record about a particular activity. In the diary method participants provided momentary affective ratings about an activity as they engaged in it. Results revealed a variation in affective data obtained from the two methods. The momentary diary affective ratings on activities (e.g. child care, work or travel) were less positive than in the general affective ratings. Television watching was rated more positively in the diary than in the general ratings.

Diary studies have the potential to gather rich, narrative, self-disclosing statements about participants over a long period of time (Thiele, Laireiter, & Baumann, 2002). The complex qualitative data obtained using diary methods would be difficult to obtain with standard psychological measures that primarily rely on one shot designs, close ended items, or retrospective accounts (Hektner & Csikszentmihalyi, 2002). One of the

strengths of the diary method is its ability to study temporal variability (e.g. the researcher can pose a question; for example, does the variable of interest change from morning, to afternoon to evening, does the variable differ on weekdays vs. weekends). A sufficient number of diary entries provide data about within-person variability, between person differences, and also between person differences in variability. The latter is an important but neglected topic in psychology (Bolger et al., 2003).

However, the personal costs incurred to the participants in providing such data is a limitation of the diary method. The method requires people to be interested in the study for a long period of time and repeatedly to fill out the same measures, which creates an assortment of problems related to data collection and the quality of data collected (Bolger et al., 2003). For instance, the requirement to respond repeatedly to the same questionnaires places substantial demands on the participant in terms of time commitment and motivation. Investigators have attempted to shorten the diary instrument to be less time consuming; however, this often results in a trade-off: less in-depth reports of a phenomenon at each time of measurement. Some designs are obtrusive and disruptive to participant's routines (e.g. being in class, sleep, meetings, etc.). Hence, the experimenter has the added burden to design protocols that are specific to the individual's routines. Doing so may compromise the consistency in data gathering or create a selection bias regarding which participants can adhere to a particular protocol. The length of study participation has been found to be related to response decay: the rate of responding goes down the longer the person participates in the study (Stone et al., 1991).

The long and obtrusive designs of diary methods may lead to higher attrition rates (Bolger et al. 2003). The demographic and personality characteristics of those willing to participate in demanding protocols may be differ in important ways from people who

decide to drop out (Stone et al., 1991). Hence, the findings from such participants may not generalize to non-respondents. In addition, participants who are willing to continue with the study may lose their motivation to fill out the diaries in an authentic manner or habituate to the questions (Bolger et al., 2003). For instance, repeated exposure to the questionnaire may cause subjects to skim over the questionnaire and superficially respond to the questions rather than pay full attention every-time they have to fill out the diary. Getting people to remember to record the diary in a timely manner is difficult even when participants are willing to comply. Participants may fill out the diary after the designated time, which may cause the data to be affected by retrospective biases.

The diary method is also vulnerable to problems arising from reactivity and self-presentation bias (Bolger et al., 2003). The experimenter typically meets with the participant just before data collection starts and then once again at the end for a debriefing session. The lack of interaction between the experimenter and the participant during the data collection processes makes it difficult to ascertain whether the participant was telling the truth (Thiele, Laireiter, & Baumann, 2002). The participants may have had several incidents when they were reluctant to be truthful when reporting on information that is interpersonal or emotionally charged, or embarrassing in nature. In such instances the participant may be tempted to reconstruct or fabricate information or even skip large sections. This problem may go undetected until the end of the study.

With regards to reactivity, diary keeping may alter the topography, phenomenology of the behaviors, thoughts and feelings that are being observed (Thiele, Laireiter, & Baumann, 2002). For instance, the participant may become more sensitive or conscious of just the indicators asked about in the diary questionnaire and less sensitized to other indicators.

Such problems may compromise the reliability and validity of the data.

Descriptive Experience Sampling

DES is a non-quantitative variant of inner experience sampling methods. The DES method was developed approximately 30 years ago by Hurlburt (1976). The primary aim of DES is to obtain faithful descriptions of an individual's inner experiences at particular points in time (Hurlburt & Akhter, 2006; Hurlburt & Heavey, 2006). DES defines experience as whatever is directly present in consciousness at any moment in time (Hurlburt & Heavey, 2002; 2006). In the typical DES study an individual is asked to wear a beeper in his/her natural environment. The beep occurs at random times, cueing the participant to pay attention to his/her inner experience that was ongoing at the moment of the beep. The individual is to jot down some notes about what is in his/her experience at that particular moment. This process is repeated for several beeps; typically six beeps are collected during one sampling day. Within 24 hours of beep collection the participant and the researcher engage as co-investigators in an "expositional interview" to obtain detailed descriptions of the individual's experience at the moment of each beep. The participant is allowed to decline to discuss any beeped experience for whatever reason. The samples they do discuss are thoroughly and rigorously explored with the aim of obtaining a faithful description of the participant's inner experience.

This process of capturing inner experience during several beeped moments and shortly thereafter engaging in an expositional interview is repeated over a period of several days. The DES method does not collect beeps based on predetermined themes or research questions. The method simply collects random samples of inner experience as they naturally occur and allow the individual's experience to unfold as it may.

Once the DES sampling/interviewing procedures are completed, the entire set of beeped moments can be examined to distill the "salient characteristics" of inner

experience. Participants are typically invited to review the individual sample summaries and the descriptions of salient characteristics, and to provide input/discussion about their accuracy.

DES is reliable and replicable as demonstrated by Hurlburt and Heavey (2002). That study included 10 undergraduates who were interviewed about the same beeps by two independent observers. The samplewise and participantwise reliability was computed for five characteristics commonly observed across participants - images, inner speech, unsymbolized thinking, feelings, and sensory awareness. The interobserver (samplewise) reliability ranged from .52 to .92. The participantwise reliability ranged from .91 to .98. The percentage of observer agreement ranged from 83% to 97%.

DES is an idiographic method where the focus of study is on one individual at a time. It allows for in-depth investigations of one person's inner experience and may yield rich, unique insights that may be missed if aggregates of data were to be used. The idiographic information provided by a particular case provides rich data which may provide the groundwork for hypotheses that can later be tested empirically. The issue surrounding the validity of DES has to do with whether DES faithfully apprehends inner experience of the individual and if this account of inner experience can be validated for the particular individual (Hurlburt & Heavey, 2006).

DES is an ecologically valid method (Hurlburt, 2008). Sampling *in situ*—in the environment that the individual naturally inhabits (Hormuth, 1986)—has been established as an important way to assure apprehending phenomena that are generalizable and relevant to real world situations. A fundamental aspect of DES is to collect data in an individual's natural environments as they go about their everyday activities (Hurlburt, 1997, Hurlburt & Heavey, 2006). The participant is beeped and is asked to describe any

inner experience he or she apprehended at the moment of the beep. Every effort is made to obtain a faithful description of the participant's experience in the way that it occurs to him or her.

DES shares a few common elements with other sampling methods – the focus on momentary experience, the use of a signaling device, the valuing of ecological validity, and iteratively apprehending pristine experience (Hurlburt, in press). However, DES is conceptually and methodologically different from other experience sampling methods in several ways that warrant attention.

Specific Focus on Experience at the Moment of the Beep

Somewhat similar to other sampling methods, DES aims at capturing experience at the moment it occurs. DES attempts to obtain this experience by delivering a brief, unambiguous, external signal (a beep) which designates the moment under consideration (Hurlburt & Heavey, 2002). Unlike some other sampling methods, the experience sampling is random and not event, time, or situation-based. In addition, DES makes a sharp distinction between what is ongoing at the last undisturbed moment of the beep and what awareness was triggered by the beep (Hurlburt & Heavey, 2006). DES is squarely interested in the former because there could potentially be several events occurring at any given moment; however, only certain aspects may enter in an individual's experience. Specifying the moment of the beep helps minimize retrospection, interpretation, and faux generalization. In an interview, specifying what is meant by the moment of the beep is crucial so as to ensure that the participant and interviewer's efforts are aimed in the same direction. The moment that DES seeks to describe is generally shorter than the moment used in other sampling techniques.

Iterative

Apprehending inner experience is neither easy nor impossible (Hurlburt & Heavey, 2003). Paying attention to and reporting the experience at the moment of the beep is not intuitive but rather a learned skill (Hurlburt, Koch, & Heavey, 2002). Hence, a participant must learn DES over multiple sample/interview sequences (Hurlburt, 2009; Heavey & Hurlburt, 2008). Given that the interviews are unstructured and the questions are dependent on the participant's inner experience, the participant may not at the start have a clear idea about how s/he should talk about experience. During the interview, the participant is asked several specific questions to hone in on details about what exactly was in his/her experience at the moment of the beep. With the help of such questions and the substantial focus on the precise moment under consideration, the participant progressively learns and improves the skill of capturing experience at the last undisturbed moment before the beep (Hurlburt, 2009).

Typically, participants become reasonably proficient in observing and reporting their experience over the course of three sampling meetings. However, in some cases it takes longer, as in the case of a 22-year-old college student "Amy" (Hurlburt & Heavey, 2006). Amy reported at the outset that she lied compulsively, had questions about her personal, sexual, and ethnic identity, and had a poor relationship with her mother. While participating in DES, Amy initially had substantial difficulties in apprehending and reporting her inner experience. On the first sampling day after a prolonged discussion of two beeps, Amy and the interviewers remained unclear about what was in Amy's experience at the moment of the beep. On the next sampling day Amy's descriptions were initially clear but as the interview progressed her descriptions became inconsistent.

This made it difficult to be confident about what was in her experience at the moment of the beep. Amy's third and fourth sampling days were equally difficult.

Overall, it seemed apparent that at the outset Amy had difficulty differentiating between what was ongoing at the moment of the beep and what was triggered by the beep, and was unsure and unclear about the characteristics of her inner experience. The interviewer remained supportive of her, acknowledged her difficulty in grasping the DES task, explained what is meant by the moment of the beep, and asked her several questions to help her learn to hone in on her experience for the next sampling day. This focus on experience at the moment of the beep continued for four more sampling days. On the fifth day concerted efforts of Amy and the interviewer to observe Amy's experience at the last undisturbed moment of the beep bore fruit. Amy was, apparently, now able to describe her experience with a moderate level of clarity and consistency. She showed a level of proficiency typically evinced on the second sampling day. Her descriptions became increasingly clear on subsequent sampling days.

Bracketing Presuppositions

Presuppositions are preconceived impressions about something. These impressions exist without critical examination and interfere with experiencing the world accurately (Hurlburt & Heavey, 2006, Hurlburt, 2009). Bracketing presuppositions aids the targeting of what is directly observed by minimizing interferences from assumptions or inferences about an experience (Heavey & Hurlburt, 2008). It leaves the door open to discover new and unexpected experiences. DES brackets presuppositions when asking participants to observe their experience and also during the interview.

Bracketing presuppositions is designed to allow unique insights in clinical and non-clinical populations. For example, Jones-Forrester (2006) investigated the inner

experience of bulimic individuals. The study participants were not asked to sample during bingeing episodes or asked about their body image or any other predetermined themes, even though those aspects might be presumed to be important. Instead, the participants were simply asked to provide random samples of their beeped experiences. Such random sampling of naturally occurring experiences revealed that the inner experience of bulimic individuals were strikingly multiply fragmented, a characteristic not anticipated by the bulimia literature. The bracketing of presuppositions allowed the investigators to discover that the most salient aspect of participants' experiences had little or nothing to do with the thinness ideal so closely linked to bulimia in extant literature.

Hurlburt and Sippelle (1978) sampled with "Donald," who presented with several symptoms (e.g. sweaty palms and feet, diarrhea, tremors, feeling that limbs were heavy and sluggish) indicative of severe anxiety and panic attacks. Donald was involved in therapy and presented himself as someone who was happy and content with his life and family. The origins or reasons for his anxiety were not apparent from his therapy sessions. Donald agreed to wear a beeper in his natural environment for two days. An inspection of his beeped moments revealed that a substantial portion of his thoughts had to do with his annoyance towards his children. This was surprising to Donald; there was no evidence of such feelings during the initial interview. Discovering such a result requires the effective bracketing of presuppositions.

Hurlburt (1993) sampled with "Fran," who was diagnosed with borderline personality disorder. DES revealed that Fran's inner experience was characterized by seeings that had no figure ground phenomenon. She experienced seeing multiple inner images and was able to pay attention to these multiple, complex, images at the same time with equal focus. The bracketing of presuppositions allowed Hurlburt to notice this absence of

figure/ground phenomenon, something that had not been reported in the borderline personality literature.

Hurlburt and Melancon (1987) sampled with a 23-year-old female, “Jennifer,” who was diagnosed with paranoid schizophrenia. Jennifer’s beeped moments frequently included experiencing images that were tilted, obliterated, or inaccurate in detail. This tilting or twisting of images seemed related to her behavioral tendency of frequently dropping or spilling things. Prior to sampling, her spilling behavior had been assumed to imply aggression and hostility. Bracketing of presuppositions allowed the investigators to provide an alternative potential explanation for Jennifer’s external behavior—spilling was the result of tilted imagery.

Autistic individuals are believed to have a unique deficit where they have no theory of mind. Such individuals have been speculated to have little access to their mental states and to be poor at introspecting about their own thoughts. In contrast, Hurlburt, Happé, and Frith (1994) conducted DES sampling with three individuals with Asperger’s and found that two of the three individuals seemed easily able to access, observe and report their inner experience, a finding at odds with the no-theory-of-mind understanding. These two participants’ experience was exclusively visual images. Hurlburt, Happé, and Frith (1994) noted that an exclusively visual focus may lead to the inability to take the point of view of the other. That is, exclusively visual focus provides an alternative explanation for the characteristic that is widely held to imply lack of theory of mind. Consistent with this study’s findings, extant literature reports that visual thinking is the preferred mode of problem solving for autistic people, as noted by teachers (Schopeler et al., 1980), parents (Park & Youderian, 1974) and autistic individuals themselves (Grandin, 1992). Relatedly, existing research purports that autistic individuals have an unimpaired ability to

understand pictures. For example, they realize that pictures can misrepresent the things they depict and although they cannot grasp that beliefs can be outdated they understand that pictures can be outdated (Charman & Baron-Cohen, 1992; Leekam & Perner, 1991; Leslie & Thaiss, 1992).

Performance Art

DES can be said to be a performance art that requires substantial training of both the interviewer and the participant to obtain a faithful description of the participant's inner experience at a specified moment. Written materials (Hurlburt, 1990; 1993; Hurlburt & Akhter, 2006; Hurlburt & Heavey, 2001; 2002; 2004; 2006; Hurlburt et al., 2002; Hurlburt & Schwitzgebel, 2007) are currently available that describe those skills and the values and principles behind them. Training attempts to date suggest that it is difficult for written materials to convey the skills necessary to recognizing the inner experience phenomena identified by DES as well teach the process of the DES method such as to capture the exact moment of the beep, bracket presuppositions, and so on.

The current study speculates that the experiential nature of DES concepts may be better conveyed through a more expressive, interactive multimedia training tool. For that reason the current study created, improved, and evaluated such a medium. To develop a training tool that includes skill based exercises aimed at teaching all the phenomena identified by DES as well the process of conducting the expositional interview would be a huge undertaking. To see if his medium is incrementally more effective than training available in written form we started by developing two training modules that were specifically aimed at teaching the skills required to recognize the phenomena of sensory awareness and unsymbolized thinking.

DES defines sensory awareness (Hurlburt 1990, 1993; Hurlburt & Heavey, 2006; Hurlburt, Heavey, & Bensaheb, in press) as a phenomenon where a central or primary focus of an individual's attention is on a particular sensory quality (e.g. color or pitch) and not on an instrumental aim. Sensory awareness can be bodily (itch, tingle) or pertain to external events (e.g. brightness or the sunshine, blueness of a shirt). Sensory awareness is its own distinct phenomenon, not an aspect of perception (Hurlburt, Heavey, & Bensaheb, in press). DES defines unsymbolized thinking (Hurlburt 1990, 1993; Hurlburt & Heavey, 2006; Hurlburt & Akhter, 2008) as a phenomenon where an explicit, specific, unambiguous thought that occurs without experienced symbols – no words, images, sensory awareness or any other symbols. Individuals experiencing such a thought are able to provide a clear description of the content or idea, and the thought occurs to the person all at once rather than gradually unfolding with a set rhythm or tempo (Hurlburt & Akhter, 2008). When asked how the thought was occurring to them they report they were “just thinking” or “just wondering” but can give no further description of how this thought presents itself to them.

All DES investigations since these phenomena were first reported have discovered these phenomena. Hurlburt and Heavey (2002) and Heavey and Hurlburt (2008) showed that sensory awareness and unsymbolized thinking are each features of approximately one quarter of waking experience. Despite their frequent occurrence the existence of unsymbolized thinking has been contested (Hurlburt & Akhter, 2008) and the occurrence of sensory awareness has been easily overlooked (Hurlburt, Heavey, & Bensaheb, in press).

Focus Groups

The present study developed two modules, one for sensory awareness and one for unsymbolized thinking, of an interactive multimedia training tool. The question we sought to answer was whether such a tool could provide more effective training for DES practitioners. The design of the tool was originally untested, so part of the present study was to evolve the design using a series of focus groups.

A focus group is a method widely used to discover an audience's preferences or opinions about a product (Krueger, 1994), including (similar to that of the current study) the identification of potential flaws in a new training program and generating information about how best to design training for the target audience (Stewart & Shamdasam, 1990). In general, focus groups provide a venue for a group of individuals who are representative of the target population to provide their opinions (Krueger, 1994). Typically a series of two or three focus groups are conducted to detect consistent trends and patterns (Langford & McDonagh, 2003). Participants engage in a guided discussion led by moderators. Handwritten, audio taped, or video recorded transcripts of the discussion are collected, coded, and analyzed.

Data analysis is the most complex portion of the focus group (Litoselliti, 2003). The method used can be complex or simple depending on the research question (Fern, 2001; Stewart & Shamdasam, 1990). Essentially, the method of analysis is tailored to the research question to state the views of the focus group clearly (Krueger & King, 1998). It is important to analyze the data objectively so as to not become biased by what is most convenient for the researcher or what is most frequently mentioned (Bloor, Frankland, Thomas, & Robson, 2001). Typically, the first step in the analysis process is to generate a summary of the discussion by categorizing data in order to make it manageable for

interpretation. Next, the emerging themes are analyzed using the appropriate analysis (Krueger & King, 1998). In cases where decisions need to be made quickly and the conclusions are straightforward, a summary of the main themes and concepts that were revealed during the group discussions is sufficient (Stewart & Shamdasam, 1990).

Focus groups generally have 4 to 10 participants – enough individuals to generate shared opinions but also to leave room for unique and diverse ideas (Bloor et al., 2001; Fern, 2001; Langford & McDanagh, 2003). The group should include individuals who represent the audience for which the product is targeted. Small groups consisting of as few as three individuals are recommended when the topic of discussion is complex (Bloor et al., 2001). Homogeneous groups have the potential to uncover shared information, whereas heterogeneity can foster new and unique ideas. Hence, a group with both these attributes can generate rich and complex information (Bloor et al. 2001; Fern, 2001). Focus groups are typically conducted in a series to detect patterns across groups and avoid the idiosyncrasies of one group discussion (Stewart & Shamdasam, 1990).

Focus groups generate qualitative data where participants provide their opinions, thoughts and feelings in a natural and conversational manner. There is no pressure on the group to come up with solutions or a consensus (Krueger, 1994). The questions posed to the focus group should be open-ended, carefully crafted to be clear and unambiguous, and asked in a pre-determined, logical sequence so that the group is clear about which issue is under consideration (Fern, 2001, Litoselliti, 2003; Stewart & Shamdasam, 1990).

Qualities of a Moderator

A group can have two moderators – primary and assistant. A moderator in any capacity is expected to be interpersonally skilled and well versed in the purpose of the study and topic of discussion (Litoselliti, 2003; Stewart & Shamdasam, 1990). The

moderator's responsibility is to generate a non-threatening, comfortable, and unbiased atmosphere that stimulates group discussion (Krueger & King, 1998). Ideally, moderators are interested and enthusiastic about the topic so that they perform at their best ability and group dynamics are not negatively affected by their apathy (Fern, 2001).

The job of the primary moderator is to guide and encourage topic related discussions in an unbiased manner and manage unobtrusive control over the group (Bloor et al., 2001). The primary moderator is responsible for making notes of key ideas and concepts so as to be able to summarize them at the end of group (Litoselliti, 2003). The primary moderator probes participants to provide additional explanation for responses that need clarification (Krueger, 1994). Lastly, the primary moderator makes notes of his/her spontaneous questions and leaves time to ask them towards the end of group. The assistant moderator's primary responsibility is to make a copious record of the session either by tape recording the session or by taking hand written notes. If the session is being taped, the assistant moderator is responsible for making the appropriate arrangements (e.g., having the tape recorder, having several blank tapes ready; Krueger, 1994).

The moderator is responsible for maintaining a comfortable group dynamic where all members feel included and validated when they have opinions different from that of the group (Krueger, 1994; Litoselliti, 2003). The moderators are expected to manage situations skillfully when one group member is outspoken and dominates the discussion or if other group members are conceding to one person's opinions because that person is considered to be more knowledgeable, an authority figure, or because that person is attractive (Bloor et al., 2001, Fern, 2001, Stewart & Shamdasam, 1990). Group members commonly contradict themselves, or provide unfinished sentences. Such pieces of data

become problematic during data analysis. Hence, the moderator needs to be on alert to eliminate contradictions or incomplete speech during the group discussions to minimize their impact on data analysis (Frankland & Bloor, 1999).

Advantages and Disadvantages of Focus Groups

Focus groups have several advantages (Krueger, 1994). For instance, they have the potential to generate ample and rich data quickly and economically. Therefore, at times focus groups are preferred over questionnaires and individual interviewers. In addition, collective interaction between individuals has the potential to stimulate thoughts and reactions in a way that interviews with an individual may not. The group interaction synergistically generates shared opinions that provide decision makers with insight about several different aspects about the product, such as best ways to improve the quality of, or evaluate a product. Shared ideas are generated because members influence each other by responding to ideas and comments during the discussion and skilled interviewers encourage and validate ideas that are different and unique. The moderators can directly and immediately interact with participants to clarify their responses and probe for information and encourage the flow of information with follow up questions (Langford & McDonagh, 2003).

Focus group results are often easy to understand because they report verbal responses that the participants provided (Steward & Shandasam, 1990). Focus groups operate on the principle that people live in a society where group interactions are commonplace; hence, engaging in a collective discussion resembles the everyday experience (Krueger, 1994). Overall, focus groups may be a good way to become in tune with the target audience's preference about a product.

One of the disadvantages of focus groups is that the quality of discussion (e.g. live and energetic or slow and lethargic) is influenced by the group dynamic and is difficult to predict (Langford & McDonagh, 2003). Moderators may bias participant responses by unwittingly providing cues as to what are the desired responses (Stewart & Shamdasam, 1990). Data gathered from open ended questions may be difficult to summarize and can be easily biased by unwittingly omitting key statements (Langford & McDonagh, 2003). The live and immediate nature of focus groups may lead the researcher to put more faith in the results than is warranted (Fern, 2001; Stewart & Shamdasam, 1990).

Interactive Training Tools

There have been other attempts at using computerized training tools to impart psychological skills. For example, Ekman's (2006) *Subtle Expression Training Tool and Micro Expression Training Tool* is considered state of the art multimedia training. It was developed to help individuals accurately identify emotionally valenced facial features in seven emotions: sad, angry, surprised, fear, disgust, contempt, and happy. The subtle and micro expressions representing these emotions are considered to be universal and innate (Ekman, 2004; 2006). Ekman's training includes computer generated illustrations of faces which morph in and out of the target expression. Once the learner sees the expression flash across a neutral face, s/he is required to identify the correct emotion by clicking on the button corresponding to the emotion's label. Immediate feedback is provided in terms of "correct" or "wrong" and a total score of correct responses is provided at the end. The emotional expression training developed by Ekman provides one of the first stimulus sets that could be used in experimental work (Ekman, Friesen, & Tomkins, 1971).

Another type of commonly available training is in the form of training DVDs where actors follow a script to demonstrate a concept (e.g. Brooks-Harris & Ralston, 2002). Once the concept is conveyed, the learners are provided with another hypothetical situation to help them practice skills they just learned.

The Present Study

The present study had two aims. First, it developed a multimedia interactive training tool to provide training in recognizing two of the inner experience phenomena discovered by DES: sensory awareness and unsymbolized thinking. Second, the study evaluated the training tool to determine if it was better at transmitting the concepts of sensory awareness and unsymbolized thinking than were the written materials published by Hurlburt and colleagues (e.g., Hurlburt 1990, 1993, 1997; Hurlburt & Akhter, 2008, Hurlburt & Heavey 2001, 2002, 2006; Hurlburt & Schwitzgebel, 2007).

The study had two phases. In the development phase, the researchers first developed preliminary versions of the two training modules. Then both of these modules were investigated using focus groups and progressively adjusted and refined to incorporate the suggestions made by the focus groups. In the validation phase, the training potential of these improved versions of the modules were validated against extant essay training materials.

The DES Interactive Multimedia Training Tool (Training Tool)

The training tool was designed to be presented on a computer and included two modules. One module, called “sensory awareness,” was aimed at helping students 1) to recognize sensory awareness and 2) to discriminate sensory awareness from other forms of experience. Similarly, the second module, “unsymbolized thinking” was aimed at

teaching students (1) to recognize the phenomenon of unsymbolized thinking and 2) to discriminate unsymbolized thinking from other forms of inner experience.

Both modules included an audio-visual introduction that explained what the module intends to present and provided the learner with a context. The sensory awareness module included a series of events intended to help users learn to recognize the target phenomenon of sensory awareness. In addition, the recognition events were interspaced with other events aimed at helping users discriminate sensory awareness from other types of inner experience phenomena. Similarly, the unsymbolized thinking module included a series of events representing the target phenomenon and other events representing other inner experience phenomena.

Each event consisted of a video clip, the opportunity for the learner to answer the question, and written feedback. More specifically, the tool's interface asked a question about an upcoming video clip (e.g., "Is the participant experiencing sensory awareness?"). After reading the question, the participant was able to launch the video clip by clicking a *Play Clip* button. After viewing the clip, the participant used the computer keyboard to enter a response in a space provided and then clicked the *Feedback* button to receive written feedback. The participant then proceeded to the next question by clicking *Next*.

The video clips in the module were excerpts from actual DES interviews, not computer-generated illustrations or staged performances dramatized by actors. Each video clip presented an actual DES participant's attempt to describe his or her inner experience. For that reason, the clips included different interviewees and interviewers, and were able to depict various ways in which similar phenomena are experienced and described. The events were arranged in approximately ascending order of complexity.

Lastly, the interactive nature of the training tool allowed the user to choose how and when to present which aspects of the tool, go back and forth or repeat a section.

Developmental Phase. The main aim of the developmental phase was to construct an efficient and effective version of the both the sensory awareness and unsymbolized thinking training tool modules. To satisfy this aim, a series of focus groups were presented with an initial version of one or the other training tool module to obtain their commentary and suggestions. Each focus group was asked straightforward questions about what they found most and least helpful in terms of training about the overall interface and content (question, video clip, and feedback) aspects in each event of the training tool module. These suggestions and opinions were categorized, summarized and incorporated to make necessary modifications in the successive version of the module. The improved version of the module was then exposed to the next focus group to obtain further suggestions for improvement. This successive-improvement procedure was repeated until the point of diminishing returns was reached.

Validation phase. In the validation phase, there was a validation study for the sensory awareness training tool module and another parallel validation study for the unsymbolized thinking training tool module. For sensory awareness, one group of 25 participants trained using the sensory awareness training tool module (with the improvements from the developmental phase incorporated) and another group of 25 participants trained using a sensory awareness essay. Participants from both groups submitted a confidence rating to reflect how certain they felt that they had mastered the concept they were trained under. Immediately following training, the participants were tested to assess their ability to recognize sensory awareness and discriminate it from other types of phenomena. The concept mastery test included twelve questions, six in the form

of video vignettes (to be consistent with the training tool medium) and six in the form of written vignettes (to be consistent with the essay training medium).

A parallel method was used for unsymbolized thinking: 25 subjects trained using the unsymbolized thinking training tool module and another 25 subjects trained using the unsymbolized thinking essay.

The study hypothesized that:

- 1) The group trained using the sensory awareness training tool module will obtain higher sub-scores on both the video vignettes and essay vignette questions, hence obtaining a higher total score as compared to the group trained using the sensory awareness essay.
- 2) The group trained using the unsymbolized thinking training tool module will obtain higher sub-scores on both the video vignettes and essay vignette questions, hence obtaining a higher total score as compared to the group trained using the unsymbolized thinking essay.
- 3) The group trained using the sensory awareness training tool module will endorse higher confidence ratings than the group trained using the sensory awareness essay.
- 4) The group trained using the unsymbolized thinking training tool module will endorse higher confidence ratings than the group trained using the unsymbolized essay.

CHAPTER 3

METHOD

The present study design included two phases, the Developmental Phase and the Validation Phase.

Developmental Phase

Overview

During this phase the training tool's interface and content were critically evaluated using focus groups, and were modified as a result of that evaluation.

Participants

Participants included 19 graduate and 15 undergraduate students at the University of Nevada, Las Vegas. Graduate students from the department of psychology were invited to participate by sending them a letter via the department list-server. The recruitment e-mail was circulated once a week for three weeks. The undergraduates were recruited from the psychology department subject pool. Volunteering students were grouped together based on the dates they were available. The groups were assigned to either a sensory awareness or unsymbolized thinking focus group. Three graduate and three undergraduate focus groups resulted for each training tool module (i.e. total of six focus groups for each module). Each focus group consisted between 1 – 5 group members.

Apparatus

The DES interactive multimedia training tool as described above.

Procedure

All volunteers received reminder phone calls or e-mails one day prior to the group. The group was lead by two moderators, a primary (the researcher) and secondary (research assistant). In preparation to be a secondary moderator, the research assistant studied the DES literature and the focus group literature, participated in the DES expositional interviews for 6 sessions, and familiarized himself with the training tool modules. The primary moderator was mainly responsible for running the group and the secondary moderator was mainly responsible for preparing the video taping equipment. Both moderators took hand-written notes to record the suggestions made by focus group members. The moderators managed focus group sessions by applying the following skills suggested by Krueger (1990):

1. Asked open-ended questions about the group's perception on the training tool modules' interface, and the question, video clip, and feed-back sections of each training event.
2. Lead the group discussion related to each question in a non-directive manner but ensured that the conversation remained on topic.
3. Generated a permissive and non-judgmental environment by making explicit statements inviting alternative points of views such as "There are no right or wrong answers," "Negative and positive comments are welcome," and, "At times negative comments are more helpful when building a new training tool."
4. Gathered the group's opinions, thoughts and feelings about the video event.

5. Asked group members to clarify or elaborate on responses that were unclear to the moderator.
6. Were vigilant towards and eliminated contradictory statements, incomplete speech, or interrupted speech by probing for additional information.
7. The primary moderator focused on taking notes on the main points and concepts. The assistant moderator took more detailed notes and was in charge of taping the sessions.
8. Both moderators left time at the end to ask spontaneous questions that they thought of during the course of the group discussion.
9. Moderators summarized the main points generated by the discussion, presented them to the group and asked if they had anything further to add.

The two moderators met weekly to review the notes taken during the focus group, to resolve any discrepancies via discussion and consulting with the video taped session, and to discuss ongoing questions and or concerns about moderating focus groups.

Interface and Content Evaluation. Volunteers participated in one of six focus groups for each module to evaluate the interface and content of the training tool. Each group consisted of one to five participants. These groups were conducted in the computer room of the experience sampling laboratory. The selected training tool module was presented to the participants on a computer screen. The participants were arranged in a semi-circle around the computer screen so that each participant had a clear view of the screen and access to the mouse for navigation. The participants took turns navigating the training tool module by passing the mouse after every five events.

At the start of each focus group the moderator oriented group members to the purpose of the study and provided them with a context for the discussion (see Appendix A). The

participants were then asked to start training on the module presented as if they were actual learners and pay particular attention to aspects such as the ease of navigation, and also to the clarity of the questions, video clip and feedback aspects on each event. The participants were instructed to tell the moderator if something was unclear and provide comments about why it was unclear. These questions and comments then generated discussions about the group's observations and also the group's suggestions to improve the particular flaw. The group's comments on each aspect, overall event and interface were noted by the moderators. At times the comments were consensual and at times members had divergent views and suggestions.

Moderators systematically recorded each individual member's positive and critical comments and suggestions and also noted if group members did not have any comments or concerns because the event was clear to them. Both modules were presented in turns to one graduate-student focus group and one undergraduate focus group. Collective suggestions from each focus group were categorized and incorporated into the existing modules. The consequent improved module was then presented to the next focus group. Six focus groups were held for each module (sensory awareness and unsymbolized thinking) until the point of diminishing returns was reached.

Categorizing Focus Group Data. The moderators' notes were used to determine the nature of suggestions and recommendations generated by the focus group. After each focus group the moderators' notes were organized in a table generated in word to determine the critical (e.g. "I don't like..."), positive (e.g. "I really liked..."), or neutral (e.g. no comment or "I had no problem with...") suggestions provided by the group for the question, clip, feedback and interface. The suggestions from each focus group were

successively incorporated to generate a continuously improving version of the training tool modules.

Incorporating Suggestions Using Logical Analysis. This procedure was conducted in three steps and used the data catalogued by the moderators in a word table. First, the premise (of form if *A* then *B*) within the data under each category was identified. For instance, “If I add the words, ‘This is not sensory awareness’ to the feedback (which originally starting with ‘No’), then the feedback becomes clear.” Second, all such premises arising under a category (e.g. question, video clip, feedback, interface) were grouped and connections were explored between one group of premises and another (e.g., “If I shorten the clip it helps the clarity of the individual clip. However, if I elaborate the feedback and keep the clip as it is the entire event becomes clear and it adds to the instructive quality of the entire module.” Third, contradicting premises were weighed against each other (e.g. “Keep the clip because it is necessary” and “Delete the clip because it is redundant”); the primary researcher decided to make the changes according to one premise.

Validation Phase

Overview

The purpose of the validation phase was to validate the training tool against existing written materials.

Participants

One hundred undergraduates were recruited from the Psychology Department subject pool. The participants were assigned to one of four training conditions that crossed content (sensory awareness or unsymbolized thinking) and mode of presentation (training

tool module or written essay): the sensory awareness training tool module, the sensory awareness essay, the unsymbolized thinking training tool module, or the unsymbolized thinking essay. Each condition included 25 participants. The four training conditions were randomly assigned to particular time slots. Participants signed up for a time slot and were exposed to the corresponding training condition.

Training Materials

The two training tool modules (sensory awareness and unsymbolized thinking) developed during the Developmental Phase were used in the Validation Phase. Two essays, one for sensory awareness and one for unsymbolized thinking, were developed by incorporating the extant literature written by Hurlburt and colleagues regarding these phenomena.

Test Materials

Concept mastery test materials were created for sensory awareness and unsymbolized thinking. The test materials comprised twelve questions with two types of test modes: video vignettes and written vignettes to represent equally the training tool module format and the essay training format. That is, for the sensory awareness concept mastery test, six questions asked participants “is subject experiencing sensory awareness?” after viewing six different video vignettes. The other six items asked participants the same question about corresponding written vignettes. The concept mastery test for unsymbolized thinking followed a parallel format. For both modules, all video and written vignettes were either excerpts or written descriptions of actual DES interviews.

Two forms (A and B) of each concept mastery test were developed. Form A started with questions about the six video vignettes followed by the six written vignettes and Form B was in the opposite order. Two sub-scores were computed: the number of correct

video vignette items, and the number of correct written vignette items. The total score was the sum of the two sub-scores.

Procedure

Participants were required to sign up for a particular time slot. Specific time slots were designated for the training tool modules or essay training for either sensory awareness or unsymbolized thinking. This information was not made available to the participants when they signed up for participation. Participants who signed up for a particular time slot received the type of training designated for that time slot (i.e., sensory awareness training tool module, sensory awareness essay training, unsymbolized thinking training tool module, or unsymbolized thinking essay training). All participants received one hour of training and completed the confidence rating form immediately after. They received a 10-minute break after the training phase, following which they completed the concept mastery materials described above. The participants were randomly assigned to Form A or Form B. Completion of the testing segment concluded participation in the study.

CHAPTER 4

RESULTS

Development Phase

In the developmental phase, there were two separate series of focus groups: one focused on the interface (how the controls worked, how the media were presented, etc.) and content for the sensory awareness training tool module and the other focused on the exact same aspects for the unsymbolized thinking training tool module.

Interface Alterations to Both Training Tool Modules

Subjects from both series of focus groups mentioned wanting introduction that described how to operate the training tool, so an introductory page was added to include instructions.

Subjects appeared to be unsure about how they were to navigate through the presentation buttons on each page in sequence, so colorful numbers “1,” “2,” ... “6” were added next to each button: 1– Read; 2 – Play; 3 – Respond.....6 – Next..

A “Help” button was added; clicking Help leads to a page that describes the function of each button.

The navigation buttons (Top, Home, Next, Back) were moved from the bottom of each page to a side panel to indicate that they were operable in parallel with any of the presentation buttons.

The navigation buttons were placed on a colored field to separate them from the presentation buttons.

Each of these changes was tested with subsequent focus groups to ensure that the changes had been effective and did not have undesirable side effects.

Content Alteration to Both Training Tool Modules

As with the interface, changes suggested by the focus groups were successively incorporated into the module for consideration by subsequent focus groups. Table 1 presents a summary of changes that resulted in the modules. For a more complete listing see Appendix B where Tables B1 and B2 will present details of alterations as a result of focus groups made to the sensory awareness and unsymbolized thinking training tool modules respectively.

Table 1

Number of Alterations to the Modules as a Result of Focus Groups

Change	Module	
	Sensory Awareness	Unsymbolized Thinking
Deleted entire event	3	2
Typographical error fixed	4	0
Query edited	5	5
Video clip edited	4	4
Feedback edited	6	4
Event name edited	2	0

Validation Phase

Participants trained to recognizing the inner experience phenomenon of sensory awareness or unsymbolized thinking by either interacting with the training tool or by reading essay materials. Following training, participants were tested on their ability to recognize the inner experience phenomenon on a concept mastery test consisting of six video vignettes and six written vignettes. For each (sensory awareness and unsymbolized thinking) training tool module, analyses were conducted to compare responses between the groups trained using the training tool modules and the group trained using essays.

Sensory Awareness

Gender and Order-of-Presentation Comparisons. There was no statistically significant difference between males ($M=20.00$) and females ($M=20.19$) on the concept mastery test ($t = -.197, df = 48, P = 0.845$). There was no statistically significant difference between concept mastery test forms A ($M= 20.44$) and B ($M= 19.80; t = 0.7, df = 48, P = 0.49$). Therefore, data from both genders and both forms were combined for the subsequent analyses.

Confidence Rating Comparison. There was no statistically significant difference between the confidence ratings of participants who trained on the sensory awareness training tool module ($M= 4.97$) and those who trained using the sensory awareness essay ($M= 4.51; t = 1.3, df = 48, P = 0.19$).

Concept Mastery Comparison. Means and standard deviations of the concept mastery test scores for the sensory awareness training tool module group and the essay group are presented in Table 2. There were two training types: that delivered by the training tool and that delivered by the essay materials. There were two concept mastery test modes: items that were presented as video vignettes and items that were written

vignettes. We conducted a two-way analysis of variance with concept mastery as the dependent variable and training type and test mode as the independent variables. There was a significant main effect for training type ($F(1,96) = 37.49, P = .001$); across both test modes, the training tool training type mean (22.32) was higher than the essay training mean (17.92; effect size $d = 1.88$). There was no significant main effect for test mode ($F(1,96) = 1.38, P = .506$) and no significant interaction ($F(1,96) = .18, P = .672$).

Table 2

Sensory Awareness Concept Mastery Test Scores

Training Mode	Training Tool Module			Essay Training			Effect Size
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Test item							
Video vignette	11.16	.850	25	9.00	1.76	25	1.56
Written vignette	11.16	.800	25	8.92	1.75	25	1.64
All items	22.32	1.18	25	17.92	3.08	25	1.88

Unsymbolized Thinking

Gender and Form Comparison. There was no statistically significant difference between males ($M= 18.81$) and females ($M= 19.53$) on the concept mastery test ($t = -0.634, df = 48, P = 0.53$). There was no statistically significant difference between concept mastery test forms A ($M= 18.42$) and B ($M= 20.25; t = -1.78, df = 48, P = 0.08$). Therefore, data from both genders and both forms were combined for the subsequent analyses.

Confidence Rating Comparison. There was no statistically significant difference between the confidence ratings of participants who trained on the unsymbolized thinking training tool module ($M= 4.56$) and those who trained using the unsymbolized thinking essay ($M= 4.87$; $t = 1.3$, $df = 48$, $P = 0.2$).

Concept Mastery Comparison. Means and standard deviations of the concept mastery test scores for the unsymbolized training tool module group and the essay group are presented in Table 3. Just as with the sensory awareness module described above, there were two training types: that delivered by the training tool and that delivered by the essay materials. There were two concept mastery test modes: items that were presented as video vignettes and items that were written vignettes. We conducted a two-way analysis of variance with concept mastery as the dependent variable and training type and test mode as the independent variables. There was a significant main effect for training type ($F(1,96) = 15.71$, $P = .001$); across both test modes, the training tool training type mean (20.80) was higher than the essay training mean (17.80; effect size $d = 0.87$). There was no significant main effect for test mode ($F(1,96) = 1.38$, $P = .506$) and no significant interaction ($F(1,96) = .18$, $P = .672$).

Table 3

Unsymbolized Thinking Concept Mastery Test Scores

Training Mode	Training Tool Module			Essay Training			Effect Size
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Test item							<i>D</i>
Video vignette	10.72	1.31	25	9.28	1.95	25	0.86
Written vignette	10.08	2.06	25	8.52	2.02	25	0.76
All	20.80	3.01	25	17.80	3.77	25	0.87

CHAPTER 5

DISCUSSION

This study aspired to develop a multimedia training tool that is both portable and effective at helping learners to understand and recognize two phenomena identified by DES (sensory awareness and unsymbolized thinking) and then to evaluate the success of that training tool. Sensory awareness and unsymbolized thinking have been noted as being the most difficult to fully understand even during live supervision. Results of the evaluation suggest that this study was successful in accomplishing its aim. Participants trained using the training tool performed significantly better at identifying the phenomena they were trained to recognize than did those trained on the essays.

The Development Phase

The study included two phases, the development and validation phase. The aim of the development phase was to begin with a “first draft” and end with a polished, effective, user-friendly training tool. Toward this end, a preliminary version of each module was exposed to a series of six focus groups that operated the module and critiqued it. Focus group suggestions included minor corrections such as changing the wording of the question and feedback sections, editing a video clip by removing extraneous information, or elaborating the feedback section. Some suggestions helped

the researcher refine the introductory event by including clearer examples and re-organizing the event's structure to improve continuity.

The focus groups also identified events that needed to be deleted from the module because they were problematic. For instance, some events were found to be ambiguous or aimed at teaching aspects that were outside the scope of the present module; these were removed. Other events were modified, based on participants' requests, to improve the impact. For example, specific cues to recognize non verbal behaviors characteristic of the phenomenon were added to some events. The groups' suggestions to remove redundant buttons, infuse color, and add a page to help explain how to use the tool were incorporated to improve the overall presentation and ease of operation of the training tool.

By the end of the development phase, the sensory awareness and unsymbolized thinking modules each included an introductory event and 24 training events. Overall, the focus group members reported that they found the modules to be helpful in learning phenomena recognition skills. Specifically they appreciated the multi-modal exposure to the concepts: via an introductory segment, question-answer-feedback format, exposure to a variety of examples and the module's ascending difficulty level. Furthermore, the interactive nature of the training tool allowed them to go back and review an event and go at their own pace. The improved version of the two modules at the end of the development phase was administered in the validation phase.

The Validation Phase

The validation phase of this study trained undergraduate subjects using either the multimedia training tool or essays, and then compared the learning of the two groups.

The overall results suggest that participants trained using the training tool were significantly better at identifying the phenomena of sensory awareness and unsymbolized thinking on the concept mastery test than participants trained using the essays. Both training tool modules were more effective at imparting the skills needed to recognize the inner experience phenomena than were the essays. These differences could not be attributed to variables such as gender or order of test item presentation.

The results for both sensory awareness and unsymbolized thinking are very similar. For each, there was a very large main effect for training type and a nearly nonexistent interaction between training type and test mode. For sensory awareness, the training-type main effect was very significant ($F(1,96) = 37.49, P = .001$) and very large ($d = 1.88$). The training tool training type mean (22.32) was much higher than the essay training mean (17.92). This is a strikingly large effect: not a single one of the essay training participants mastered the sensory awareness concept as well as did the average training tool participant. Similarly, for unsymbolized thinking the training-type main effect was very significant ($F(1,96) = 15.713, P = .001$) and very large ($d = 0.87$). The training tool training type mean (20.80) was much higher than the essay training mean (17.80). Only 6 of the 25 unsymbolized thinking essay training participants (24%) mastered the unsymbolized thinking concept as well as did the average training tool participant. These results indicate that training using the training tool was much more effective than using the essay.

Furthermore, the lack of interaction indicates that the training tool was much more effective regardless of whether it was evaluated using the video vignettes or the written vignettes. The interaction was almost nil for sensory awareness ($F(1,96) = .18, P = .672$) as was the case for unsymbolized thinking ($F(1,96) = 0.046, P = 0.831$). For both

modules, it is not surprising that the participants trained using the training tool obtained higher scores on the video vignettes – they were trained using that medium. However, participants also obtained higher scores on the written vignette items. The superior performance on the written vignettes test items is notable because the written vignettes were consistent with the essay group’s training but were a novel medium of presentation for the participants trained using the training tool modules. The training tool modules prepared the participants to recognize the phenomena better than did the essay training even when the test mode corresponded with the essay training.

This level of training efficiency might be due to the fact that the training tool was more successful in conveying the experiential nature of DES concepts. Perhaps the training tool was able to impart the skills that are central and essential to the understanding of sensory awareness and unsymbolized thinking. Such a basic and fundamental conceptualization of the phenomena facilitated the learner’s ability to recognize these phenomena regardless of how they were presented during the testing phase. Another possibility for the superior performance of the training tool group participants could be that the two training tool modules contained a more detailed and comprehensive set of skills compared to the essays. The events included in the training modules may have provided additional strategies such as, immediate corrective feedback, multimedia exposure to the concepts and calling participants’ attention to the interviewee’s non-verbal behaviors that made it easier for participants to recognize the inner experience phenomena.

Despite the fact that the training provided by the training tool was in-fact superior to that provided by the essays, there was no difference in the training tool group participants’ and essay group participants’ level of confidence in having mastered the

concepts. Each participant participated in only one kind of training, and did not have the opportunity to compare that mode of training with the other. One potential explanation for this disparity is that subjects don't know what they don't know—they think that they understand what the phenomenon is when they don't. A second explanation is that subjects' ratings of confidence were confounded with ratings of having performed the task set to them by the experimenter: a rating of high confidence might then be interpreted as indicating something like, "Yes, I read the materials, and I'm ready to proceed."

Limitations

The current study had two major limitations. First, the training materials were unevenly developed. The training tool was subjected to rigorous development using several focus groups of undergraduate and graduate students. The comments and criticisms helped the researcher become familiar with the learner's perspective and modified the training tool accordingly. Both the sensory awareness and the unsymbolized thinking modules of the training tool underwent several versions and modifications prior to being included in the validation phase. By contrast, the essays for sensory awareness and unsymbolized thinking were not subjected to any such development. The essays were created by condensing the literature published about DES in general and specifically on the phenomena of sensory awareness and unsymbolized thinking (e.g., Hurlburt, 1990; 1993; Hurlburt & Akhter, 2006; Hurlburt & Heavey, 2001; 2002; 2004; 2006; Hurlburt et al., 2002; Hurlburt & Schwitzgebel, 2007). That literature had been subjected to peer review, but that review was not aimed directly at developing an effective training tool.

Perhaps the essay training's efficacy could have been enhanced if they were subjected to a parallel level of scrutiny and evaluation as the training tool.

We left the essays unmodified was because the validation phase was aimed at examining the efficacy of a new way of training by comparing it to the present way of training. The unmodified essays were used to reflect the training provided by the extant literature. This did, however, tip the scales in favor of the training tool.

The second main limitation of the study was that the participants included in the validation phase were undergraduate students enrolled in introductory psychology classes, whereas the typical person who may use the DES method is a graduate student or consciousness professional who may be better equipped to grasp the information included in the essays than were the undergraduate subjects. The essays described two phenomena that have been considered more challenging to grasp than other phenomena identified by DES. These concepts were explained using appropriate but sophisticated language. A graduate student or consciousness professional would have a more sophisticated knowledge of psychology in general and would be more familiar and comfortable with reading scholarly articles. Such population differences could be responsible for the significant results obtained in the validation phase. However, even consciousness professionals have difficulty understanding the concepts of unsymbolized thinking and sensory awareness (Hurlburt, 2009; Hurlburt & Akhter, 2008b).

Suggestions for the Future

The current study accomplished the goal of developing a multimedia training tool that offers apparently substantial advancements in training over currently available methods for sensory awareness and unsymbolized thinking. Future studies should

substantiate these results by using graduate students or students that are particularly interested and motivated to learn the DES method. Given the development and evaluation method used in the current study helped produce an effective training tool, future studies might apply a similar method to improve the training effectiveness of the essay materials. Furthermore, the level of training provided by using a combination of essay and multimedia training tool methods should be explored.

Future studies should also focus on exploring the particular aspects of the training tool that were useful in imparting the skills required to recognize the inner experience phenomena. The training tool explained and described the phenomena of sensory awareness and unsymbolized thinking via multiple exposures to the concept using a variety of methods. The modules included a contextual introductory event, excerpts from a variety of live interviews, a question-response-feedback format that provided immediate corrective feedback to the participant, and segments squarely dedicated to the recognition of body language cues. Those aspects could be broken apart to determine which were most useful. Such a study may provide valuable information and the impetus for developing future training modules.

Perhaps the strongest implication of this study is that it calls for the development of additional training tool modules for the other three frequently occurring phenomena identified by DES (inner speech, inner hearing, inner seeing).

In addition to training aimed at recognizing the remaining three phenomena identified by DES, other modules aimed at teaching particular DES expositional interview skills should be part of a future project. These modules may include instructions on how to inquire about the beeped moment, how to bracket one's presuppositions, how to deliver open-ended and open-beginning questions, how to

recognize subjunctification, and how to recognize the interviewee's verbal and non-verbal cues that indicate whether he or she is talking about generalities or the experience at the moment of the beep. These aspects have been described in written materials by Hurlburt and colleagues as being important and essential to conducting an expositional interview aimed at obtaining faithful descriptions of a participant's inner experience. Developing a training tool that includes a complete set of instructional modules ranging from teaching the skill of phenomenon recognition to the process of DES would be a valuable future endeavor.

Implications

The study results suggest the multimedia training tool holds promise in furthering our understanding and skill of recognizing inner experience phenomenon identified by DES. The initial familiarity of DES concepts taught by using an effective training tool may facilitate and enhance the training provided in live or distant supervision and expedite the overall mastery of the method. In addition, the training tool holds implications in proliferating research based on DES methodology. If it is true that unsymbolized thinking and sensory awareness are frequent phenomena of inner experience, and if it is true that these phenomena are sometimes substantially misunderstood by readers of the literature, then a more effective way of describing these phenomena may make a substantial contribution to the science of inner experience.

APPENDIX A

INTRODUCING FOCUS GROUPS TO THE STUDY

Good afternoon and welcome to our session. My name is Arva Bensaheb and I am the principal moderator on this project. Assisting me is (*insert name here*) who is also a research assistant on this project. Thank you for taking the time to join our discussion about a training video for the Descriptive Experience Sampling method or DES.

DES is a method with one goal, to obtain faithful descriptions of an individual's inner experience.

In the typical DES study a participant is asked to wear a beeper in his/her natural environment. The beep beeps at random times and cues him/her to pay attention to his/her inner experience that was ongoing at the moment of the beep. The participant is then asked to make a note what is in his/her awareness at that particular moment. This process is repeated for several beeps. After a series of such beeps are collected, the investigator and the participant engage in an expositional interview as co-investigators to obtain as faithful description of the participant's awareness at the moment of each beep. Eventually, these moments can be combined to provide a participant with an objective report of his/her inner world.

So far, research using DES has been conducted mainly at the University of Nevada, Las Vegas. Lately, there has been a surge of interest in DES: psychologists around the country and around the world want to learn about it. Hence, we are creating a training tool aimed at teaching core concepts about the DES method.

Our task here today is to explore how this tool might work, to express reactions to the tool, to suggest improvements, and so on – things that might help the tool developer to improve it.

In the next two hours we are going to show you one module of the training tool which will include a general introduction and then a series of training events. Each training event will include a question, a video clip, and some feedback of various kinds.

We invite you to participate in this training and provide us with your opinions about the clarity of the wording about the question, about the video clip itself, and about the clarity and understandability of the feedback. There are no right or wrong answers. We strongly encourage everyone to provide his or her opinions candidly because we feel that differing points of views and comments critiquing the product are interesting and helpful.

We will be on a first name basis this afternoon, and in our later reports no names will be attached to comments. You may be assured of complete confidentiality. Please keep in mind that we are just as interested in negative comments as positive comments, and at times negative comments are the most helpful.

APPENDIX B

TABLES

Table B1

Alterations to Sensory Awareness Training Tool Module as a Result of Focus Groups

Page	Event Name	Alteration
1	Introduction	An explanation that sensory awareness can be bodily was added. The wording in the “cat scratching” example was changed to provide clarity on the distinction between sensory awareness and perceptual awareness. The introduction was expanded to explain how participants often use different words such as “feeling” to describe a sensation
2	<i>Bus floor I</i>	A spelling error was corrected.
3	<i>Bus floor continued</i>	The question was elaborated to clarify that the subject’s task was to attend to body language and non-verbal cues. The specific cues were explicitly stated to help subject watch for and recognize them.
4	<i>Headband</i>	One focus group found the question “Is Adam experiencing sensory awareness?” to be too vague and not directive enough. The researchers decided not to change this question for two reasons: a) this was a standard format in all the segments on both modules; and b) no other focus group had concerns about this question even when specifically asked.
5	<i>Head band continued</i>	The question was elaborated to clarify that the subject’s task was to attend to body language and non-verbal cues. The specific cues were explicitly stated to help subject watch for and recognize them. Also, a typo in the question was corrected.

6	<i>Cigarette Tip</i>	The feedback was expanded to start with “This is not sensory awareness” in response to the question “Is interviewee experiencing sensory awareness?” This reduced the confusion generated by the original start phrase “no” which seemed to indicate to participants that their response was incorrect. This change was made across both modules in all the segments where appropriate.
N/A	<i>Scrap book</i>	This event was deleted from the module following several unsuccessful attempts to include an event demonstrating the concept that sometimes we are not sure what the phenomenon is. All attempts caused confusion and frustration for participants.
7	<i>Necklace</i>	The clip was shortened for the sake of clarity.
8	<i>Necklace continued</i>	The clip segment cut from “Necklace” was added here to improve the lesson intended by this two part series.
9	<i>Letters</i>	The volume of the audio on this clip was increased. The title of this segment was changed from “Taco bell” to “Letters” because subjects suggested this to be a more fitting heading.
N/A	<i>Goosebumps</i>	This clip was deleted because subjects were distracted and confused by interviewee’s idiosyncratic experience of goose bumps.
10	<i>Tuna</i>	No changes were required.
11	<i>Back pack</i>	This segment was moved up from page 17 to page 11 because it was indicated as being “too easy” to placed towards the end of the module.
12	<i>Singing dance</i>	A reminder was added in the feedback that sometimes interviewees use words such as “feeling” to describe sensations. A typo was corrected and the title was changed from “dance” to “singing dance” which was considered more suitable and descriptive of

		the event.
13	<i>Crossing the street</i>	No changes were required.
14	<i>Crossing the street continued</i>	No changes were required.
15	<i>Eraser dust</i>	The volume of the audio on the clip was increased.
16	<i>Eraser dust continued</i>	The question was elaborated to clarify that no feedback was required and the subject's task was to attend to body language and non-verbal cues. The specific cues were explicitly stated to help subject watch for and recognize them.
N/A	<i>Hot chocolate</i>	The event was deleted due to concerns similar to ones observed in "Scrap book."
17	<i>Badge</i>	This was added to replace the "Scrapbook" event; participants found it to be clear and no changes were required.
18	<i>Badge continued</i>	No changes were required.
19	<i>Socks</i>	The clip was shortened by cutting out initial, extraneous background information.
20	<i>Socks continued</i>	The question was elaborated to clarify that no response was required and the subject's task was to attend to body language and non-verbal cues. The specific cues were explicitly stated to help the subject watch for and recognize them.
21	<i>Beeper</i>	No changes were required.
22	<i>Nose Ring</i>	No changes were required.
23	<i>Smiles</i>	No changes were required.
24	<i>Clam Chowder</i>	This clip was added to replace the "Goosebumps" event; participants found it to be clear, and no changes were required.

Table B2

Alterations to Unsymbolized Thinking Training Module as a Result of Focus Groups

Page	Event Name	Alteration
1	<i>Introduction</i>	An elaborated explanation of “symbols” was included to better highlight the differences between unsymbolized thinking and inner experiences that include symbols.
2	<i>Strawberries</i>	No changes were required.
3	<i>Strawberries continued</i>	The question was elaborated to clarify that the subject’s task was to attend to body language and non-verbal cues. The specific cues were explicitly stated to help subject watch for and recognize them.
4	<i>Moving the car</i>	Feedback was elaborated to alert the viewer that the specific identifiers such as body language and content cues will be reviewed over the next two segments.
5	<i>Moving the car continued</i>	The question was elaborated to clarify that no response was required and the subject’s task was to attend to body language and non-verbal cues. Specific cues were explicitly stated to help subject watch for and recognize them.
6	<i>Moving car continued</i>	The question was elaborated to clarify that the subject’s task was to attend to body language and non-verbal cues. The specific cues were explicitly stated

		to help subject watch for and recognize them.
7	<i>Video</i>	Volume of the audio on the clip was increased.
8	<i>Goosebumps</i>	This event was transplanted from the sensory awareness module and added to the unsymbolized thinking module because it was received as a clear example of what is not unsymbolized thinking.
N/A	<i>Reading</i>	This event was deleted. Attempts towards clarification required lessons in interviewing skills and detracted from the aim of the exercise which was to improve phenomenon recognition skills.
9	<i>No hesitation</i>	The clip was shortened to cut out extraneous background information and wording the feedback was changed to be less technical.
10	<i>Feelings/thoughts</i>	No changes were required.
11	<i>Shower</i>	Volume of the audio on the clip was increased.
12	<i>Cash</i>	The clip was re-edited to demonstrate that the interviewee's leaning forward was the reason only half her face was in the frame.
13	<i>Plant</i>	This clip was added to replace the "Reading" event and no changes were required.

14	<i>Stupid Splash</i>	No changes were required.
15	<i>Stupid Splash continued</i>	The clip was re-edited to have it end less abruptly.
16	<i>Notes</i>	No changes were required.
17	<i>Land</i>	No changes were required.
18	<i>Helpless/distress</i>	Despite the suggestion by one focus group to remove the event because it seemed redundant, the event was included in the module because the majority appreciated the event's humor and training value.
19	<i>Jade I</i>	No changes were required.
20	<i>Jade II</i>	The question's wording was changed to clarify that the subject's task was to attend to the additional information in the clip and provide a response.
21	<i>Jade III</i>	The question's wording was changed to clarify that the subject's task was to attend to the added information in the clip and provide a response.
22	<i>Jade IV</i>	No changes were required.
23	<i>Protein</i>	This clip was added to replace the "Pants" event, and no changes were required.
24	<i>Pain</i>	No changes were made. The event was clear as suggested by the majority. One group protested because they had never seen this interviewee before and had grown accustomed to

the interviewees in the previous events. The researchers decided to include this event in light of its importance as a foil to the phenomenon unsymbolized thinking.

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