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Descriptive Experience Sampling Demonstrates the Connection of Thinking to Externally Observable Behavior

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Cognitive models of psychotherapy assume a connection between thinking and behavior but have examined that connection with the use of only retrospective reports of thinking. However, such retrospective reports may not be trustworthy. Descriptive experience sampling (DES), a nonretrospective procedure for examining inner experience (thinking, feelings, etc.), has demonstrated links between thinking and behavior in some psychiatric populations but not yet in general. Here, DES was used to compare 7 undiagnosed individuals who share an externally observable characteristic (high rate of speech) to 7 normal-speech-rate individuals. High-speech-rate individuals had fewer instances of simple inner speech, more instances of complex inner experiences, fewer feeling experiences, and more "just doing" experiences, thus demonstrating a connection between inner experience and external behavior, and that DES is useful for exploring inner experience.

KEY WORDS: descriptive experience sampling; inner experience; speech rate; cognition.

Much of modern psychology and all cognitive models of psychotherapy assume that there is a connection between thinking and external behavior. For example, Beck (1995) stated, "In a nutshell, the *cognitive model* proposes that distorted or dysfunctional thinking (which influences the patient's mood and behavior) is common to all psychological disturbances. Realistic evaluation and modification of thinking produce an improvement in mood and behavior" (p. 1; italics in original). There are four important assumptions embedded in the cognitive model: (a) there is a connection between thinking and behavior; (b) we can access our thinking (i.e., we can introspect); (c) we can report accurately about our introspections; and (d) we can, with training, change our thinking patterns. This paper addresses the first three of these assumptions.

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Assumption (a), that there is a thinking/behavior connection, is usually taken for granted rather than directly examined; when it is examined, the thinking portion of that connection is generally assessed by retrospective measures such as questionnaires (for a review, see Glass & Arnkoff, 1997) or thought listing (for a review, see Cacioppo, von Hippel, & Ernst, 1997), which by assumptions (b) and (c) are presumed to be accurate. However, there is substantial evidence that retrospective reports about thinking may not be trustworthy. For example, Nisbett and Wilson (1977), in an influential review, considered studies that ask participants to give retrospective verbal reports or causal explanations of their mental processes. Their conclusion was clear: "In summary, it would appear that people may have little ability to report accurately on their cognitive processes" (p. 246). While Nisbett and Wilson's review was not targeted only or most directly at cognitive therapy, its broad scope and sweeping conclusion should undermine confidence in assumptions (b) and (c) and lead cognitive science to be skeptical about studies that use retrospective reports to explore the connection between thinking and behavior.

Nisbett and Wilson (1977, p. 246) recognized the possibility, if not the existence, of accurate cognitive assessment procedures: "Procedures such as interrupting a process at the very moment it was occurring, alerting subjects to pay careful attention to their cognitive processes, [and] coaching them in introspective procedures" might make it possible for people to give accurate descriptions of their mental processes. That is, nonretrospectiveness of method may be the key to investigating inner experience.

There are two nonretrospective methods of examining thinking currently in use: the think-aloud methods (for a review, see Davison, Vogel, & Coffman, 1997) and the sampling methods (for a review, see Hurlburt, 1997). However, Hurlburt (1993) showed that the think-aloud methods are not fast and detailed enough to report complex inner experience completely.

Descriptive experience sampling (DES; Hurlburt, 1990, 1993, 1997) can be considered an extension of the family of methods called thought sampling or experience sampling (Hurlburt, 1997). The DES procedure is as follows: (1) A random beeper is used to cue participants to pay particular attention to their inner experience that was ongoing at specific moments in their natural environments and immediately to jot down in a notebook enough details to allow reconstruction of the moment in the Step 2 discussion; (2) the participant and the investigator discuss each sampled moment in detail within 24 hr of the sampling; (3) the investigator prepares a written description of each sampled moment, and after several days of such sampling/discussing/describing, the investigator extracts the salient features from the complete set of sampled moments.

Thus DES is precisely the kind of "interrupting/alerting/attending/coaching" method called for by Nisbett and Wilson (1977). The adequacy of the DES method has been addressed from a variety of perspectives. For example, Monson and Hurlburt (1993) showed that the DES method avoids the pitfalls that crippled introspective attempts a century ago. Hurlburt and Heavey (2000) concluded that the DES procedure is effective because it focuses on specific, discrete, short moments and triggers the focus on those moments as immediately as possible.

Hurlburt (1993, 1997) discussed the idiographic validity of DES reports and gave five reasons why his idiographic description of Fran should be believed. Hurlburt (2000a), also from an idiographic perspective, presented a transcript of a DES interview and discussed its method and validity. He concluded, for example, that the delay between the beep and the interview (typically under 24 hr) did not generally have a major impact on the accuracy of the method because the participant wrote a description of the sampled moment immediately after the beep. In those cases where the delay between sample and interview seemed problematic, the interval could be shortened or eliminated almost completely (by remaining in the vicinity of the participant and conducting interviews immediately), but that was not usually necessary.

Hurlburt and Heavey (this issue) examined the nomothetic reliability of DES coding. Two independent interviewers used the DES method on six samples from each of 10 randomly selected participants and rated them on the presence or absence of five characteristics of inner experience. The single-sample interrater-reliability kappa coefficients for those five characteristics ranged from .52 to .92. The participantwise reliabilities for the averages of the six items ranged from .78 to .95. Spearman-Brown adjustment showed that reliabilities for more typical 18-item averages would range from .91 to .98. Thus Hurlburt and Heavey (this issue) concluded that the DES method can be as reliable as the best questionnaires currently in use.

Thus DES can be considered to be an effective method for exploring thinking as well as other aspects of inner experience, and might therefore provide the most direct evidence currently possible regarding a connection between thinking and behavior. It has proven useful in investigating the inner experience of a wide variety of individuals, both "normal" and those in an assortment of diagnostic categories. As a general rule, Hurlburt and colleagues have found that most individuals, both nonpatients and psychiatric patients, could give useful reports about the features of their inner experience. That psychiatric patients can report accurately may be surprising because of their presumed defensive or otherwise unconscious processes. However, Hurlburt has argued (1993, 1997; Hurlburt & Sipprelle, 1978) that the DES procedure requires that we rethink the concept of defense and the unconscious: Sampling seems to show that most individuals have relatively unhindered access to awareness (even anxiety arousing or otherwise problematic awareness) at the moment it occurs. However, when people retrospectively characterize themselves or generalize about themselves, they systematically neglect the problematic awarenesses. Thus, sampling shows that defense may be more a characteristic of retrospection than of introspection. Clearly such a fundamentally important distinction as whether defense involves retrospection or introspection deserves more thorough analysis.

There are many designs that might be employed to use DES in the direct investigation of a connection between thinking and behavior. Each has its own advantages and disadvantages, but perhaps the initial design in this situation is naturalistic observation, ascertaining whether individuals who share some distinct externally observable characteristic also share some distinct characteristics of inner experience. If such naturalistic observation cannot demonstrate a substantial connection between inner experience and external behavior, then it is unlikely that other research designs would be able to establish that such a connection exists.

Hurlburt and colleagues have explored the inner experience/external behavior connection with the use of this naturalistic approach, employing psychiatric diagnosis as the "distinct externally observable characteristic" that defines the groups and employing the DES procedure as the investigation tool. They observed that schizophrenic patients had "goofed up" images and hyperclear emotional experience, characteristics that normal individuals did not share (Hurlburt, 1990); that depressed individuals had frequent unsymbolized inner experience (Hurlburt, 1993); that hypomanic individuals had frequent visual images (Hurlburt, 1993); that Asperger Syndrome patients had either visual images or no inner experience whatsoever (Hurlburt, Happe', & Frith, 1994); that anxious individuals had frequent self- and other-directed criticism (Hebert & Hurlburt, 1993); that bulimic individuals had frequent multiple inner experiences and implied thinking (Doucette & Hurlburt, 1993); and that a borderline personality patient had no figure/ground phenomenon in inner experience whereas psychology assumes that all individuals experience figure/ground (Hurlburt, 1993). None of these studies used sufficient numbers of participants or sufficiently representative samples to be able to claim that these characteristics apply to all members of the diagnostic groups. However, taken together they do make a compelling naturalistic case that DES does indeed demonstrate that individuals in different diagnostic categories are likely to have different forms of inner experience.

Thus, it is reasonable to believe that at least in psychiatric patients there is some connection between thinking and behavior. However, until now there have been no studies that directly (nonretrospectively) examine such a connection in nonpsychiatric individuals. This study is a preliminary attempt to explore the connection between nonpsychiatric inner experience and behavior with the use of the same naturalistic method that Hurlburt used with psychiatric populations. In particular, we ask whether nonpsychiatric individuals who share a particular externally observable behavior also share particular features of inner experience. If these individuals do share features of inner experience, and those features are atypical, then this study would make two substantial contributions. First, it would demonstrate that inner experience and external behavior are in some way connected in nonpsychiatric individuals, confirming the accepted but not-directly-tested assumption of cognitive psychology. Second, it would demonstrate the efficacy of the DES method in exploring such issues.

There are, of course, many externally observable behaviors that differentiate nonpsychiatric individuals (emotional expressiveness, activity level, etc.), and that might therefore be candidates for examination in this study. We chose natural rate of speaking (measured in words per minute) as the externally observable behavior and asked whether people with unusually high speech rates share unique or atypical characteristics of inner experience. We chose to consider high rate of speech for two reasons. First, many observers, like John Broadus Watson, hold that "thought is in short nothing but talking to ourselves" (Watson, 1925, p. 191). Although inner speech is actually only one of many aspects of the experience of thinking (Hurlburt, 1990, 1993), it is one of the most frequently occurring characteristics of inner experience (Hurlburt, 1990, 1993). It therefore seemed reasonable to speculate that an unusual aspect of external speech (high speech rate) might be associated with an unusual pattern of inner speech or some other atypical aspect of inner experience.

Second, investigators conducting DES explorations have frequently observed (but never published) that individuals whose inner experience included frequent visual images often have unusually high external speech rates. These observations were never systematic, but led to the casual conjecture that it was as if an inner picture was "worth a thousand words" and people who experienced inner pictures frequently spoke quickly to "keep up" with their visually complex inner experience. Regardless of the truth of this informal conjecture, the apparent connection between visual images and high speech rate seemed to justify the direct exploration of high speech rate.

Thus this study used the DES procedure to investigate a number of individuals who shared high rate of speaking as an externally observable behavior, asking whether they shared atypical characteristics of inner experience. However, let us keep clearly in mind that the purpose of this study was to undertake a preliminary investigation of the connection between directly observable behavior and inner experience. Our focus on high speech rate is merely a means to that end. We are not primarily interested in high speech rate per se—it is merely one of many behaviors we might have chosen to serve as an exemplar of directly observable behavior.

That being said, our first task was to identify high-speech-rate individuals. Although many methods have been used to measure speech rate, no existing method is particularly useful for measuring the natural rate of speaking. We therefore developed the "story-retelling method" as our own means of measuring speech rate: we asked individuals to read a simple children's story (Breathed, 1991) and then to retell the story in their own words. Their speech rates were measured during this retelling by counting the number of words they used and dividing this number by the number of minutes that they used in the retelling of the story. A pilot study showed that this story-retelling method of measuring speech rate was effective in correctly identifying individuals who were known to us to have high speech rates. Later, we took a random sample of 16 introductory psychology students and measured their speech rates with the use of this procedure, finding that the mean and standard deviation were 174.0 and 21.8 words per minute (wpm), respectively. The literature does not, to our knowledge, provide norms for the rate of naturally occurring English speech. Fairbanks, Guttman, and Miron (1966) claimed that 140 wpm was "unquestionably close to the central tendency which would be expected for skilled speakers reading to communicate the content in question" (p. 44), but their focus was on professional speaking, not casual, conversational speaking.

Studies of speech rate have demonstrated clearly that neurological dysfunction, memory dysfunction, and affect disturbance can lead to slowed or accelerated external speech, but to our knowledge there is no literature relating speaking rates to features of inner experience, which is the intent of this study. Therefore, this study should be considered an exploratory investigation of the connection, if any, between high speech rate and inner experience.

This study consisted of two groups, a high-speech-rate group and a comparison group. The high-speech-rate group proceeded through three phases. The first two phases (H1 and H2) were designed to identify participants who had, as an enduring personal characteristic, high rate of speech. In the third phase (H3) we used the DES method to examine the inner experience of these high-speech-rate participants.

We compiled these reports of inner experience to explore the extent to which these high speech rate individuals shared features of inner experience in common to that contrasted with the comparison group.

The comparison group proceeded through three phases (C1, C2, and C3) designed to use the DES method with a random sample of participants who could be matched for age and sex with the high-speech-rate participants, but who themselves had low or average speech rates.

METHOD

Phase H1

Participants

We recruited 348 undergraduate volunteers from introductory psychology classes.

Materials and Apparatus

A brief questionnaire consisting of six noninvasive multiple-choice questions was designed for this study. These questions asked participants to report the number of weekly telephone contacts with friends, their level of fashion consciousness, their natural speech rate, their degree of political interest, their employment status, and their frequency of on-campus dining. The only question that was of interest to this study was the speech rate question (the others were distracters used to mask the study's focus on speech rate): "How would you characterize your natural rate of talking? 1) I talk slower than do most students; 2) About the same as most students; 3) Faster than most students; 4) A lot faster than most students."

Procedure

The purpose of Phase H1 was to identify a group of individuals who had high self-reported speech rates and advance them to Phase H2. All 17 participants who answered the questionnaire item "How would you characterize your natural rate of talking?" with choice "4) A lot faster than most students" were invited to participate in Phase H2. These participants were not informed why they had been selected, and debriefing indicated that none knew that self-reported speech rate was the selection criterion.

Phase H2

Participants

The 17 individuals who self-reported high speech rates in Phase H1 were invited to participate in Phase H2; 12 did in fact participate. Each of these 12 was given course research participation credit. Additionally, 1 participant from an advanced

psychology class who identified herself as having a high speech rate in response to an inquiry in her class was included in Phase H2 for a total of 13 participants entering Phase H2.

Materials and Apparatus

Participants in Phase H2 read a children's fable (Breathed, 1991), presented as three typewritten pages (1,213 words).

Procedure

The purpose of Phase H2 was to identify a group of individuals who had high speech rates as measured by the objective story-retelling procedure and advance them to Phase H3. Participants entering Phase H2 were asked to schedule a meeting at a convenient time with the investigator in a campus office. At this meeting they were given the children's fable and asked to read it; when finished, they were asked to retell the story in their own words. These retellings were audiotaped. The audiotapes were timed and transcribed, and the participants' objective rate of speaking was found by counting the number of words (or clearly vocalized pauses) and dividing by the number of minutes required for the retelling. Of the 13 high-self-reported-speech-rate participants entering Phase H2, eight did in fact have high speech rates as objectively measured by the story-retelling method. These rates ranged from 188 to 227 wpm ($M = 208.0$, $SD = 13.7$), substantially higher than the "ideal" rate of about 140 wpm (Fairbanks, Guttman, & Miron, 1966) and also substantially higher than the average rate of 174.0 wpm ($SD = 21.8$) that we found in our own 16-participant speech-rate study. This difference was statistically significant, $t(21) = 3.79$, $p < .001$.

Phase H3

Participants

All eight of those participants who in Phase H2 were objectively measured as having high speech rates were invited to participate in Phase H3; seven did in fact participate. These 7 participants thus had high speech rates by both self-report and objective measurement. They were given additional research participation credit. Five of the participants were female, and two were male. They ranged in age from 18 to 25 years. All except one were native American English speakers. The lone exception's native language was German; he spoke English fluently as a second language, and all his interactions with us were in English.

Materials and Apparatus

A random-interval generating beeping device (Hurlburt, 1980) that is small enough to fit into a pocket was supplied to each participant in this phase of this study. The beeper emitted at random intervals a 700-Hz tone that could be heard through a small transistor-radio earphone. The random intervals could range from a

few seconds to 1 hr and averaged 30 min. The volume of the beeper was adjustable by the participant, and the beep could be stopped by the participant by pressing a button on top of the beeper.

A pocket-sized (3 in. × 5 in.) spiral notebook was supplied to each participant for recording notes about their inner experience at the moment of each beep.

Procedure

The 7 participants entering Phase H3 were examined using the DES method described by Hurlburt (1990, 1993). Each of the individuals participated in a series of individual interviews.

During the initial interview, the sampling process was explained. The beeping device and notebooks were given and explained to each participant, and they were asked to turn the beeper on and wear the earphone for a convenient and consecutive 5-hr period, or until at least eight beeps had been received. They were instructed that at each randomly occurring beep, they were to "freeze" the inner experience that was ongoing at the moment of the beep and jot down notes about what was occurring in their inner experience at that moment. They were asked simply to describe their experience, not to consider why the experience was occurring, whether the experience was or was not typical for them, or what was the significance of the experience. All participants were advised that they should feel free to decline to describe any sampled experience, and we maintained the participants' confidentiality.

Within 24 hr of the sampled moments, the participant met with the investigators for a thorough discussion of the samples. These meetings were either videotaped or audiotaped. The goal was for the investigators to reach a clear understanding of the inner experience that was occurring at each sample. In an effort to reach the goal, the participant was asked open-ended questions that encouraged complete descriptions of the beeped moments. These discussions were highly detailed and intensive (see Hurlburt, 1990, 1993, for a more complete discussion of this interview procedure); typically we could adequately discuss between three and five samples during the scheduled 1-hr meeting. Samples not discussed were discarded. A written description of each discussed sample was then prepared.

The complete sampling/discussing/description procedure was repeated on subsequent days. These days of sampling/discussing/description continued until the investigators and the participants were in agreement that new samples seemed rather similar to those already encountered. Each participant sampled from three to five sampling days. At the end of each participant's sampling period, the investigators reviewed the written descriptions, notes, and/or recordings of each of that participant's samples to extract the salient characteristics that emerged from that participant's sampling. A more detailed discussion of the extraction of salient characteristics is found in Hurlburt (1990, 1993). A detailed written characterization of each participant's salient characteristics was then created for each participant. Then we attempted to contact the participant and asked him or her to read that characterization and to provide any criticism or commentary deemed appropriate. Four of the 7 participants agreed to do so; two could not be contacted, and one declined

to see the written summary, saying that our comments during the final debriefing interview were sufficiently detailed to give her confidence that our written summary would be accurate. Criticism or commentary from the participants would have caused us to consider revising the characterization; however, all participants were in total agreement with our written characterizations of them.

Once the salient characteristics had been extracted and inspected for each participant, we examined the set of salient characteristics for common characteristics that emerged across participants, which form the results of this study.

Phase C1

The purpose of Phases C1, C2, and C3 was to provide a seven-person comparison group, matched at least approximately in age and sex to the high-speech-rate group of Phase H3, whose participants spoke at low-to-moderate speech rates but were otherwise diverse. We accomplished the diversity goal by stratifying undergraduate psychology students according to their scores on the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994). We could have stratified on any of a variety of measures that might have speech-rate or behavioral implications.

Participants

All 210 students who were in attendance at one lecture meeting of a large introductory psychology class participated in Phase C1. This class was the same course (introductory psychology) offered at approximately the same time of day in the same university as the classes from which participants in Phase H1 were obtained, but was in the next academic year. All those participants received course research-participation credit.

Materials and Apparatus

The SCL-90-R (Derogatis, 1994) was administered to all participants in Phase C1. The SLC-90-R asks participants to indicate the extent to which they are bothered by a list of 90 different psychological symptoms. Each item is scored on a scale from 0 (*not at all*) to 4 (*extremely*). The Global Severity Index, used in this study, is the sum of all responses and indicates the overall extent to which the person is bothered by psychological symptoms. All participants in Phase C1 also filled out a brief demographic questionnaire.

Procedure

The investigators gave a brief description of a series of studies including this study to the 210 students attending an introductory psychology class. All students in the class were then invited to fill out the SCL-90-R, a brief demographic questionnaire, and an informed consent form in exchange for research-participation credit and the possible opportunity to proceed to Phase C2 of the study; all students did so.

Phase C2

Participants

Twenty participants from Phase C1 were randomly selected (two from each of 10 strata of the class as described below) to participate in Phase C2. Participants in Phase C2 received additional credit toward the course research-participation requirement and were also paid $30.

Materials and Apparatus

The same materials were used in Phase C2 as were used in Phase H3.

Procedure

The 210 participants from Phase C1 were stratified into 10 equal-sized strata (21 per stratum) on the basis of their SCL-90-R Global Severity Index scores. Two prospective participants from each stratum, one male and one female, were selected at random and invited to participate in the series of studies that included the present Phase C2. If a prospective participant for Phase C2 declined to participate, he or she was replaced by another randomly chosen individual from the same stratum; this replacement occurred a total of nine times.

Each participant met with the investigators four times, the explanation meeting and three sampling meetings. The explanation meeting and the sampling meetings were essentially the same as the meetings in Phase H3 with two exceptions because part of this comparison group also served as participants in another study: First, there were precisely three sampling meetings for each participant (instead of 3–5 as in Phase H3). Second, each participant was interviewed regarding five samples each day (instead of a variable number of samples as in Phase H3). The first day's samples were discarded as being training exercises. The interviewers were kept blind to the SCL-90-R scores and strata information throughout the data collection portion of the study.

Phase C3

Participants

Seven participants matched for sex and approximate age to the participants in Phase H3 were selected from the participants in Phase C2 by the procedure described below. These 7 participants comprise the comparison group for this study. As in Phase H3 there were five females and two males; their ages ranged from 18 to 21.

Materials and Apparatus

Participants in Phase C3 read the same children's fable (Breathed, 1991) used by the participants in Phase H2.

Procedure

The purpose of Phase C3 was to identify a comparison group of individuals matched on sex and age who had low-to-moderate speech rates. We measured the speech rate with the use of the story-retelling procedure of each of the participants from Phase C2 (excluding four that were lost because of administrative difficulties). Then, beginning with the slowest speech rate, we identified a Phase C2 participant as a member of the comparison group if his or her sex and age approximately matched a participant in the high-speech-rate group. It turned out that seven of the eight individuals with the slowest speech rates could be selected for the comparison group by this procedure. The comparison group participants' mean speech rate was 155.7 ($SD = 17.4$); this rate was statistically significantly different from that of the high-speech-rate group, $t(12) = 6.25$, $p < .001$.

RESULTS

The salient characteristic extraction procedure of the DES procedure is designed to allow characteristics to emerge from each single participant in an entirely idiographic way. Such characteristics may be based on regularities in the content (the *about*) or the form (the *how*) of the experiences reported in the study, although in most studies the salient characteristics turn out to be related to form (Hurlburt, 1997). This study followed this same extraction procedure. Thus, it was possible for each participant to produce his or her own idiosyncratic set of salient characteristics, different from that of the other participants and from those discovered in previous research. However, the characteristics of inner experience found in our samples were the same as those that Hurlburt (1990, 1993) reported to occur in the inner experience of other descriptive sampling study participants. These characteristics are listed in Table I. These are the same characteristics discussed in some detail in Hurlburt (2000b), and are all characteristics of the form (the *how*) of inner experience—whether an experience was a thought or a feeling, whether it was in words or images, and so forth. No content characteristics emerged as salient.

We rated between 16 and 22 samples ($M = 19.3$, $SD = 2.3$) for each of the seven high-speech-rate participants, for a total of 135 high-speech-rate samples. We rated exactly 10 samples for each of the seven comparison group participants for a total of 70 comparison samples. The percentages of samples in which each characteristic was present are shown in Table II. Note that the percentages for any person (that is, in any column) may add to more than 100% because more than one characteristic may be scored at any given sample. The percentages within the two groups are statistically significantly different (by chi-square tests, $df = 1$, $N = 205$) for three characteristics: feelings, multiple awareness, and just doing. The last two rows of Table II will be discussed below.

DISCUSSION

This study was designed to explore whether people with a particular externally observable characteristic (high speech rate) share particular characteristics of inner

Table I. Salient Characteristics of High-Speech-Rate Participants' Inner Experience

Salient characteristic	Description
Inner speech	The experience of speaking words in the person's own voice, with the same vocal characteristics (timbre; rate; inflection for commas, question marks, etc.; pauses; accents; stutters; etc.) as the person's own external speech, but with no external (real) noise
Unsymbolized thinking	The experience of thinking some particular, definite thought without the awareness of that thought being conveyed in words, images, or any other symbol
Image	The experience of seeing something that is known to be not actually present. In its pure form seeing an image has the same characteristics as seeing an external object: The center is in clearer focus, the focus or attention becomes less clear at the periphery; there is no distinct border or edge to the experience, and so on
Feeling	An emotional experience, including sadness, happiness, humor, anxiety, joy, fear, nervousness, anger, embarrassment, and so on
Multiple awareness	Two or more separate, more-or-less unrelated simultaneous processes. For example, "Saying to myself about my cheating boyfriend in my own voice 'What a rat!' and simultaneously feeling angry" is scored as inner speech and feeling but *not* multiple awareness; "Seeing an image of my boyfriend at work and another simultaneous image of him riding his bicycle" is scored as an image and multiple awareness
Sensory awareness	A sensation that does not have particular emotional significance. Such a sensory awareness may be bodily (itch, tingle, pain, pressure, hotness, coldness, shiver, stiffness, etc.) or external (noting the color of something, smelling a particular odor, etc.)
Inner hearing	The paying attention to the auditory characteristics of an inner phenomenon, for example, hearing in imaging someone else's voice talking or music playing
Worded thinking	Thinking in particular distinct words, but those words are not being (innerly or externally) spoken, heard, seen, or voiced in any other way
Just doing	The participant reports that he or she was not aware of anything at the moment of the beep, but was "just doing" something, or just reading, or just watching TV

Table II. Percentages of Inner Experience Characteristics in High-Speech-Rate Group and Comparison Group

Characteristic	High speech rate	Comparison	Chi-square	Exact significance
Inner speech	20.7	28.6	1.576	.209
Unsymbolized thinking	42.2	34.3	1.215	.270
Images	24.7	22.8	0.064	.801
Feelings	16.2	35.7	9.836*	.002
Multiple awareness	25.9	7.1	10.356*	.001
Sensory awareness	18.5	15.7	0.250	.617
Inner hearing	4.4	0.0	3.205	.073
Worded thinking	3.7	1.4	0.840	.359
Just doing	13.3	2.9	5.746*	.017
"Simple" inner speech	5.2	27.1	20.069*	.000
"Rich" experience	43.7	22.9	8.634*	.003

Note. Percentages do not add to 100% because of the possible coding of multiple characteristics for each sample. All chi-square statistics have 1 degree of freedom and are based on 205 observations.
* $p < .05$.

experience that differ from people who do not have that particular characteristic. Specifically, we speculated at the outset that inner speech and visual images might appear in unusual ways in these high-speech-rate individuals as compared to low- or normal-speech-rate individuals.

Inner Speech

Inner speech occurred in 20.7% of high-speech-rate samples and in 28.6% of the comparison group samples, a difference that was not statistically significant. Inspection of the data, justified on the grounds that this is an exploratory study, showed that inner speech occurred at an unusually low frequency for six of the seven high-speech-rate participants, but that one of our high-speech-rate participants ("Barb") had an extremely high percentage (73%) of samples with inner speech. However, Barb's inner speech was nearly always (in 80% of her inner speech samples) only one aspect of a complex, multiple inner experience. This is in stark contrast to typical DES participants whose inner speech is a simple phenomenon, usually occurring by itself, as the only feature of the experience at that moment, or accompanied by a noncognitive characteristic (feeling or sensory awareness). For example, 95% of our comparison group's inner speech was a simple phenomenon by this definition. This observation of Barb's unusual inner speech led us to define "simple inner speech," derived from the original experience categories by scoring simple inner speech as being present if the sample included inner speech but no other cognitive component (no image, no unsymbolized thinking, no other inner speech). The percentages of simple inner speech are shown in the second-to-last line in Table II; there was approximately 5 times as much simple inner speech in the comparison group as in the high-speech-rate group, and very little overlap between the groups: The percentages for the high-speech-rate participants were 0, 0, 5, 6, 6, 10, and 11, whereas the percentages for the comparison group participants were 0, 10, 20, 20, 40, 50, and 50. Thus our original speculation that high-speech-rate individuals would be unusual in terms of inner speech was supported.

Visual Images and "Rich" Experiences

At the outset we speculated that high-speech-rate participants might have frequent visual images on the rationale that fast speech was an effort to "keep up" with the complexity of the image. However, the percentages of images in the high-speech-rate group were not statistically significantly different from the comparison group.

Examination of our results showed that the "keeping-up-with-complexity" rationale might still be considered correct if we considered images to be only one kind of complexity of inner experience. Another kind of complexity is multiple awareness; the frequency of multiple awarenesses in the high-speech-rate group (25.9%) was three times higher than in the comparison group (7.1%). To explore this new keeping-up-with-complexity rationale, we derived a new category of experience that we called "rich." Our intent is to use the term rich to mean basically "nonsimple" in the sense that a "simple" experience is a straightforward thought (or feeling, or bodily

awareness, etc.) about one thing, whereas a rich experience is about several things simultaneously or is a richly detailed representation of one thing (e.g., an image). The last row of Table II shows the percentage of samples that were rich, meaning that they either involved a visual image (row 3 of Table II) or multiple (simultaneous) awarenesses (row 5 of Table II) or both. The percentage of rich experiences is thus the sum of the Images row and the Multiple awareness row, reduced by the samples in which both occurred. This way of examining the data showed that the high-speech-rate participants had statistically significantly more rich experiences (about twice as many) as did the comparison group.

Typical participants' inner experience is usually rather simple or straightforward, such as "I was doing my algebra homework, and at the moment of the beep I was saying to myself, 'I'd better do that problem again' " or "I was seeing a visual image of my girlfriend on her bicycle." Here, by contrast, is an example of a rich experience: "Sabrina" was beeped while sitting in a psychology class. At the moment of this beep she was aware of smelling cigarette smoke on her right hand. Simultaneously, she was aware of a strong bodily feeling of nervousness that was strongest within her stomach and seemed to extend into all areas of her body. Also, simultaneously, Sabrina's head was "full of thoughts"—so full that it felt like an "overload." These thoughts were all simultaneous and unsymbolized, so many that they couldn't be counted, thoughts about family, school, friends, what she would do in December, guilt, and so on. Such multiple experiences are rather unusual among typical participants but were frequent in our high-speech-rate sample.

Just Doing

There was also a third noteworthy characteristic of these samples. Our high-speech-rate participants had a high frequency of engaging in activity with no ongoing inner experience at all, a phenomenon that Hurlburt (1990) has called "just doing" (or "just reading" or "just watching TV"). Our high-speech-rate participants had 4.6 times as many just-doing experiences (13.3%) as did our comparison participants (2.9%).

Inner Experience is Related to External Characteristics

It should be recalled that our primary interest in this study was in exploring whether inner experience, as revealed by the DES procedure, is related to externally observable behavior. Our focus on high speech rate was merely a means to that end: If the DES procedure demonstrated that high-speech-rate individuals had inner experience characteristics that were distinct from typical individuals, then we could infer (a) that there are connections between inner experience and external behavior and (b) that DES is a useful tool in the exploration of inner experience not only in psychiatric populations (as Hurlburt and colleagues have previously shown) but also in nondiagnosable individuals.

We did in fact discover a connection between inner experience and external behavior, and that does therefore support the utility of the DES procedure. There is no literature that we know of that would have predicted that high-speech-rate individuals are likely to have little inner speech or to have rich or nonexistent inner

experience. Thus this study is a prototype for basic exploratory research into the connection between inner experience and a variety of external behaviors, not merely speech rate. Because high rate of speech as we have defined it can be considered a personality characteristic, this study opens, for example, new ways to explore and understand human personality.

If we tentatively accept that high-speech-rate individuals have rich experience, for example, we must recognize that this observation is correlational in nature and says nothing about whether high speech rate causes rich experience or vice versa, or whether some third unmeasured variable causes both. Additionally, we should be clear that this study investigated high speech rate as a relatively enduring personality characteristic, not as a feature that might have been occurring at any particular sampled moment. There is thus no reason to expect that if we induce some average-speech-rate individual to talk rapidly at a given moment that that would make his or her inner experience at that moment richer.

Process Versus Content in Cognitive Theory

Cognitive therapy frequently theorizes about individual differences in cognitive content. For example, A. T. Beck (1967) held that the automatic cognitions of depressed individuals are characterized by a negative view of the self, the world, and the future. Thus, cognitive therapy has been primarily interested in what people think about. However, our high-speech-rate participants were differentiated from typical participants by the form of their thinking, not by its content. It is not what high-speech-rate individuals think *about*, but *how* they think about it that differentiates them from typical individuals: high-speech-rate individuals use little inner speech and have frequent rich experiences, for example. Hurlburt and colleagues reported form (or *how*) characteristics of their psychiatric samples also—the schizophrenic individuals' "goofed up" images and hyperclear emotional experience (Hurlburt, 1990), the depressed individuals' unsymbolized thinking (Hurlburt, 1993), the hypomanic individuals' visual images (Hurlburt, 1993), the Asperger Syndrome patients' visual images or no inner experience whatsoever (Hurlburt et al., 1994), the bulimic individuals' multiple inner experiences and implied thinking (Doucette & Hurlburt, 1993), and the borderline personality patient's lack of figure/ground phenomenon (Hurlburt, 1993)—are all *how* characteristics. The only content (*what*) characteristic that has emerged from Hurlburt and colleagues' studies is that anxious individuals have frequent self- and other-directed-criticism (Hebert & Hurlburt, 1993).

Cognitive psychology, in its focus on the *what* of cognition, has for the most part ignored individual differences in the *how* of cognition. This study demonstrates that there may well be good reason to reconsider the fundamentals of cognitive theory in this light.

This Study is Preliminary

This study has three methodological weaknesses, and so we should be cautious in generalizing from these results. First, the sample sizes are small, necessitated by

the labor-intensive nature of the DES method. Certainly it might seem desirable to create a standardized questionnaire that participants could use to rate their own inner experiences directly, thus substantially reducing the labor involved, eliminating interrater bias, and making much larger sample sizes possible. Many sampling studies, including some of our own earlier ones (e.g., Hurlburt, 1980; Hurlburt & Melancon, 1987a, 1987b), have used such participant-rating approaches. However, the DES procedure has more recently but repeatedly shown that people are often dramatically inaccurate about self-characterizations unless aided by an interview procedure such as the DES method. For example, most people who engage in unsymbolized thinking believe at the outset of sampling that unsymbolized thinking is impossible both for themselves and for anyone else, and it requires the training that takes place in several sampling interviews before they can recognize it in themselves. As another example, many participants early in their sampling experience describe *all* their inner processes beginning with the words "I was saying to myself. . . ." Some intensive procedure (like the DES interviews) is necessary for those participants to come to discriminate between actually saying something to themselves (what we call inner speech) and images, unsymbolized thinking, feelings, and so on. We believe participant self-rating is not to be trusted without such training.

Second, the participants who shared high speech rate in common may also have shared some other unmeasured aspect in common, and therefore the inner characteristics we observed may be more related to that other characteristic than to high speech rate itself. Third, idiographic explorations of inner experience such as those produced by the DES method have as yet been conducted only by Hurlburt and colleagues, and so it is possible that there is some idiosyncrasy of the investigators that produces these results.

This study should, therefore, be regarded as a preliminary investigation, in need of replication by investigators not connected to Hurlburt. It does, however, point to the importance of such replication. The study strongly suggests that it is both possible and desirable to explore inner experience directly with the use of nonretrospective measures. The DES method allows such exploration and has shown the potential to provide unique and potentially important insights into inner experience.

Final Comment

We should keep clearly in mind the purpose of this paper, which is to demonstrate the connection of thinking to externally observable behavior and the utility of the DES method in exploring that connection. We conclude that it is possible to examine directly what has until now been relatively uncritically assumed in the literature. We focused on individuals with a high rate of speech merely as a means to that end. We purposely chose a relatively insignificant behavior—rate of speech—because that makes the case for a connection between thinking and behavior in the strongest possible terms: If there is a connection between an insignificant behavior and thinking, then it is certainly to be expected that there are connections between significant behaviors (such as psychiatric diagnoses) and inner experience. The DES procedure has already shown, at least in a preliminary way, that the DES method

can discover inner experience "signatures" in a variety of diagnostic groups such as schizophrenia, depression, bulimia, and so on (Hurlburt, 1997). The present paper extends that into the realm of the everyday.

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