

Issues in Cognitive Assessment: Task Difficulty, Reactivity of Measurement, Thought Listing Versus Inventory Approaches, and Sequences Versus Frequency Counts

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This investigation explored four methodological issues in cognitive assessment: the effects of task difficulty on positive and negative thoughts, the possible reactivity of thought listing, the comparability of results from thought listing and inventory measurement, and the nature of information derived from examination of different sequences of thoughts. Results on task difficulty showed that interaction tasks perceived to be difficult, compared to those perceived to be easy, elicit relatively fewer positive and relatively more negative thoughts. Two studies attempted to show that thought listing is a reactive process. Results indicate that thought listing has no demonstrable effects on comfort in the situation, self-efficacy beliefs concerning interaction, stereotyping, or ease with different groups of individuals. A comparison of thought listing and inventory measurement showed that, generally, these two methods produce equivalent results. Examination of the role of various sequences of positive and negative thoughts suggests that evaluation of different sequences does not yield information that frequency counts cannot provide. The implications of the findings for cognitive assessment and cognitive therapy are discussed, the relative importance of positive and negative thoughts is examined, and the nature of a possible mediating variable between cognitions, affect, and behavior is explored.

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INTRODUCTION

In the numerous investigations of cognitive factors that influence social anxiety and performance, a multiplicity of constructs, methods, and approaches are used. To clarify some of the ambiguities and shed light on artifactual as opposed to real differences among findings, more methodological studies are needed to determine how best to conduct cognitive assessment (Glass & Arnkoff, 1982; Kendall, 1984).

The purpose of this investigation was to explore four methodological questions in cognitive assessment: (a) Do easy and difficult tasks elicit similar patterns of thoughts? (b) Is thought listing reactive? (c) Do thought listing and inventory approaches provide comparable data? (d) How much more information is obtained from an examination of sequences than from frequency counts?

Perceived Task Difficulty (Question A)

Data concerning the relative importance of positive and negative self-statements for adaptive behavior, successful performance, and social anxiety are confusing and inconsistent. For example, some studies have found that negative self-statements are more important (e.g., Halford & Foddy, 1982; Kendall et al., 1979), some have found that positive thoughts are more important (e.g., Heimberg, Acerra, & Holstein, 1985; Hollandsworth, Glazeski, Kirkland, Jones, & Van Norman, 1979), while other investigations have found both to be important (e.g., Galassi, Frierson, & Sharer, 1981a; 1981b; Schwartz & Gottman, 1976). Other investigators have stressed the utility of positive and negative ratio or difference scores (e.g., Acton & Cameron, 1985; Amsel & Fichten, 1988a, 1988b; Heimberg, Chiauzzi, Becker, & Madrago-Peterson, 1983; Hope, Heimberg, Zollo, Nyman, & O'Brien, 1987; Jerremalm, Jansson, & Ost, 1986; Merluzzi, Burgio, & Glass, 1984; Missel & Sommer, 1983). Indeed, in a recent series of papers Schwartz and his colleagues (Schwartz, 1986; Schwartz & Garamoni, 1986; Schwartz & Michelson, 1987) have proposed that different ratios (proportion of positive to positive plus negative thoughts) characterize distinct states of mind (SOMs) which reflect functional and dysfunctional thinking about events. They contend that, typically, 63% of all valenced thoughts are positive, a condition they call "positive dialogue." As individuals become more anxious, this balance shifts toward 50% ("internal dialogue of conflict"), and to instances where positive thoughts are fewer than negative thoughts ("negative dialogue" and "negative monologue"). As affect becomes very positive, the ratio of positive to negative thoughts increases ("positive monologue"). An impressive body of evidence reviewed by Schwartz and Garamoni (1986) suggests that these ratios do indeed reflect functional and dysfunctional thinking about events. Because it may be the ratio of positive to negative thoughts, rather than their individual

frequencies, which characterizes and mediates adaptive behavior, the ratio proposed by Schwartz [Positive/(Positive + Negative)] could constitute the best dependent measure in the evaluation of the relative importance of positive and negative thoughts (Amsel & Fichten, 1988a).

A consideration of the perceived difficulty of the tasks may well account for inconsistencies in the findings on the relative importance of positive and negative thoughts—inconsistencies that cannot be adequately explained by differences in type of task (i.e., assertion, test performance, social interaction) or by the data-gathering methods (e.g., thought listing, think aloud, inventory). For example, task characteristics such as same versus opposite sex interaction (Beidel, Turner, & Larkin, 1986; Glass, Merluzzi, & Cacioppo, 1978; Turner, Beidel, & Larkin, 1986), interaction with similar versus dissimilar individuals (Heimberg, Acerra, & Holstein, 1985), achievement versus "behave naturally" instructions (Merluzzi, McNamara, & Rudy, 1983; Sarason & Stoops, 1978), and positive versus negative assertion situations (Pitcher & Meikle, 1980) have been shown to influence the relative frequencies of positive and negative thoughts. A characteristic common to these situations appears to be perceived task difficulty.

Further, evidence exists that dispositionally high anxious people evaluate interaction situations more negatively than do low anxious individuals, and they make more negative attributions about the situation (Cacioppo, Glass, & Merluzzi, 1979; Goldfried, Robins, & Padawer, 1984). Dispositionally anxious people also estimate their performance to be poorer than do low anxious individuals (Beidel, Turner, & Dancu, 1985), even when this is not the case (Curran, Wallander, & Fischetti, 1980). Thus, high levels of dispositional anxiety can result in the perception that a task is difficult.

At present, there is little evidence comparing situationally high and low socially anxious individuals' thoughts. Yet, if the common denominator influencing the relative frequency of positive and negative thoughts is perceived task difficulty, one would expect situationally high and low anxious persons' thoughts to differ.

In the present investigation three studies evaluated the effects of task difficulty on thoughts. Study I compared the thoughts of individuals who experienced different levels of situational anxiety. Study 2 examined thoughts listed concerning easy and difficult interaction situations, and Study 4 compared the thoughts of dispositionally high and low socially anxious people.

Reactivity of Thought Listing (Question B)

Intuitively, one would imagine that the act of listing one's thoughts would influence subsequent performance, anxiety, and cognitive evaluations. Paying attention to and listing negative thoughts such as, "I am uncomfortable . . . how can I get out of this . . . what will she think of me

if I don't do well" may lead to anxiety, poor performance, and discomfort during interaction. Listing positive self-statements, on the other hand, would be expected to have the opposite effect. Indeed, many cognitive therapy packages include self-statement modification modules designed to alter the frequencies of negative and positive thoughts (e.g., Dush, Hirt, & Schroeder, 1983; Gauthier, Pellerin, & Renaud, 1983).

In other areas, research has shown that self-focused attention (being made aware of oneself as a social object through verbal instructions, facing a mirror, being videotaped) tends to enhance attitude-attitude and attitude-behavior consistency (cf. Fiske & Taylor, 1984, chap. 7) and to heighten existing affective states (Gibbons, Smith, Ingram, Pearce, & Brehm, 1985). In addition, socially anxious individuals have been found to report more self-focused thoughts than nonanxious persons; however, the causal direction of this relationship is unclear (Hope, Heimberg, Zollo, Nyman, & O'Brien, 1986). Self-monitoring, another self-focusing strategy, has also been shown to be reactive in a variety of contexts (Mace & Kratochwill, 1985). But is thought listing equivalent to such self-focusing manipulations?

In the attitude change literature, the results of Cacioppo, Harkins and Petty (1981) show that listing thoughts after a persuasive communication does not affect subsequent attitudes. Similarly, in studies of impression formation (cf. Anderson, 1981), learning skill, and perceptual-motor performance (Ericsson & Simon, 1984), thought listing has been shown to have no effects.

A limited number of studies have examined the issue of the reactivity of listing one's thoughts directly; these do not support the hypothesis that thought listing is reactive. For example, Galassi, Frierson, and Sharer (1981b) found no differences in anxiety or examination performance between subjects who completed an inventory of thoughts either concurrently or retrospectively, suggesting that paying attention to one's thoughts is not reactive. On the other hand, Blackwell, Galassi, Galassi, and Watson (1985) did find that thought listing caused more anxiety than think aloud evaluation, which, in turn, resulted in greater anxiety than did paying no attention to thoughts. Similarly, Arnkoff and Smith (in press) also showed some evidence for reactivity when thoughts were collected during the course of an exam. Because of the design of these studies, however, alternate explanations of the results, as noted by the authors, are equally likely.

Given the intuitive appeal of the notion that thought listing is reactive, contradictory findings from other areas, the dearth of data bearing on this issue in the cognitive assessment literature, and the methodological importance of knowing whether this frequently used assessment strategy is reactive, two studies (1 and 3) investigated the possible reactivity of listing thoughts concerning both easy and difficult interaction tasks.

Thought Listing Versus Inventory Approaches (Question C)

Another thorny methodological issue revolves around the relative merits of thought listing and inventory measures of self-statements (cf.

Clark, 1988). While the latter technique has the obvious appeal of convenience, it also has numerous drawbacks (cf. Glass & Arnkoff, 1982; Glass & Merluzzi, 1981; Kendall & Hollon, 1981). Both approaches are frequently used. When investigators report contradictory results, conceptual considerations, task differences, nonreplication, and population differences are generally confounded by the possibility of methodological differences due to instrumentation. Furthermore, the few investigations that have explored this issue have come to dramatically different conclusions (e.g., Arnkoff & Smith, in press; Dodge, Heimberg, Hope, & Becker, 1986; Myszka, Galassi, & Ware, 1986; Segal & Marshall, 1985). Therefore, in Study 1 of the present investigation identical tasks were administered to subjects in both thought listing and inventory reporting conditions.

Sequences (Question D)

An obvious advantage of thought listing is that it permits examination of the role of different sequences of thoughts. It has been argued (cf. Arnkoff, Notarius, Galassi, Fulkerson, & Galassi, 1984; Cacioppo & Petty, 1981; Glass & Arnkoff, 1982; Galassi, Frierson, & Sharer, 1981a; Notarius, 1981a) that analysis of sequences rather than mere examination of frequency counts could provide insights about the process of thinking and about the function of self-statements in influencing and guiding behavior.

While there has been much discussion of sequences, there has been relatively little research. A notable exception is the pioneering work of Schwartz and Gottman (1976), who found that high assertive subjects were more likely to have exclusively positive sequences of thoughts than were low assertive subjects. In the attraction literature as well, different sequences of utterances about another person have been shown to cause marked differences in liking for the person who emitted the statements. On this task however, it was not an exclusively positive sequence but a negative-positive sequence that resulted in the greatest attraction (Aranson & Linder, 1965).

But what about the role of different sequences of positive and negative self-statements in mediating social anxiety and performance? Does the impact of the sequence + - (e.g., "She seems like a nice person. But I fell uncomfortable.") differ from the opposite (- +) sequence (e.g., "I feel uncomfortable. But she seems like a nice person.") even though these contain an equal number of positive and negative thoughts? Is it the patterning or the frequency of positive and negative thoughts that is related to low anxiety and expectations of good performance? Studies 1 and 2 explored these issues.

Present Investigation

The present investigation addressed the four questions noted above. The four studies reported are based on data collected in the context of

larger investigations where the focus was on differences between responses concerning hypothetical interaction with able-bodied and with disabled peers (Amsel & Fichten, 1988b; Fichten, 1986; Fichten & Amsel, 1988). The interpretation of the results necessitated a better understanding of the methodological issues. Thus, this article constitutes a *process analysis* of the data and will not focus on the able-bodied/disabled comparison. Furthermore, because analyses in these investigations showed no consistent sex differences, male and female data are combined.

Three of the four questions posed are addressed by several studies. Study 1 provides data relevant to all questions. In Study 2, data relevant to Questions A and D are provided, while Studies 3 and 4 provide information relevant to Questions B and A, respectively. To simplify interpretation, results for each study are organized by question.

METHOD

Measures

General Information Form

This measure contains questions about sex, age and absence or presence of a physical disability. General ease with able-bodied students and with students who have a physical disability is assessed using 6-point scales (1 = very uncomfortable, 6 = very comfortable). Results show that Ease scores are logically related to relevant criterion variables (e.g., Amsel & Fichten, 1988b; Fichten & Amsel, 1988).

Social Avoidance and Distress Scale (SAD)

The SAD (Watson & Friend, 1969) is one of the most frequently used measures of social anxiety. The measure has demonstrated good reliability and validity (cf. Arkowitz, 1981). The median SAD score for college students reported by Watson and Friend (1969) was 7, with high scores representing greater social anxiety.

Comfort Interacting Scale

This single item is presented both on the College Interaction Self-Statement Test [(CISST), Fichten & Amsel, 1988] and the Cognitive Role Taking Tasks (Fichten, 1986). It asks respondents to indicate, on a 6-point scale, how comfortable they would feel in the situation. Test-retest reliability coefficients for the Comfort Interacting score range from .58 to .65 and, when interaction with able-bodied persons is considered, scores on this scale are significantly related to established measures of social anxiety such as Watson and Friend's SAD and Fear of Negative Evaluation

(FNE) scales ($r = -.48$ and $-.58$, respectively) (Fichten & Amsel, 1988).

College Interaction Self-Statement Test (CISST)

This 40-item inventory measure of thoughts about interaction with able-bodied and with physically disabled college students has two dimensions: focus of attention (on the self/on the other person) and valence (positive/negative). A brief description of a hypothetical interaction situation between same-sex students in the college context is provided. Subjects are asked to imagine that they are involved in the interaction and to indicate how they would feel on the Comfort Interacting Scale. Subjects then rate, using a 5-point scale, how often they would have each of 40 thoughts.¹ Item content and subscale definitions are based on open-ended thought listing data from Fichten's (1986) study of thoughts concerning interaction between able-bodied college students and between able-bodied students and their wheelchair user peers; here it was found that focus of attention and valence are discrete elements which have differential impact on comfort and self-efficacy beliefs.

The measure yields five scores: Comfort Interacting score (6-point scale) and four thought frequency scores (Self-Referent Positive, Self-Referent Negative, Other-Referent Positive, Other-Referent Negative). Psychometric data are provided by Fichten and Amsel (1988) and Amsel and Fichten (1988b). These indicate internal consistency coefficients for subscales which range from .54 to .87 and test-retest correlation coefficients between .28 and .89. Validity data show that subscale scores are meaningfully related to pertinent criterion variables. For example, when thoughts concerning able-bodied persons are evaluated, Positive Self and Other Referent subscale scores correlate significantly with scores on the Positive subscale of the frequently used Social Interaction Self-Statement Test (SISST) (Glass, Merluzzi, Biever, & Larsen, 1982); scores on the two Negative CISST subscales are significantly related to SISST Negative subscale scores. Also, CISST subscale scores distinguish between interaction with disabled and able-bodied individuals and, when thoughts concerning disabled peers are evaluated, the CISST scores of respondents with and without prior contact with disabled individuals differ significantly.

Cognitive Role-Taking Tasks

This measure, fully described by Fichten (1986) and Fichten and Martos (1986), is used to collect thoughts and feelings. Brief descriptions

¹ Examples of CISST items. Self-Referent Positive: "I enjoy meeting new people." Self-Referent Negative: "I'd better be careful how I say things." Other-Referent Positive: "She seems to be an interesting person." Other-Referent Negative: "He will probably just get tongue-tied if I start talking to him."

of hypothetical interaction situations between able-bodied college students and between able-bodied and wheelchair user students are provided.² Subjects are asked to imagine that they are involved in each situation and to list, in written form, the thoughts and feelings they experienced while imagining themselves in the situation. In the 1986 studies, 11 interaction situations were used; studies described in the present investigation use either all or a subset of these situations. After listing their thoughts concerning an interaction situation, subjects indicate how comfortable they would feel in the situation (Comfort Interacting Scale).

College Student Trait Checklists

This measure lists 10 socially desirable and 10 socially undesirable traits commonly attributed to disabled (e.g., quiet, unhappy) or to able-bodied (e.g., sociable, phony) college students (Fichten & Amsel, 1986). Respondents select the five traits that best describe a stimulus person from each list. The Checklists have been shown to be a good measure of stereotypes of disabled college students (Fichten, Amsel, Robillard, & Judd, in press).

College Interaction Self-Efficacy Scale (CISES)

This 47-item measure evaluates strength of self-efficacy expectations concerning interaction between same-sex college students. Respondents indicate whether they can comfortably perform a variety of interaction behaviors (e.g., ask for a favor, initiate a conversation). For each behavior subjects feel they can do, they indicate how confident they are of this (10 = very uncertain, 100 = certain). Strength of self-efficacy expectations is the sum of confidence ratings divided by 47. Psychometric data provided by Fichten, Bourdon, Amsel, and Fox (1987) indicate internal consistency coefficients which range from .94 to .99. When used to evaluate self-efficacy expectations concerning social contacts with able-bodied peers, scores on the CISES are significantly ($r = .61$) related to Moe and Zeiss' (1982) measure of self-efficacy expectations in social situations and to SAD scores ($r = -.59$). When self-efficacy expectations concerning interaction with disabled peers are evaluated, CISES scores have been shown to be significantly related to knowledge of appropriate behavior and to attitudes toward disabled persons. Also, respondents who have had prior contact with individuals who have disabilities score

² An example of an easy task is, "A student (in a wheelchair/who is shorter than you) has just asked you for help to (sharpen a pencil because they cannot reach the pencil sharpener on the wall/reach a library book located high on the shelves)." An example of a difficult task is, "You are sitting with some friends in the cafeteria. A student (in a wheelchair) whom you don't know well comes and joins the group. You are introduced and shortly thereafter everyone else leaves. You have 15 minutes before class."

higher on the measure than do respondents with no such prior experience.

Study 1

This study investigates all four questions posed. To explore Question A concerning easy and difficult tasks, differences in the number and types of thoughts that situationally high and low anxious people have concerning the same interaction tasks are evaluated. The issue of the reactivity of thought listing (Question B) is explored by examining ratings of expected comfort during interaction before and after thought listing. Whether thought listing and inventory measurement provide comparable information (Question C) is evaluated by investigating the degree of correspondence between scores on the two types of measures. Also, a preliminary exploration of the effects of sequences (Question D) is conducted by (a) determining the relative frequencies of single thoughts of different valence and of various sequences of positive and negative thoughts (i.e., + +, - -, + -, - +) (b) establishing whether single and multiple thoughts of a particular valence may be legitimately combined, and (c) evaluating the impact of different ending sequences of thoughts.

Subjects and Procedure

Subjects were 217 volunteer nondisabled college students, 107 males and 110 females. Mean age was 18. Randomly assigned to the two experimental conditions, subjects completed measures with reference to two hypothetical interactions with a same-sex able-bodied or wheelchair user student. Subjects completed the CISST and the Cognitive Role Taking Tasks four weeks apart (order was counterbalanced). The same two interaction tasks were specified on both measures.

Thoughts on the Cognitive Role Taking Tasks were coded in accordance with a slightly modified version of Fichten and Martos' (1986) coding manual into 1 neutral and 6 valenced categories: Positive or Negative and either Self-Referent, Other-Referent, or Situation-Referent. Thoughts were rated by coders trained to a 71% thought-by-thought interrater agreement criterion (O'Leary & Kent, 1973); the Kappa coefficient (Cohen, 1960) was .804. Interrater agreements on seven spot-checks of reliability ranged from 77% to 89%, with a mean of 84% (Kappa coefficient = .854).

Results

Question A. In each experimental condition, subjects were divided into Comfortable (low situationally anxious) and Uncomfortable (high situationally anxious) based on a mean split of their Cognitive Role Taking

Tasks Comfort Interacting scores. To evaluate differences in the thoughts of subjects Comfortable or Uncomfortable in the situation, 2-way mixed design ANOVA comparisons [Comfort (High/Low) \times Valence (Positive/Negative)] were made on Self-Referent and on Other-Referent thoughts.

In the Able-Bodied condition, the main effect of Comfort was not significant. However, results show more Self-Referent and Other-Referent Positive than Negative thoughts, $F(1, 84) = 34.50, p < .001$; $F(1, 84) = 91.71, p < .001$, respectively. Significant interactions of Valence \times Comfort were found for both Self-Referent and Other-Referent thoughts, $F(1, 84) = 8.48, p < .01$; $F(1, 84) = 7.13, p < .01$. Results in the Disabled condition reveal the identical pattern of significant differences. This is of particular interest since dispositional social anxiety (SAD score) and situational anxiety (Comfort Interacting score) are *not* significantly correlated in the Disabled condition (Fichten & Amsel, 1988). The significant interaction of Comfort \times Valence can best be seen in Figure 1a; this shows relatively more Positive and fewer Negative thoughts by Comfortable than by Uncomfortable subjects.

To ascertain whether Comfortable and Uncomfortable subjects differed in terms of Schwartz's (1986) states of mind model, SOM ratios [Positive/(Positive + Negative) thoughts] were calculated. These indicate that situationally low anxious subjects manifested a "positive dialogue" (SOM = .57) while high anxious subjects manifested an "internal dialogue of conflict" (SOM = .52).

Question B. Of relevance to the question concerning reactivity of thought listing are scores on the Comfort Interacting Scale which is presented before rating thoughts on the CISST and after thought listing on the Cognitive Role Taking Tasks.

Results indicate no significant differences between Comfort Interacting ratings made before and after thought listing in either the Able-Bodied or in the Disabled conditions (Able-Bodied before: $M = 3.91, SD = 1.02$; after: $M = 3.96, SD = .96$; Disabled before: $M = 3.81, SD = .95$; after $M = 3.73, SD = 1.11$), suggesting that thought listing is not reactive in this context.

Question C. Raw scores on the CISST and Cognitive Role Taking Tasks (see Table 1) could not be compared directly because there were large differences in means and standard deviations. Therefore, standard (z) score transformations were made on values on each scale and 2-way within groups ANOVA comparisons were made separately in the Able-Bodied and in the Disabled conditions on z scores.

Results in the Able-Bodied condition show more Self-Referent and fewer Other-Referent thoughts on the Cognitive Role Taking Tasks than on the CISST, $F(1, 56) = 13.51, p < .05$; $F(1, 56) = 48.85, p < .001$, respectively. On both the Self-Referent and Other-Referent comparisons more Positive than Negative thoughts were indicated, $F(1, 56) = 26.02, p < .001$; $F(1, 56) = 35.17, p < .001$, although, as the Measures \times Valence interactions and post hoc comparisons show (Self-Referent thoughts: interaction = not significant; Other-Referent thoughts: interaction, $F(1, 56)$

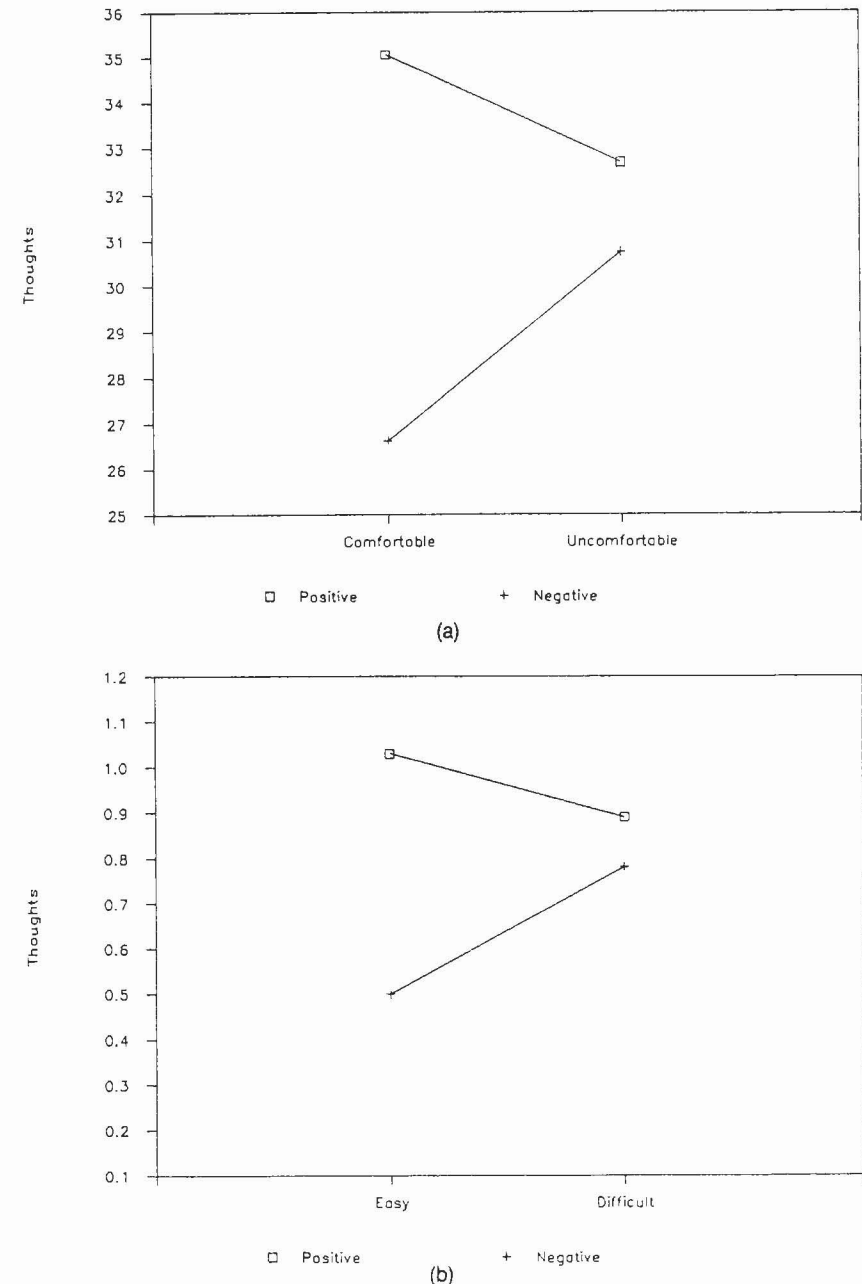


FIG. 1. Interactions of Valence by (a) Situational Anxiety, (b) Task Difficulty, and (c) Dispositional Anxiety. Scores represent the mean frequencies of Positive and Negative Thoughts on the CISST [(a) and (c)] and on the Cognitive Role Taking Tasks (b).

quencies of different sequences of thoughts, the number of situation tasks that had single thoughts (+ and -), consistent sequences (exclusively positive and exclusively negative), one valence switch sequences (+ to - and - to +), and two or more valence switches was determined for each subject. Proportions of different sequences in the Able-Bodied and Disabled experimental conditions, presented in Table 2, suggest that (a) there are more thoughts in the Disabled than in the Able-Bodied experimental condition (i.e., fewer single thoughts), (b) there are relatively more single positive and consistent positive thoughts and fewer single negative and consistent negative ones in the Able-Bodied than in the Disabled condition, and (c) that sequences that start negatively and end positively (- +) are quite common while the opposite sequence (+ -) is relatively rare.

Comfort Interacting scores associated with different sequences were examined to determine whether single and consistent thought scores may be legitimately combined. Because of low single score frequencies, no inferential statistics were used. The means in Table 2 suggest that consistent positive (+ +) and single positive (+) sequences are associated with the highest Comfort Interacting scores, while consistent negative (- -) and single negative (-) sequences are associated with the lowest scores; therefore, single and multiple thoughts of the same valence may legitimately be combined. Mixed sequences, regardless of direction (+ - or - +) or number of switches were associated with intermediate Comfort Interacting scores.

But maybe it is not the nature of *all* of one's thoughts about a situation

TABLE 2
RELATIVE FREQUENCY OF SEQUENCES, ENDING SEQUENCES AND
COMFORT INTERACTING

Experimental Condition	Sequences						2 or More Switches
	Single		Consistent		1 Switch		
	+	-	++	--	+-	-+	
Proportion of Different Sequences (%)							
Disabled	6	5	17	19	.12	29	12
Able-Bodied	17	7	25	12	4	23	12
Sequences and Comfort Interacting ^a							
Disabled	4.11	3.70	4.40	3.17	3.71	3.95	3.78
Able-Bodied	4.19	3.60	4.15	3.24	4.00	3.89	3.72
Ending Sequences and Comfort Interacting ^a							
Disabled	N/A	N/A	4.23	3.30	3.53	3.67	N/A
Able-Bodied	N/A	N/A	4.03	3.20	4.00	3.95	N/A

^a The higher the score, the more comfortable. Maximum score = 6.

that best predicts how comfortable one is in that situation. Perhaps it is only the last two thoughts (ending sequence) that one has about a situation that are particularly important. To explore this possibility, Comfort Interacting scores for sequences ending in + +, - -, + -, and - + thoughts were examined. Again, the means in Table 2 suggest that the exclusively positive sequence is associated with the highest and the exclusively negative sequence with the lowest Comfort Interacting scores; mixed sequences, regardless of direction, produce intermediate values.

Study 2

This study explores differences in the number and types of thoughts (positive/negative) that people list concerning easy and difficult interaction tasks (Question A) and explores how different sequences of positive and negative thoughts (+ +, - -, + -, - +) are related to comfort during interaction (Question D).

Subjects and Procedure

Subjects were 115 volunteer able-bodied college students, 50 males and 65 females. Average age was 18. Randomly assigned to one of the two experimental conditions, subjects listed their thoughts concerning 11 interaction situations on the Cognitive Role Taking Tasks with reference to hypothetical interaction with a same-sex able-bodied or wheelchair-user student.

Thoughts were coded in accordance with Fichten and Martos' (1986) Cognition Coding Manual into 1 neutral and 6 valenced categories: Positive or Negative and either Self-Referent, Other-Referent, or Situation-Referent. Thoughts on 20 protocols were coded by two trained coders; during this time an average of 83% thought-by-thought interrater agreement (Bell-Dolan, 1985; O'Leary & Kent, 1973) was attained. Reliability for each code was also evaluated: interrater agreements ranged from 66% to 92%. All remaining protocols were coded by one of the coders; an additional 10% were coded by the second coder on a random spot-check basis. None of these fell below the predetermined 70% interrater agreement criterion. Since interrater agreements were generally high, data from one coder were used in the analyses.

RESULTS

Question A. To examine whether Easy and Difficult tasks generate different numbers of thoughts, situation items on the Cognitive Role Taking Tasks were divided into five easy and five difficult tasks (see Footnote 2); this determination was based on ratings made by a different sample of 57 college students (23 males and 34 females who completed the Comfort Interacting Scales of the Cognitive Role Taking Tasks measure without

listing their thoughts. Comfort Interacting scores for each situation item were summed separately on the able-bodied and disabled versions. The 11 items were rank ordered for each experimental condition and the 5 items above and below the median were designated easy and difficult, respectively.

The effects of task difficulty on the frequency of Positive and Negative thoughts were examined in a 3-way mixed design ANOVA comparison (Experimental Condition \times Task Difficulty \times Valence). Results show that more Positive thoughts than Negative were listed, $F(1, 96) = 19.33$, $p < .001$, and that more thoughts were indicated on Difficult than on Easy tasks, $F(1, 96) = 9.47$, $p < .01$. The significant interaction of Valence \times Task, $F(1, 96) = 32.50$, $p < .001$, best seen in Figure 1b, shows relatively more Positive and fewer Negative thoughts on Easy than on Difficult tasks. The Tukey hsd test shows that significantly more Positive than Negative thoughts were generated on Easy Tasks (but not on Difficult Tasks) and that more Negative thoughts were listed on Difficult than on Easy Tasks ($p < .01$ for all comparisons).

As in Study 1, Schwartz's (1986) SOM ratios were calculated to further explore differences between thoughts concerning Easy and Difficult tasks. Scores indicate that Easy Tasks are characterized by a "positive dialogue" (SOM = .67) while Difficult Tasks show an "internal dialogue of conflict" (SOM = .53).

Question D. To explore the effect of sequences, subjects' Comfort Interacting scores were used on an item-by-item basis, and thoughts listed concerning each hypothetical interaction task were examined to determine the sequence of thoughts. The number of interaction tasks that had consistent (+ + and - -) and one valence switch (+ - and - +) sequences was determined for each subject (single thoughts were grouped with consistent sequences). To evaluate the effect of the various sequences, mean Comfort Interacting scores for each sequence were examined in a 2-way ANOVA comparison (Sequence \times Experimental Condition). Results show a significant Sequence main effect, $F(3, 85) = 67.54$, $p < .001$; the means, presented in Table 3, and Tukey hsd post hoc tests show that the + + sequence results in higher Comfort Interacting scores than any of the other sequences ($p < .05$), which do not differ significantly from each other.

The relationship between the frequency of each sequence and global Comfort Interacting (mean of all 11 Comfort Interacting scores) for each subject was also evaluated. Pearson product-moment correlation coefficients in Table 4 show that the frequency of exclusively positive sequences is significantly related to global Comfort Interacting while the frequencies of all sequences that have at least one negative thought are significantly related to lack of comfort.

Study 3

The objective was to explore further the possibility that thought listing is reactive (Question B) by examining the effects of thought listing con-

TABLE 3
SEQUENCES AND COMFORT INTERACTING

Experimental Condition	Sequences			
	++	--	+-	-+
Disabled	4.01	1.56	1.39	1.26
Able-Bodied	4.52	1.99	1.76	1.56

Note. Values are means. The higher the score the more comfortable. Maximum score = 6.

cerning hypothetical interaction with specific groups of people on subsequent comfort with members of the group in question and with members of a different group. The effects of thought listing on self-efficacy expectations and trait attributions were also investigated. In addition, the effects of thought listing concerning easy and difficult tasks, which have been shown in Study 1 to generate different ratios of positive and negative thoughts, were evaluated.

Subjects and Procedure

Subjects were 169 volunteer able-bodied college students, 65 males and 104 females. Mean age was 19 years. Subjects were randomly assigned to six experimental conditions. In four of these (Thought Listing) subjects listed their thoughts concerning 11 hypothetical interactions with either an able-bodied or a disabled same-sex college student on the Cognitive Role Taking Tasks measure. Half of the subjects in the disabled and in the able-bodied experimental conditions then completed the General Information Form, the College Interaction Self-Efficacy Scale (CISES), and the College Student Trait Checklists regarding same-sex able-bodied students while the rest completed these concerning disabled students.

TABLE 4
RELATIONSHIP BETWEEN FREQUENCY OF DIFFERENT SEQUENCES AND GLOBAL COMFORT INTERACTING

Experimental Condition	Sequences			
	++	--	+-	-+
Disabled Condition	.328*	-.291*	-.758***	-.424**
Able-Bodied Condition	.352*	-.709***	-.371**	-.604***
Both Conditions Combined	.337***	-.476***	-.637***	-.536***

Note. Pearson r values. Sample size in the disabled condition is 51; in the able-bodied condition it is 47.

* $p < .05$

** $p < .01$

*** $p < .001$

Thus, half of these subjects completed *all* measures concerning interaction with either an able-bodied or a wheelchair-user college student, while the other half listed thoughts concerning one group but completed all other measures concerning the other group. In the remaining two experimental conditions (No Thought Listing), subjects were presented with the 11 items of the Cognitive Role Taking Tasks (either the disabled or the able-bodied version), but were not asked to list their thoughts; they merely completed the Comfort Interacting Scales and the General Information Form.

Results

Question B. In a replication of Study 1, a 2-way [Thought Listing (Yes/No) \times Experimental Condition] between-groups ANOVA comparison was carried out on Comfort Interacting scores. Results showed no significant main effect or interaction involving the Thought Listing variable. To examine whether thought listing concerning a particular group of students had any effect on ratings of Ease with such students, a 3-way mixed design ANOVA comparison was made. Again no significant main effect or interaction involving the Thought Listing variable was found.

Thought listing concerning interaction could have differential effects on other variables, depending on the group of people with whom the subject is interacting. Therefore, the effects of listing thoughts concerning interaction with members of different groups on stereotyping and self-efficacy beliefs were assessed in 2-way between-groups ANOVA comparisons (Experimental Condition \times Stimulus Group). Results show that thought listing concerning either group had no significant effects on stereotyping of either disabled or able-bodied people. Results on self-efficacy beliefs showed a significant interaction, $F(1, 91) = 5.73, p < .05$. The Tukey hsd test shows that while subjects who listed their thoughts concerning interaction with able-bodied individuals had lower self-efficacy expectations concerning future interaction with able-bodied students than did subjects who listed their thoughts concerning disabled people ($p < .05$), none of the other comparisons were significant.

Because perceived task difficulty could interact with thought listing, the effects of listing thoughts on the five Easy and five Difficult tasks of the Cognitive Role Taking Tasks measure were evaluated in a 3-way ANOVA comparison (Task \times Thought Listing \times Experimental Condition). While it was expected that thought listing concerning Difficult tasks would result in Lower Comfort Interacting scores than not listing one's thoughts and that thought listing concerning Easy tasks would result in higher scores, no significant interaction involving the Thought Listing and Task Difficulty variables was found.

Study 4

The objective of this study was to provide answers to Question A by determining (a) whether there are differences in the number and types of

thoughts (positive/negative) that high and low dispositionally socially anxious people have concerning the same interaction task, and (b) whether high and low dispositionally anxious subjects experience different levels of comfort during interaction.

Subjects and Procedure

Subjects were 55 first- and second-year volunteer able-bodied college students, 32 males and 23 females. Mean age was 18 years. Subjects were randomly assigned to one of the two experimental conditions: hypothetical interaction with a same-sex able-bodied or wheelchair-user college student. All completed the SAD and indicated their thoughts concerning a single interaction situation on the CISST. Subjects were divided into high and low anxious groups based on their SAD score; Watson and Friend's (1969) median was used (i.e., high = 7 or greater, low = less than 7).

Results

Question A. To examine thoughts of High and Low Anxious subjects, 3-way mixed design (Anxiety \times Experimental Condition \times Valence) ANOVA comparisons were made on Self-Referent and on Other-Referent thoughts. On Self-Referent thoughts, results show that while there was no difference between High and Low Anxious subjects, there were significantly more Positive than Negative thoughts indicated $F(1, 51) = 26.79, p < .001$. In addition, the significant Anxiety \times Valence interaction, $F(1, 51) = 6.45, p < .05$, best seen in Figure 1c, shows relatively more Positive and fewer Negative thoughts by Low Anxious than by High Anxious subjects. The Tukey hsd test shows more Positive than Negative thoughts in the Low Anxious group only ($p < .01$). On Other-Referent thoughts the pattern and direction of the findings was the same, but the Social Anxiety \times Valence interaction did not reach significance.

Schwartz's (1986) SOM ratios were calculated to further explore differences between high and low dispositionally anxious individuals. Results indicate that Low Anxious subjects' thoughts are characterized by a "positive dialogue" (SOM = .57) while those of High Anxious subjects reflect an "internal dialogue of conflict" (SOM = .53).

Results on Comfort Interacting scores show that in the Able-Bodied condition High Anxious subjects had lower scores ($M = 3.29$) than Low Anxious subjects ($M = 4.43$), $t(26) = 3.01, p < .01$. In the Disabled condition, however, the comparison was not significant, indicating that dispositional social anxiety, as measured by the SAD, did not influence situational anxiety when an atypical interaction of socializing with a disabled student was considered.

DISCUSSION

Perceived Task Difficulty (Question A)

Three studies investigated the effects of task difficulty on thoughts. Results show that task difficulty (Study 2), dispositional social anxiety (Study 4), and situational anxiety, when manipulated and, thus, unrelated to dispositional anxiety (Study 1), all produce similar results. The findings suggest that it is perceived task difficulty that influences the nature of thoughts. Generally, while no differences were found on the total number of positive and negative thoughts, tasks perceived to be easy resulted in relatively more positive and fewer negative thoughts than tasks perceived to be difficult. Also, in all three studies "easier" tasks produced "positive dialogue" SOM scores, while "difficult" ones resulted in an "internal dialogue of conflict."

Since perceptions of task difficulty were not directly evaluated, it is possible that what we have termed "perceived task difficulty" may reflect other task parameters. While we believe that perceived task difficulty provides a reasonable label for the construct, it is possible that other factors, such as the belief that one can successfully engage in the task (self-efficacy expectancies) or that effective performance will accomplish desired goals (outcome expectancies) are involved. Future research should focus on evaluation of specific task relevant factors that influence thoughts in interpersonal contexts.

Reactivity of Thought Listing (Question B)

Study 1 explored ratings of comfort in hypothetical interaction situations after listing thoughts and in the absence of doing so. Study 3 examined the consequences of thought listing concerning interaction with two different groups of individuals on ease, self-efficacy beliefs, comfort interacting, and stereotyping of both groups. This study also assessed the effects of thought listing concerning easy and difficult tasks. Despite repeated and complex attempts to demonstrate that the act of listing one's thoughts has consequences, no evidence for the reactivity of this procedure was found. Given the sample sizes, the probability of a Type II error varies between 15% and 30%. Thus, the present data cannot support thought listing as a reactive technique, at least where hypothetical interaction is concerned.

Comparability of Inventory and Thought Listing Data (Question C)

The results of Study 1 showed relatively few differences between the measures. The main difference found was that the inventory, relative to the thought listing measure, underestimated the frequency of self-referent thoughts and overestimated the frequency of other-referent ones, especially other-referent positive thoughts. In general, however, the overall

pattern of the findings was similar. Given the difficulties of coding open-ended thoughts and the problems obtaining a meaningful number of thoughts for data analyses, the inventory approach may be a viable means of evaluating thoughts and self-statements in many contexts. These include evaluations of self-referent thoughts in different populations and thoughts concerning tasks of differing levels of perceived difficulty.

It should be noted, however, that the relative frequencies of different types of thoughts are not equivalent across measures; people appear to indicate relatively more self-referent and fewer other-referent thoughts in the open-ended format; this is especially true of other-referent positive thoughts, where inventory SOM ratios consistently indicated a more positive state of mind than thought listing SOM ratios. Because other-referent thoughts can be particularly important when interactions with specific groups of individuals are considered (e.g., person with a disability, one's boss, a potential dating partner), the open-ended technique may be preferable in certain situations in order to obtain a better understanding of the structure of respondents' thoughts.

Sequences (Question D)

While it was expected that examination of the sequence of positive and negative thoughts would provide information additional to that furnished by frequency counts, results on sequences (Studies 1 and 2) show that only exclusively positive thoughts are related to comfortable interaction. All sequences involving a negative thought, regardless of order, appear to be equivalent and are related to lack of comfort. In addition, all aspects of the present results are consistent with findings obtained when using frequency counts (Fichten, 1986) and the results are consistent with those of Schwartz and Gottman (1976), who found that highly assertive subjects' thoughts were characterized by exclusively positive sequences ("unshaken confidence") while low assertive subjects were more likely to have exclusively negative ("unshaken doubt") or mixed (+ - "giving up" and - + "coping") sequences. Thus, the results suggest that frequency counts and the more laborious and difficult task of examining and analyzing sequences yield similar results and that it is not the pattern but the frequency of thoughts with different valences that is important for comfortable interaction.

CONCLUSIONS

Before concluding, it is necessary to comment on some of the methodological limitations of the present investigation. First, none of the studies evaluated thoughts about actual interaction. Rather, hypothetical interaction tasks were used. While data indicate that hypothetical and actual interactions result in similar thoughts and ratings (Zweig & Brown, 1985),

the analog nature of the present investigation must be taken into account nevertheless as it presents a major limitation to the generalizability of the findings. Indeed, we hope that the results point to areas where more ecologically valid research might focus. Second, the data were collected with a view to answering questions other than those posed earlier. This set limitations and sometimes complicated the experimental designs. However, just as the present investigation was prompted by concerns about the meaning of the results of the larger studies, it is because the findings of substantive investigations may be open to misinterpretation that answers to fundamental methodological questions must be found.

The original studies triggered four important methodological questions. The answer to the first question posed, "Do easy and difficult tasks elicit similar patterns of thoughts?" is "No." On difficult interaction tasks, people are likely to indicate relatively more negative and fewer positive thoughts than on easy tasks. While this finding is hardly surprising, the results of the three studies on task difficulty suggest that in evaluations of thoughts which individuals have, it is important that the perceived difficulty of the task be determined. Only once this is done can the relative importance of positive and negative thoughts for anxiety, cognitions, and performance be evaluated. The data also suggest that the key dependent variable may not be the absolute number of positive or negative thoughts; instead, as suggested by others, it may be the ratio of positive to negative thoughts that is important. Schwartz's (1986) state of mind (SOM) ratios appear to be particularly promising in this regard.

But perhaps the methodological implications noted above overshadow the most important aspect of the findings—the possibility that perceived task difficulty is the key mediating variable between cognitive, affective, and behavioral events. Should this be the case, then self-statement modification modules of cognitive behavioral interventions may need to focus on reevaluations of the perceived difficulty of various tasks (e.g., public speaking, asking someone for a date, going to a shopping center), rather than on altering the base rates of clients' positive and negative thoughts. Of course, this is an empirical question and deserves further attention in the cognitive therapy literature.

The second question asked was, "Is thought listing reactive?" Two studies which included 341 subjects, three independent variables and five dependent variables failed to find *any* support for the hypothesis that thought listing is reactive in this context. While negative results can never prove conclusively that thought listing is not a reactive process, the findings do suggest that the act of assessing thoughts does not have dramatic effects.

It has been suggested that asking clients to self-monitor their thoughts, especially their negative ones, may result in deterioration. The findings of the present investigation showed no evidence for the reactivity hypothesis, even when difficult tasks, which were shown to generate many negative thoughts, were considered. While the conclusions must, at this point, be tentative, the results suggest that self-monitoring of either posi-

tive or negative thoughts is not likely to have consequences for the client. Furthermore, the results suggest that merely asking clients to pay attention to their positive thoughts, without providing them with directions concerning the use of positive thoughts as a coping strategy and without providing them with new means of acquiring additional positive thoughts and rebutting negative ones is not likely to result in therapeutic change.

"Do thought listing and inventory approaches provide comparable data?" was the third question addressed in this study. The answer is a qualified "Yes." Results show that, generally, similar patterns of findings are obtained when using thought listing and inventory measurement, and that the findings of studies using different methodologies for the evaluation of thoughts and self-statements may be compared.

There are two qualifications to this conclusion, however. First, the present investigation explored both the valence and the focus of attention of thoughts. Findings on valence were similar using the two types of measures. On focus of attention, however, thought listing, compared to inventory measurement, resulted in relatively more self-referent and fewer other-referent thoughts. It seems as though people are more likely to think about themselves and their own reactions and feelings than about the other person involved in interaction. When given an inventory containing thoughts about the other person, people are likely to indicate that they have many more such thoughts than appears to be the case. This can obscure actual differences between respondents as well as differences in the demand characteristics of different interaction contexts.

The second qualification is methodological. Because thought listing typically produces low frequencies of valenced thoughts, correlations between inventory scores and thought listing frequencies are very conservative. Therefore, the methodology used to determine similarity between the two types of measures has differed: some studies compared different groups' raw scores on each type of measure (e.g., Segal & Marshall, 1985), others have correlated the percentages of positive, negative, and neutral thoughts with inventory scores (e.g., Dodge, Heimberg, Hope, & Becker, 1986), while some have used both of these techniques (e.g., Myszka, Galassi, & Ware, 1987). In the present investigation, yet a third method, mean comparison on *z* score transformed data was used. Given the confusion and the statistical difficulties of determining the relationship between variables, it is hardly surprising that different investigations have come to dramatically different conclusions about the comparability of inventory and thought listing results. Nevertheless, the findings have shown that results on negative thought subscales of self-statement inventories are generally similar to results on negative thought frequencies on open-ended thought listing protocols (Dodge et al., 1987; Myszka et al., 1986; Segal & Marshall, 1985). With the exception of the present investigation and that of Arnkoff and Smith (in press), however, this has not been the case for positive thoughts.

In the present study, the inventory measure used was developed in an

empirical fashion; inventory items were based on thoughts listed in an open ended manner. Therefore, the conclusions of the present study may apply only to those evaluations where the types of self-statements specified on the inventory closely resemble open ended thought listings. When this is the case, however, economy and ease considerations as well as generally better construct validity (cf. Clark, 1988) seem to justify the use of an inventory measure.

One of the reasons for using thought listing rather than inventory measurement concerns the possibility that analysis of thought sequences may provide unique information. The final question of this investigation, "How much more information is obtained from an examination of sequences than from frequency counts?" addressed this issue. The findings suggest that the answer is, "Very little." In the present investigation, examination of thought sequences provided virtually no information that could not be obtained from counting frequencies. Of course, this may have been due to the nature of the hypothetical interaction tasks or the way in which sequences were examined. Perhaps, as Arnkoff et al. (1984) suggested, sequences should be evaluated only when a relatively large number of methodological requirements are met. Nevertheless, the present findings suggest that it is not always necessary to resort to complex examinations of sequences.

As the field of cognitive assessment matures, more definitive answers to the questions posed in this investigation will be provided. In the interim, the results of methodological inquiries, even when these are based on secondary analyses of data, will not only clarify practical assessment issues but may also shed light on the nature and function of different types and patterns of thoughts.

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