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Recommendations for Self-Statement Inventories: Use of Valence, End Points, Frequency, and Relative Frequency

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Methodological confounds and inconsistencies in evaluations of self-statements hamper exploration of conceptual issues in cognitive assessment. Although many measures incorporate both positives and negatives, there is confusion in reporting; raw frequencies, difference scores, problematic ratios (positive/negative, negative/positive), and States-of-Mind (SOM) ratios are all used. Here, we examine methodological issues in evaluations of valenced self-statements in two studies and formulate empirically based guidelines for common usage. Our findings clearly indicate that (a) valenced thought frequencies and SOM ratios yield different information, (b) in SOM ratio calculations, inventory scale end points should always start at 0, (c) if scales do not start at 0, scores can be converted mathematically, and (d) the higher the SOM score, the better the individual's adaptation on various criterion measures; this includes even extremely positive SOMs (0.91–1). Thus, SOMs are monotonic and can be used in statistical analyses without transformation.

KEY WORDS: self-statements; thoughts; SOM ratios; states of mind; scale end points; measurement.

As the field of cognitive assessment has matured, investigators have developed a variety of self-statement measures which assess thought content in numerous domains (e.g., heterosocial interaction, depression, public speaking). Although recent reviews (e.g., Glass & Arnkoff, 1994; Heimberg, 1994) suggested that many measures show good validity, important questions remain concerning the relative importance of the presence and absence of positive and negative thoughts in mediating adaptive behavior, successful performance, depression, and social anxiety.

A host of troublesome methodological issues relate to the evaluation of positive and negative thoughts. Although many—perhaps most—self-statement measures incorporate both positive and negative thoughts, there is no uniformity in reporting

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valenced frequency scores. Computation of a difference score between positive and negative thoughts results in the loss of important valenced frequency data, as does the use of ratios alone. A variety of ratios such as positive/negative and negative/positive have been clearly demonstrated to have computationally problematic distributions (cf. Amsel & Fichten, 1990). Lack of consistency has led to conceptual and methodological confusion, the loss of important information that researchers have obtained but failed to report, and results that cannot be compared across studies. The goal of this paper is to examine methodological aspects in the assessment of positive and negative self-statements and to formulate empirically based guidelines for common usage.

Positive and Negative Thought Frequencies

Generally, studies have shown that positive and negative thoughts are independent dimensions (e.g., Amsel & Fichten, 1988; Glass & Arnkoff, 1994; Heimberg, Keller, & Peca-Baker, 1986), with negative thoughts often showing a closer relationship to poor functioning than positive thoughts (e.g., Dodge, Hope, Heimberg, & Becker, 1988). The prevalence of this latter type of finding has prompted Kendall and his colleagues (cf. Kendall, 1984) to discuss the "power of non-negative thinking." Nevertheless, an important and substantial minority of studies have shown that positive thoughts are particularly influential (e.g., Fichten, 1986, Glass & Furlong, 1990; Heimberg, Acerra, & Holstein, 1985; Ingram, Kendall, Siegle, Guarino, & McLaughlin, 1995).

The presence and absence of positive and negative thoughts may serve different functions in mediating affect and behavior (e.g., Bruch, Mattia, Heimberg, & Holt, 1993; Jolly & Dykman, 1994; Scheier & Carver, 1992). That positives and negatives do not constitute a bipolar dimension has been shown in a variety of other areas as well, including the evaluation of attitudes (Cacioppo & Bernston, 1994), affect (Watson, Clark, McIntyre, & Hamaker, 1992), world view (Chang, D'Zurilla, & Maydeu-Olivares, 1994; Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992), neurological processing (Vollhardt, 1991), and behavior (Markman, 1991). Available data suggest that relatively frequent negative and infrequent positive thoughts and affect are both pathological, although each may be associated with different aspects of adjustment (e.g., frequent negatives with both anxiety and depression, infrequent positives with depression only) (Burgess & Haaga, 1994; L.A. Clark & Watson, 1991; Ingram, Slater, Atkinson, & Scott, 1990). Although the typical findings for "normals" in numerous studies support the view that approximately two thirds of valenced thoughts are positive and only one third are negative (Schwartz & Garamoni, 1986), the role of frequent positives and infrequent negatives is not yet well understood.

Ratios

The importance of relative frequencies suggests that adaptive thinking can be best characterized not by the raw frequencies of positive or negative thoughts (or

their difference), but by the balance between them. In keeping with this view, a number of researchers have suggested using ratios (e.g., Amsel & Fichten, 1988; Blankstein, Flett, Boase, & Toner, 1990; Heimberg, Bruch, Hope, & Dombeck, 1990). In particular, Schwartz and his colleagues (Schwartz, 1986; Schwartz & Garamoni, 1986, 1989, Schwartz, Reynolds, Thase, Frank, & Fasiczka, 1996), have been most influential in proposing both a theoretical position as well as a computational technique.

Ratios may not only constitute more meaningful units of analysis than frequency scores but also simplify statistical operations. Because frequencies of positive and negative thoughts are generally independent of one another and because experimental/clinical outcomes are often correlated with *either* positive or negative frequencies, it is usually necessary to use both in statistical analyses. For instance, in an analysis of variance, this could be done multivariately (MANOVA), with positives and negatives representing separate dependent variables, or univariately by contrasting positives versus negatives (i.e., using valence as an additional factor). Either way, the experimental design of the analysis becomes more complex where valenced scores are used.

A further advantage to the use of ratios is that they avoid the distributional problem of positive skew that is often present with frequency counts, which have a lower bound of zero, but no upper bound. Certainly, this is the case for thought listing, where low frequencies are very common and high frequencies occur only occasionally (cf. Arnkoff & Glass, 1989; Glass & Arnkoff, 1994). Since univariate and, particularly, multivariate ANOVAs show increased rates of Type I error with departures from normality, investigators who use frequencies encounter the further complication of having to perform data transformations.

That ratio scores contain information related to both positive and negative frequencies is logical and has been confirmed empirically (e.g., McDermut & Haaga, 1994). Use of such a composite can simplify complex ANOVA designs, eliminate the need to use both positive and negative frequencies in regression analysis and correlation, and standardize individual differences in total thought frequencies such as those which occur when production methods, such as thought listings, are used. Thus, use of ratios allows comparison of different evaluation methods, such as endorsement and open-ended measures of thoughts (cf. Arnkoff & Glass, 1989; D.A. Clark, 1988; Fichten, Amsel, & Robillard, 1988).

What Ratio Should Be Used?

The cognitive assessment literature shows that a variety of different ratios have been used (cf. Amsel & Fichten, 1990 for an in-depth examination). One common type is of the form Positive/Negative or Negative/Positive (e.g., Ayres, 1988). Others are Positive/(Positive + Negative) and Negative/(Positive + Negative); where the denominator sometimes also contains neutral thoughts.

Mathematically, it is easily shown that the Positive/Negative sort of ratio is a poor choice. It results in undefined values whenever the denominator is zero. It

has no upper bound, so it presents no advantage over the raw scores, as data transformations must still be performed.

Results are considerably less problematic when the Positive/(Positive + Negative) [or Negative/(Positive + Negative)] type ratio is used. First, the ratio is never undefined, because the denominator is never zero, except in the total absence of response. Also, the ratio has a lower bound of zero and an upper bound of one, eliminating the need for data transformations to correct for extreme skew.

The States-of-Mind Ratio

The States-of-Mind (SOM) ratio proposed by Schwartz and Garamoni (1986, 1989) is of this type [Positive/(Positive + Negative)], defined between the values of 0 and 1. In a series of seminal position papers, Schwartz and his colleagues proposed that different ratios characterize distinct SOMs which reflect functional and dysfunctional thinking. In their original formulation, they proposed that, optimally, 62% of all valenced thoughts are positive, a condition they called "Positive Dialogue." In individuals who are distressed, 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"). When thinking is very positive, the ratio of positive to negative thoughts increases beyond the 62:38 ratio ["Positive Monologue" (PM)]; both the original Schwartz and Garamoni model as well as recent modifications (Schwartz, 1997) propose that extremely positive category SOMs are also maladaptive because they represent unrealistically optimistic thinking.

Of the various ratios available, the SOM ratio has the greatest potential for widespread use. An impressive body of evidence demonstrates that SOM ratios with lower values do, indeed, reflect less functional thinking about events (e.g., coping with a stressor, anxiety, depression) than ratios with higher values (e.g., Arnkoff, Glass, & Robinson, 1992; Bruch, Hamer, & Kaflowitz-Linder, 1992; Burgess & Haaga, 1994). Moreover, SOMs have been shown to be sensitive to treatment effects (cf. Heimberg, 1994; Garamoni, Reynolds, Thase, Frank, & Fasiczka, 1992), and it has been shown in the case of thought listings that the SOM ratio was at least as good as or better than the ratio Negative/(Negative + Positive + Neutral) in predicting criterion variables (Bruch, 1997; Bruch, Heimberg, & Hope, 1991; Heimberg et al., 1990). Indeed, neutral thoughts in the internal dialogue appear to serve little function (e.g., Glass et al., 1995; Heimberg et al., 1990). It has also been demonstrated that SOM ratios do not generally require transformation (Amsel & Fichten, 1990). Moreover, use of SOM set points for functional and dysfunctional thinking results in more consistency of interpretation as it allows investigators to go beyond merely noting changes in positive and in negative thoughts following an intervention.

Issues in Using State-of-Mind Ratios

In spite of the favorable characteristics of SOM ratios, there are difficulties associated with their use in cognitive assessment.

Different Measurement Techniques Yield Different SOMs

Thought listing and inventory measures sometimes yield different mean SOM scores and may result in SOMs which place the same individual into different SOM categories (e.g., Fichten, et al., 1988; Heimberg et al., 1990; Nash, 1993).

Low Frequencies and the Problem of Zeroes Which Need to be Corrected

A problem common to production methods such as thought listing is low frequency (cf. Arnkoff & Glass, 1989; Glass & Arnkoff, 1994), including frequencies of zero for either positive or negative thoughts. For example, if the respondent has 0 positive thoughts, the SOM ratio will be 0, regardless of the number of negatives; similarly, if a respondent has 0 negative thoughts, the SOM ratio will always equal 1. Therefore, there is no distinction between a person who lists 0 positive and 1 negative thought and a person who lists 0 positive and 10 negative thoughts, although the clinical picture may differ considerably. As we demonstrated elsewhere (Amsel & Fichten, 1990), the best solution for this problem is the simple expedient of substituting + 1 in cases where either the number of positive *or* the number of negative thoughts is 0. It should be noted, however, that the SOM will approach but never reach the limits of 0 or 1 with this correction.

Inventory Measure Scale end Points Influence SOMs

SOM ratios are affected by the scale end points used on endorsement measures, so that the ratio can attain its theoretical maximum of 1 and its theoretical minimum of 0 *only* if the scale end point begins with 0. This is independent of the number of items in the scale or the anchor word associated with the value of zero, which may be *never*, *hardly ever*, *very infrequently*, and so forth. Many—maybe most—self-statement inventories use a 1–5 scale. This constrains the maximum and minimum SOM values to .83 and .17, respectively, thereby precluding membership in various SOM categories. A cautionary note about using 1–5 scale end points appeared in Schwartz and Garamoni's (1989) paper—a warning that was largely ignored.

It is clear, mathematically, that the lower bound of a scale will influence the range of SOM ratios. One could predict that transforming 1–5 end points to 0–4 would exert the greatest influence on SOMs which fall in the more extreme categories—an outcome similar to arcsine or probit transformations—and that measures of variation would increase, since the purpose of the transformation is to extend the obtainable limits of SOM ratios. However, preliminary data indicated that the increase in variance due to such transformations may be considerably greater than one would expect (Amsel, Wright, & Fichten, 1992). To help formulate a recommendation for widespread usage, in the present investigation we evaluated the impact of scale end points on self-statement inventory scores.

Psychological Impact of Zeroes

Scale end points (0–4 vs. 1–5)may have psychological as well as mathematical consequences. Zero is a number both qualitatively and quantitatively different from all others. People confronted with a scale value of 0 beside the anchor words "would hardly ever have the thought" may answer differently from those faced with a scale value of 1. In the investigation of different scale end points, we explored this possibility as well.

Is the Relationship Between SOMs and Adaptation Curvilinear and Are Extremely Positive States of Mind Dysfunctional?

The SOM model states that both negative as well as "overly" positive states of mind (those SOMs in the PM category are maladaptive). Thus, the predicted relationship between adaptive thinking and SOM scores is not linear. If the relationship between SOMs and adaptation were to be curvilinear, this would pose difficulties for statistical analyses such as correlation and regression.

The evidence generally supports the prediction about negative states of mind (cf. Schwartz & Garamoni, 1989). Even though the model proposes that extremely positive SOMs are maladaptive because they represent unrealistically optimistic thinking, numerous investigators have failed to support this assumption (e.g., Bruch, 1997; Haaga, Davison, McDermut, Hillis, & Twomey, 1993; Schwartz & Michelson, 1987).

Schwartz (personal communication) questioned whether the use of scale end points of 1–5 might have influenced findings concerning extremely positive states of mind by *preventing* the SOM from reaching its maximum value. It seemed possible that 1–5 end points could lower some of the supposedly dysfunctional PM scores into the Positive Dialogue (PD) category and, thereby, obscure differences between these two categories. Therefore, in the present investigation we examined criterion measure scores of subjects in each of the SOM internal dialogue categories when scale end points were constrained (i.e., 1–5) as well as when they could reach the theoretical upper and lower limits (i.e., 0–4).

Recently, Schwartz (1997) revised the SOM model, adding categories and raising the cut points for "excessively" positive states of mind (PM) from .69–1 to .91–1. It is evident that end points of 1–5, which result in a maximum SOM score of .83, preclude any possibility of membership in this new, more extreme PM category. Use of end points of 0–4 allowed us to test the hypothesis that extremely positive SOMs are dysfunctional. Of course, these analyses also evaluate the linearity of SOM scores.

Present Investigation

In spite of the extensive use of SOM ratios, no empirical data yet exist to document the influence of scale end points on either SOM internal dialogue cate-

gory membership or on the properties of SOMs, such as measures of central tendency and variance. Therefore, in the present investigation we explored the impact of 0–4 and 1–5 as end points for self-statement measures. The goal was to answer the following questions: (a) How are frequency scores and SOM ratios affected by inventory scale end points? (b) Is administering a measure with a particular set of end points equivalent to converting mathematically to these values? (c) Are extremely positive states of mind dysfunctional? and (d) Which scale end points—0–4 or 1–5—provide more clinically informative SOM scores? Study 1 is based on college students' self-statements about hypothetical interaction with another college student while Study 2 deals with self-statements of older adults when they are experiencing trouble falling asleep.

STUDY 1

Study 1 constituted a preliminary exploration of the impact of scale end points on SOM ratios. Here, SOM ratios based on college students' ratings about hypothetical interactions with another college student were compared. Some of the subjects were administered the self-statement measure with end points of 1–5 (Group 1) while others were administered the same measure, with the same anchor words, but with end points of 0–4 (Group 2). Scores of each group were arithmetically converted to the other set of end points to examine whether administering a scale with end points of 0–4 and converting a 1–5 scale to 0–4 yield similar SOM ratios.

Method

Measures

College Interaction Self-Statement Test - Revised (CISST-R). This 32-item inventory measure of thoughts about interaction with college students evaluates the frequency (5-point scale) of 16 Positive and 16 Negative thoughts experienced in a hypothetical interaction between same-sex students in the college context (Amsel & Fichten, 1988; Fichten & Amsel, 1988). 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 disabled peers. As on the original CISST, scores are summed for each subscale and reported as valenced frequencies (Positive and Negative) and SOM ratios. Psychometric data on the original 40-item CISST indicate internal consistency coefficients which range from .54 to .87. Unpublished data on the CISST-R indicate 4-week test–retest reliability coefficients which range from .72 to .85 for Positive and Negative thought frequencies and from .85 to .88 for SOM ratios. Validity data show that subscale scores, both on the original as well as on the revised versions, are meaningfully related to pertinent criterion variables (Amsel & Fichten, 1988; Fichten, Amsel, Robillard, Sabourin, & Wright, 1997; Fichten, Lennox, Robillard, Wright, & Amsel, 1996). For example, when thoughts

concerning able-bodied persons are evaluated, Positive scores correlate significantly with scores on the Positive subscale of the often used Social Interaction Self-Statement Test (SISST Glass, Merluzzi, Biever, & Larsen, 1982); scores on the Negative CISST subscale 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 peers with disabilities are evaluated, the CISST scores of respondents with and without prior contact with individuals who have a disability differ significantly.

Participants

Participants were 351 nondisabled college student volunteers, 142 male and 209 female (mean age = 19); they were enrolled in psychology courses at an urban junior/community college. Approximately 40% of subjects were male and 60% were female. All were participating in a larger investigation of the effects of novelty on thoughts and feelings (Fichten et al., 1997).

Procedure

Professors in each of the 18 participating course sections provided time at the end of class. Approximately 90% of students present on the day of testing volunteered. In the context of this larger investigation participants completed the CISST-R concerning hypothetical interaction with a same-sex college student peer who was "average" and nondisabled (Experimental Condition 1), had a visual impairment (Condition 2), or who was described as a nondisabled all-round outstanding individual (Condition 3). Students were randomly assigned to experimental conditions and were instructed to imagine that they were participants in an interaction with the stimulus person. The written description of the hypothetical interaction specified that the subject was sitting in the cafeteria with friends when one of them sees a same-sex classmate getting food and proceeds to tell the subject about him or her. The subject is introduced to this student and shortly thereafter, everyone else leaves. It appears that the subject, who has 15 minutes before class, will be left alone with this student. After reading the description subjects completed the CISST-R.

All participants completed the CISST-R with the following 5-point Likert-type rating scale: would hardly ever have the thought, would rarely have the thought, would sometimes have the thought, would often have the thought, would very often have the thought. However, some students in each of the three experimental conditions were administered the measure with the end points designated 1–5 (Group 1, n = 122). The remaining 229 participants (Group 2) were administered the measure with the end points labeled 0–4 (Groups 1 and 2 were tested in two different semesters). This resulted in sample ranging from 36 to 80 per cell. Subsequently, we converted Group 1's end points to 0–4 and Group 2's to 1–5. As there were

Table I. Correlations Between All Study Measures, Controlling for Age and Gender

Measures[a]	1	2	3	4	5	6	7	8	9	10	11	12
1. PPO	—											
2. NPO	−.37	—										
	(−.40)											
3. RPS	.57[d]	−.11	—									
	(.67[d])	(−.14)										
4. ICS	−.03	.36	−.21	—								
	(−.30)	(.51[d])	(−.28)									
5. AS	−.25	.59[d]	−.19	.42[c]	—							
	(−.31)	(.42[d])	(−.15)	(.57[c])								
6. CM	−.32	.36	−.24	.17	.15	—						
	(−.16)	(.42[b])	(−.04)	(.37)	(.21)							
7. PS	−.01	−.07	.15	−.19	−.18	.42[b]	—					
	(.19)	(.04)	(.29)	(−.03)	(−.14)	(.50[c])						
8. PE	−.19	.14	−.18	.22	.12	.47[c]	.35	—				
	(−.07)	(.09)	(.01)	(.10)	(−.01)	(.32)	(.43)					
9. PC	−.32	.27	−.36	.16	.13	.66[d]	.19	.62[d]	—			
	(−.19)	(.42)	(−.20)	(.30)	(.34)	(.64[d])	(.32)	(.39)				
10. DA	−.27	.50[d]	−.21	.20	.29	.67[d]	.12	.32	.46[c]	—		
	(.05)	(.37)	(.08)	(.38)	(.30)	(.50[c])	(.28)	(.20)	(.54[d])			
11. OG	.29	−.21	.22	−.10	−.37	−.03	.23	−.01	.08	−.06	—	
	(.15)	(−.18)	(.29)	(−.34)	(−.31)	(.03)	(.51[d])	(.36)	(−.00)	(.13)		
12. HS	−.40[b]	.48[c]	−.29	.17	.24	.59[d]	−.09	.21	.51[d]	.49[d]	−.26	—
	(−.36)	(.28)	(−.32)	(.37)	(.29)	(.22)	(−.17)	(.13)	(.38)	(.25)	(−.24)	
13. SPS	−.02	.51[d]	.10	.29	.22	.41[b]	.08	.35	.37	.53[d]	.08	.49[d]
	(.01)	(.21)	(.12)	(.30)	(.28)	(.22)	(.03)	(.19)	(.18)	(.25)	(−.11)	(.46[b].

[a]Measures 1 thru 11 assessed at Time 1. Measures 12 and 13 assessed at Time 2. Correlations without parentheses are for Caucasian Americans. Correlations in parentheses are for Asian Americans. For Caucasian Americans, $n = 79$. For Asian Americans, $n = 69$. PPO = Positive Problem Orientation; NPO = Negative Problem Orientation; RPS = Rational Problem Solving; ICS = Impulsivity/Carelessness Style; AS = Avoidance Style; CM = Concern over Mistakes; PS = Personal Standards; PE = Parental Expectations; PC = Parental Criticism; DA = Doubts about Actions; OG = Organization; HS = Hopelessness; SPS = Suicidal Probability Scale.

[b]$p < .0003$.

[c]$p < .00006$.

[d]$p < .000006$.

16 Positive and 16 Negative items, these conversions were made by simply adding or subtracting 16 from both Positive and Negative frequencies.

Results and Discussion

Is Administering a Measure with One Set of End Points Equivalent to Converting Mathematically to These Values?

To answer this question, we compared Group 1 (converted to 0–4) with Group 2 (administered 0–4) on CISST-R scores (Positive, Negative, SOM); we also conducted the analogous comparisons based on 1–5 end points. Because of the large number of independent *t*-test comparisons (3 Scores × 2 Groups × 3 Experimental Conditions = 18), alpha was set at .01. Means (on the left side of Table I for valenced thought frequencies and on the right side for SOMs) and *t*-test results indicate that even this procedure of using multiple *t* tests failed to show *any* significant differences between Group 1 and Group 2.

The failure to find significant differences between scores based on administered versus converted end points on either Positive or Negative thought frequencies or on the SOM ratio for any of the three Experimental Conditions suggests that (a) it was the response scale's anchor words, rather than the values attached to the anchor words, that influenced responding, and (b) administering a measure with a particular set of end points is equivalent to converting to these values mathematically.

How Are Frequency Scores and SOM Ratios Affected by Inventory Scale End Points?

To assess the impact of end points on SOMs, we carried out six paired *t* tests; these compared the same subjects' SOM scores based on 0–4 and 1–5 endpoints. Results show that the impact on SOM ratios of using end points of 0–4, instead of the typical 1–5, was dramatic. Data on the right side of Table I show that compared to the typical 1–5, use of 0–4 as end points (a) increased SOM scores substantially and significantly (paired *t* tests on all six comparisons were significant at the .001 level), (b) caused a conspicuous increase in SOM standard deviations, almost doubling these, and (c) increased the range of SOM scores, thereby producing SOM scores that can attain all values of the theoretical model. Moreover, (d) use of 0–4 as end points changed mean SOM scores sufficiently to place some of these into SOM internal dialogue categories different from those based on SOMs computed using end points of 1–5. In addition, examination of individual participants' Positive and Negative frequency scores shows that the use of 0–4 can result in valenced frequency scores of 0; as suggested elsewhere (Amsel & Fichten, 1990) we used a correction of +1 whenever the frequency of either Positive or Negative thoughts was 0 (this occurred in less than 1% of cases). Although relatively un-

common, since it requires the participant to indicate not having experienced any of the Positive (or Negative) thoughts listed on the inventory, this results in the same problems as those caused by zeroes when using thought listing (cf. Amsel & Fichten, 1990).

The findings on the impact of 0–4 endpoints on SOMs are very robust: These held true when the scale was administered with these end points as well as when scores were converted arithmetically. The results were also consistent for the three replications afforded by the three Experimental Conditions of the larger investigation.

It is evident that using 0–4 rather than 1–5 had a variety of beneficial as well as undesirable effects. Before making firm conclusions about the wisdom of administering, or transforming to, end points of 0–4, additional information is needed about the impact of 0–4 on a wider range of SOM scores and on populations with diagnosable disorders in addition to well-functioning individuals. Also, further validity information about the meaning of membership in the different SOM internal dialogue categories is needed. The effect of 0–4 end points on the size of standard deviations also requires further examination. Study 2 sheds light on these issues.

STUDY 2

Study 2 continued the exploration of scale end points by examining thoughts of two samples of older adults during periods of insomnia. Here, the goals were (a) to continue to evaluate the impact of using 0–4 and 1–5 end points on SOM ratios, and (b) to provide additional validation for SOM internal dialogue categories. To accomplish these objectives, we administered an inventory self-statement measure with a 5-point rating scale (0–4) to an additional 445 (Sample 2) subjects. Positive and Negative thought frequencies on the inventory were arithmetically converted to 1–5. As part of the examination of the impact of end points on the validity of SOM ratios, we first correlated SOMs with scores on various sleep and insomnia criterion measures, then examined sleep and insomnia scores of subjects in the various SOM internal dialogue categories and, last, compared the scores of good sleepers with those of diagnosable poor sleepers. Poor sleepers were divided into those who experienced either high or low levels of distress about their sleep problem. Our research has shown that the "Low Distress Poor Sleeper" configuration of sleep characteristics is critical for evaluating the role of thoughts in insomnia; people in this category are individuals who appear to cope well with the psychophysiological changes in sleep architecture that characterize the insomnia complaint and frequently accompany the aging process (Fichten, et al., 1995).

Method

Measures

Sleep Questionnaire. This brief objective questionnaire inquires about typical sleep experiences, including hours slept per night, sleep onset latency, duration of

nocturnal arousals, and frequency (0–7 days/week) of experienced difficulty falling asleep, getting back to sleep after nocturnal awakenings, and falling asleep after waking up too early. It also inquires how frequently (0–7 days/week) each of these three sleep problems is accompanied by feelings of distress. The information provided allows us to (a) diagnose the presence or absence of a disorder of initiating or maintaining sleep (DIMS), (b) obtain ratings of respondents' subjective perceptions of the frequency of sleep problems (Sleep Difficulty: Occurrence of Sleep Problems; 1 = very rarely, 10 = very often) and the associated distress (Sleep Distress: Level; 1 = not at all, 10 = very much), (c) compute two derived frequency scores—Sleep Difficulty: Frequency of Problem Episodes and Sleep Distress: Frequency of Distress Episodes—which provide single summary frequency scores (0–21: higher scores indicate more frequent sleep problem/distress episodes experienced during the week), and (4) calculate Sleep Efficiency (%)—a global measure based on Total Sleep Time/Time in Bed. Our data show that scores based on this measure have acceptable psychometric properties for research use; test–retest correlations indicate reasonable temporal stability (r values range from .58 to .92) and the pattern of correlations among variables shows logical, highly significant relationships (Fichten et al., 1995, 1998; Libman, Creti, Amsel, Brender, & Fichten, 1997a).

Self-Statement Test: 60+ (SST: 60+). This 34-item inventory measure of valenced thoughts experienced during times of wakefulness was developed by our team. Respondents indicate, using a 5-point scale ranging from (0 (*never or hardly ever*) to 4 (*very often*), how often during periods of wakefulness they experience each of 17 Positive (e.g., "enjoyable things I did during the past few days") and 17 Negative thoughts (e.g., "poor health of family members or friends"). Positive and Negative frequency scores are each summed. Scores are reported as valenced (Positive and Negative) thought frequencies and as SOM ratios. Our findings show good psychometric properties for this test; internal consistency and temporal stability were high for both negative (α = .898; r = .89, respectively) and positive scales (α = .903; r = .76), and the SOM ratio has good temporal stability (r = .91). Subscales also manifest good criterion-related, convergent, and discriminant validity, and scores show significant differences between good sleepers and high and low distress poor sleepers (contrasted groups) (Fichten et al., 1998).

Participants

Four hundred forty-five participants were recruited from the community through media publicity consisting of press releases, presentations and mailings to seniors' groups, and notices in community clinics and residences for seniors. Subjects were volunteers, age 55 and over, community resident, and had sufficient intellectual and language skills to complete the measures. Of the 445 subjects, 136 were men and 309 were women; mean age was 68 (range = 55–92). All were participating in a larger investigation where the goal was to evaluate personality, adjustment, and lifestyle in older good and poor sleepers (Fichten et al., 1995; Fichten et al., 1998; Libman et al., 1997a; Libman, Creti, Levy, Brender, & Fichten, 1997b).

Procedure

All subjects completed the Sleep Questionnaire as well as an inventory measure which assessed thoughts during nocturnal arousals: the 34-item SST: 60+ . The end points of the scale on the inventory were labeled 0–4; subsequently, these were converted to end points of 1–5 by adding 17 to both Positive and Negative frequencies.

Participants were identified as belonging to one of three sleep status groups: Good Sleepers, Medium Quality, or Poor Sleepers. Poor Sleepers were those who met the conventional research criteria for the diagnosis of a disorder of initiating or maintaining sleep (DIMS) (30 minutes of undesired awake time at least three times per week, problem duration at least 6 months) and whose Sleep Questionnaire responses indicated problematic sleep on two items evaluating sleep difficulty. High Distress Poor Sleepers were Poor Sleepers whose responses indicated high distress on three items of the Sleep Questionnaire, while Low Distress Poor Sleepers were Poor Sleepers whose responses on these indicated relatively low distress. Good Sleepers were individuals who failed to meet the criteria for diagnosis of DIMS, and whose Sleep Questionnaire responses indicated minimal difficulty with sleep (on two items) and minimal distress about sleep problems (on two items). Medium Quality Sleepers had elements of both Good and Poor Sleep.

Of the 445 participants, 189 met the selection criteria for Good and 124 for Poor Sleeper status; 55 of the latter met the criteria for Low Distress Poor Sleeper and 36 met the criteria for High Distress Poor Sleeper status. The remaining subjects were either Medium Quality sleepers (n = 132) or Poor Sleepers who could not be categorized as either highly or minimally distressed (n = 33). The sex ratio in all samples was approximately one third male and two thirds female. Poor Sleepers had experienced insomnia for a mean of 13 to 15 years (range = 1–63).

Results and Discussion

To explore similarities and differences among groups, we examined both valenced thought frequencies as well as SOM ratios. As suggested elsewhere (Amsel & Fichten, 1990), we used a correction factor of +1 whenever the frequency of either Positive or Negative thoughts was 0. Table II presents the means, standard deviations, and sample sizes for Good and Poor Sleepers, both for SST:60+ end points of 0–4 as well as 1–5.

Implications for the SOM Ratio of Converting End Points from 0–4 to 1–5 on Inventory Measures

Table II shows that (a) converting SST: 60+ inventory end points from 0–4 to 1–5, a linear transformation of the frequencies, does not change the standard deviations of frequency scores, and (b) standard deviations of SOM ratios based on 0–4 are approximately double the size of standard deviations based on 1–5. Also, (c) end points of 0–4 resulted in a wider spread of SOM ratios than end points of 1–5 (.023 to .967, .234 to .755, respectively), although (d) there were no changes in SOM internal dialogue categories based on averages from this sample. It is also

Table I. Comparisons of Frequencies and States-of-Mind Ratios When End Points Are 0–4 Versus 1–5

Replications across experimental condition and group	*n*	End points	Mean thought frequencies[a]		SOM Scores[a]			
			Positive	Negative	*M*	*SD*	Range	Paired *t* tests 0–4 vs. 1–5
Condition 1								
Group 1	40	Administered 1–5	52.85	38.65	0.58	0.07	.43–.76	$t(39) = 5.32$[b]
		Converted to 0–4	22.65	22.65	0.63	0.12	.39–.89	
Group 2	80	Administered 0–4	38.76	26.50	0.60	0.10	.34–.84	$t(79) = 8.35$[b]
		Converted to 1–5	54.76	42.50	0.57	0.07	.40–.73	
Condition 2								
Group 1	46	Administered 1–5	54.98	47.48	0.54	0.06	.37–.64	$t(35) = 5.69$[b]
		Converted to 0–4	38.98	31.48	0.56	0.09	.31–.73	
Group 2	79	Administered 0–4	42.03	28.99	0.60	0.11	.34–.84	$t(78) = 8.06$[b]
		Converted to 1–5	58.03	44.99	0.57	0.07	.39–.71	
Condition 3								
Group 1	36	Administered 1–5	51.97	41.03	0.56	0.06	.41–.65	$t(45) = 4.20$[b]
		Converted to 0–4	35.97	25.03	0.59	0.09	.35–.77	
Group 2	70	Administered 0–4	37.99	27.74	0.58	0.11	.36–.91	$t(69) = 5.62$[b]
		Converted to 1–5	53.99	43.74	0.55	0.07	.40–.75	

[a]None of the independent *t*-tests comparing Group 1 vs. Group 2 (whether these are based on 0–4 or 1–5) on Positive or Negative thought frequencies or SOM ratios are significant.
[b]$p < .001$.

noteworthy that (e) the *t* test on SOM ratios based on different end points was significant for Good Sleepers; here the ratio based on 0–4 was significantly greater than that based on 1–5, $t(188) = 8.37$, $p < .001$. Table II also reveals that (f) the SOM ratio calculated by making a ratio out of the valenced group means (ratio of group means) is almost identical to mean SOM scores (mean of ratios) in all cases. In addition, 9 of the 445 subjects obtained a valenced frequency score of 0; nevertheless, because each subject endorsed at least one valenced thought and because we used the +1 correction whenever the frequency of either Positive or Negative thoughts was 0 (cf. Amsel & Fichten, 1990), there was no loss of sample size when SOM ratios were calculated using 0–4 end points.

SOM category sample sizes in Table III illustrate the greater spread of SOM scores when 0–4 rather than 1–5 inventory end points are used and indicate that end points of 0–4 extend the range and increase the area in the tails of the distribution. Thus, the distribution of SOM scores follows Schwartz and Garamoni's (1986, 1989) theoretical model of negative skew, with a lower bound of 0 and an upper bound of 1. The distribution of SOM scores is markedly constricted when 1–5 is used. Nevertheless, it should be noted that a change in end points does not result in a significant difference in the mean of SOM scores.

Individual SOMs based on 0–4 are less "central" than those based on 1–5, with 31% of the SOMs based on 0–4 falling into the central (IDC) category as compared to 46% of the SOMs based on 1–5. Thus, with 0–4 there are more individuals falling into the two end categories [(PM) Positive Monologue and (NM) Negative Monologue)] than with 1–5 end points. Moreover, the mean values are shifted upward compared to the 1–5 scale and there is generally greater membership in the positive SOM categories. This occurs because the 0–4 scale spreads the scores. Since the ratio of Positive to Negative thoughts has a norm of about 2:1 (PD), the 0–4 scale makes these already positive ratings even more extreme.

We also examined change in membership in each of the SOM internal dialogue categories when different end points are used. Results reflect the greater spread of scores using 04 and show that only 66% of subjects (293 of the 445) fall into the same SOM category when end points of 0–4 versus 1–5 are used. Only 2 individuals' SOM scores (< 1% of the sample) changed by two categories; these changes put participants in a more positive category using 0–4 rather than 1–5. The remaining 150 individuals changed by one category: one hundred thirteen (25%) were in a more positive SOM category using 0–4 rather than 1–5 and 37 (8%) were in a more negative category.

Are Extremely Positive States of Mind Dysfunctional?

Data in Table III indicate that the relationship between SST: 60+ SOM scores and criterion measures is generally linear and that the answer to this question is a very clear "No." As is obvious from Table III, which presents mean scores on various criterion measures in each of the SST: 60+ inventory SOM categories, virtually all criteria showed a monotonic trend under both end point scoring schemes,

Table II. Comparisons of Valenced Frequencies and SOM Scores on the SST:60+: End Points 0–4 Versus 1–5[a]

		Mean thought frequencies				SOM scores[b]			
		End points 0–4		End points 1–5		End points 0–4		End points 1–5	
Group[d]	Sample	Positive	Negative	Positive	Negative	Mean of ratios	Ratio of group means[c]	Mean of ratios	Ratio of group means[c]
Good sleepers	189	27.70	18.02	44.70	35.02	.61	.61	.56	.56
		(12.24)	(10.19)	(12.24)	(10.19)	(.16)		(.08)	
Poor sleepers	124	29.03	29.82	46.03	46.82	.49	.50	.49	.50
		(11.66)	(10.83)	(11.66)	(10.83)	(.14)		(.08)	
Low distress poor sleepers	55	28.67	25.85	45.67	42.85	.53	.53	.52	.52
		(11.84)	(10.69)	(11.84)	(10.69)	(.13)		(.07)	
High distress poor sleepers	36	29.53	33.36	46.53	50.36	.46	.47	.48	.48
		(12.30)	(10.01)	(12.30)	(10.01)	(.14)		(.08)	

[a]Scores are means. Values in parentheses are standard deviations. "Poor Sleepers" include High and Low Distress individuals as well as those whose distress level was intermediate.

[b]SOM ratios can be computed only if there is at least 1 Positive or 1 Negative thought reported. When the mean of ratios is computed, there can be a loss of sample size due to 0s. States of Mind (SOM) ranges are: NM (Negative Monologue) = 0–.31, NP (Negative Dialogue) = .32–.44, IDC (Internal Dialogue of Conflict) = .45–.55, PD (Positive Dialogue) = .56–.68, PM (Positive Monologue) = .69–1.00.

[c]The ratio of group means is obtained by dividing the *mean* number of Positive thoughts by the *mean* number of Positive plus Negative thoughts.

[d]Of the 445 participants. 189 were Good Sleepers, 132 were Medium Quality Sleepers, and 124 were Poor Sleepers; 55 Poor Sleepers met the criteria for High Distress Poor Sleeper, 36 met the criteria for Low Distress Poor Sleeper, and 33 Poor Sleepers could not be categorized on Distress.

Table IV. Correlations of SST:60+ SOM Ratios with Different End Points Against Criterion Variables (N = 445)

Variables	SST:60+ End points 0–4	SST:60+ End points 1–5
Thoughts variables		
Positive thought frequency	.44[d]	.56[d]
Negative thought frequency	−.63[d]	−.61[d]
Sleep variables		
Total sleep time per night (hr)	.10[c]	.10[c]
Total wake time per night (hr)	−.33[d]	−.33[d]
Sleep efficiency (%)	.32[d]	.32[d]
Sleep problem frequency[b]	−.35[d]	−.35[d]
Sleep problem occurrence[a]	−.30[d]	−.31[d]
Sleep distress frequency[b]	−.33[d]	−.33[d]
Sleep distress level[a]	−.34[d]	−.36[d]

[a]10-point rating scale (1 = very rarely, 10 = very often).
[b]Frequency of episodes per week: minimum = 0, maximum = 21.
[c]$p < .05$.
[d]$p < .01$.

with people falling into the PM category having more favorable scores than those in the PD category.

The latest version of the States-of-Mind model proposes that only extremely positive SOMs—those between .91 and 1.00—are likely to be pathological, while SOMs ranging from .67 to .90 are adaptive (Schwartz, 1997). To examine the possibility that such extremely high SOMs are pathological, we compared the scores of subjects who fell into the revised SOM model's PM and PD categories. Results indicate that 7 participants fell into the revised PM (.91 to 1.00) category and 91 fell into the revised PD category (.67 to .90). As can be seen in Table III, means on criterion variables again indicate that subjects with extremely positive SOMs had better scores than those with somewhat lower positive SOMs on *all* variables. Nevertheless, results should be interpreted with caution due to very small samples for the highest range of SOM scores.

Validity of SOM Scores

As part of the validation process, we correlated scores on relevant criterion measures with SOMs based on 0–4 and 1–5 inventory scale end points. Results in Table IV indicate no evidence of substantial change in the correlations of inventory SOM scores against criterion variables with change of end points.

GENERAL DISCUSSION

Overall, the findings are robust, unambiguous, and replicated in several contexts. Thus, they allow for clear answers to the questions posed earlier.

How Are Frequency Scores and SOM Ratios Affected by Inventory Scale End Points? Which End Points Provide More Valid SOM Scores?

The results of both Studies 1 and 2 show that changes in scale end points have a substantial impact on individual SOM scores, with more spread in scores resulting from 0–4 end points. Since, for the most part, the benefit of using an end point of 0 outweighs the cost, *we recommend that in future research, SOM ratios be calculated based on a scale that starts at 0.*

On the neutral to benefit side, the results show that using end points of 0–4, instead of 1–5: (a) produced SOM scores more in agreement with theoretical aspects of the model (e.g., in Study 2 the distribution of SOMs showed negative skew, SOM ratios varied between .023 and .967 as opposed to .234 and .755 for the 1–5 rating scale, and values stabilized around the theoretical set points), (b) spread the distribution of scores in both directions and changed individual SOM scores sufficiently to place numerous individuals into internal dialogue categories different from those based on 1–5 end points, with movement toward the more extreme categories, (c) did not change the mean of SOM scores substantially, nor did it have an impact on significance tests based on frequency scores, and (d) revealed only minor differences in correlations of SOM ratios with criterion variables. This means that there is better discrimination between people who function well and those who function poorly when 0–4 is used. Also, because membership in the highest and lowest categories increases when a scale starting at 0 is used, there is a greater possibility for differences among the categories on criterion variables.

On the debit side, if the end point value is lowered to 0, one must expect substantially larger standard deviations. Indeed, our findings in both studies show that 0–4 resulted in standard deviations almost double those obtained when using 1–5. While this is disadvantageous in some statistical analyses, our findings suggest that the greater spread in the means of SOM ratios more than offsets this increase in variability.

An additional disadvantage is that the use of 0–4 allows for the possibility of frequency scores of 0; however, using a large pool of items in the inventory should reduce the likelihood of these. Should frequency scores of 0 occur, when calculating SOMs *we recommend using a correction of + 1 whenever a subject reports either 0 positive or 0 negative thoughts*. Because frequencies of zero positive or negative thoughts on inventories are usually rare, the + 1 correction only slightly affects the distribution of SOM scores on endorsement measures.

Is Administering a Measure with One Set of Scale End Points Equivalent to Converting Mathematically to These Values?

A complete lack of significant results in Study 1 supports our assertion that, in this context, respondents are not systematically influenced by scale end points, but seem to attend to scale anchor words instead. Nevertheless, future research should explore the effects of mathematically converting end points when samples

are more clinically extreme than those in our study (i.e., SOMs that are closer to 0 and 1).

The findings of Study 1 suggest that researchers can move back and forth between 0–4 and 1–5 scale end points by converting scores mathematically. Thus, *well-validated measures such as the SISST (cf. Glass & Arnkoff, 1994; Glass et al., 1982) should continue to be administered in the original format. For the purposes of SOM calculation, however, we recommend that 1–5 scale end points be converted to a 0–4 scale.*

Are Extremely Positive States of Mind Dysfunctional?

No. In Study 2 of the present investigation we showed that subjects in the PM internal dialogue category, whether this is based on the original range or on the revised SOM model's more extreme range, were better adjusted on a large variety of criterion measures than those in lower SOM categories. Our results clearly, consistently, and significantly show a linear relationship between SOM scores and criterion variables, with more negative SOMs associated with worse and more positive with better outcomes. This was true regardless of which scale end point was used.

The present results extend the findings of studies which show that scores in the original SOM model's PM range are adaptive by showing that this is true even for the extremely positive internal dialogues reflected by Schwartz's (1997) revised model PM category (i.e., .91 to 1). As in other areas where lack of realism and overly positive evaluations characterize good functioning (e.g., Alloy & Clements, 1992; Taylor & Brown, 1988), it also appears that in the balance between positive and negative thoughts, one cannot have too much of a good thing. Nonetheless, it is possible that certain clinical groups—or certain individuals—who fall into the PM category are dysfunctional. Research using clinically diverse groups and administration of a measure of social desirability are needed to explore this possibility.

Our findings suggest that (a) even extremely positive states of mind are adaptive, and (b) that SOM scores can be used in statistical analyses such as correlation and regression without adding quadratic terms to the model. When SOM scores are used as category variables, cut points can be set assuming linearity.

We Urge Researchers to Report Both Valenced Thought Frequencies as well as SOM Ratios

There is considerable diversity in the methods used to evaluate thoughts (cf. Glass & Arnkoff, 1994; Schwartz, 1992). A distinct advantage of the SOM ratio is that it permits comparisons across different studies and methodologies, regardless of how data on positive and negative thoughts are collected. Although one cannot assume that data obtained from different cognitive assessment methods are equivalent (cf. Glass & Arnkoff, 1994), a comparison of different approaches to evaluation of self-statements can be studied using SOMs. SOMs also permit development of norms for adaptive and maladaptive thinking about events. In addition, ratios sim-

plify data analysis and interpretation of valenced information and allow comparisons of data based on different frequencies of total thoughts.

The SOM ratio is used increasingly whenever positive and negative thoughts are evaluated (Glass & Arnkoff, 1994; Merluzzi, 1993). Because it has a number of advantages over other types of ratios and because of the availability of norms and theoretically derived ranges which have been found to characterize adaptive and maladaptive thinking about events in a variety of areas, the SOM has much to recommend it for use as the industry standard which is reported by investigators on a routine basis.

For both conceptual as well as mathematical reasons, we believe that both positive and negative frequencies should always be reported. The unmindful calculation of ratio scores can mask the existence of very small frequencies. Raw frequencies must be examined and care should be taken to avoid situations where the validity of the data may be questionable. If the average frequency of positives or negatives is less than 1, then neither the ratio nor the +1 corrected ratio give an adequate picture. Here, it is imperative that frequency scores be analyzed and reported in addition to SOMs. In these cases, ratios of group means may also be informative at the group level. For conceptual reasons, too, positives and negatives should always be reported. Some questions or hypotheses in relation to specific variables require investigators to focus on valenced frequencies rather than ratios; for example, analysis of valenced frequencies may be the best approach to study the origin and characteristics of positive and negative thoughts as well as the role and function of the presence and absence of valenced thoughts. By reporting valenced thought frequencies as well as SOM ratios on a routine basis, investigators can do much to assist in the development of cognitive assessment and to increase our understanding of etiological factors in psychological disorders.

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