# OFFICE OF SCALE RESEARCH

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# Reversed-Polarity Items, Attribution Effects & Scale Dimensionality

by

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Abstract

A standard procedure in the development of multi-items scales is to incorporate reverse-coded items to control for and/or identify acquiescence response bias. In spite of the broad acceptance of this approach, very little work has been done to evaluate the impact of reversed-polarity items on the dimensionality of scales.

This study develops two hypotheses from an attribution theory perspective and empirically evaluates the impact of reversed-polarity items on the dimensionality of several popular marketing measures. The authors suggest that use of reversed-polarity items presents a substantive problem for psychometricians; because of degradation of scale dimensionality resulting from positivity bias. The existence of this phenomenon is confirmed with a multi-survey, multi-scale, multi-national research design. Implications for marketing scale developers and measurement theoreticians are discussed and an alternative perspective on the appropriate role of reversed-polarity items is proposed.

# Reversed-Polarity Items, Attribution Effects and Scale Dimensionality

With the growing popularity of multi-item ratings scales among marketing academics and practitioners has come the acceptance of "paradigms" or sets of rules for measurement development. Following Churchill (1979), those who would develop summated ratings scales are provided guidelines to aid in the process from item generation to establishment of norms of responses. These guidelines suggest that items with reversed statement polarity (with reversed coding) be incorporated in the scale to correct for "yea saying" or response acquiescence (Heaven 1983; Ray 1979, 1983; Spector 1992).

More recently, however, the assessment of unidimensionality has been presented as a top priority in scale development (Hattie 1985; Anderson, Gerbing and Hunter 1987; Gerbing and Anderson 1988). Yet, little research in marketing has addressed if or how the practice of reversing statement polarity impacts scale dimensionality. Accordingly, this study examines the attribution literature relating to positivity bias, reviews the research on reversed-polarity items and scale dimensionality, and empirically evaluates the impact of employing reversed-polarity items on the dimensionality of several measures familiar to marketing researchers.

## THE CASE FOR REVERSED-POLARITY ITEMS

Scale developers have long been aware of the potential distortion in responses arising from acquiescence (Edwards 1957; Likert 1932), affirmation, or agreement bias, although there is some disagreement as to the severity of the problem (Rorer 1965; Spector 1987). The problem seems to be exacerbated when studying sensitive topics (Gove and Geerken 1977), when items are vaguely worded (Nunnally and Bernstein 1994, p. 312), or when respondents are from lower educational and income groups (Ware 1978).

The usual solution offered by contemporary psychometricians is to include both positively and negatively worded items in the measure. For instance, Falthzik and Jolson (1974) found empirical evidence that "the intensity of consumer attitudes and behavior ... depends on whether the researcher's statements are phrased positively or negatively" (p. 104). They concluded that reversed-polarity items should be included in scales when the "issue is complex and/or the subjects have limited educational backgrounds" (p. 104). They also suggested the use of split ballots for isolating acquiescence effects.

Churchill (1979) prescribed that "[s]ome of the statements would be recast to be positively stated and others to be negatively stated to reduce 'yea-' or 'nay-' saying tendencies" (p.68). This approach was supported by Spector (1992, p. 24) who pointed out that "[b]y varying the direction of questioning, bias produced by response tendencies will be minimized. One such tendency is acquiescence."

The interpretability of measures contaminated by acquiescence bias has been recognized as a problem. Winkler, Kanouse and Ware (1983) proposed an approach to aid interpretation by using balanced scales, generating an acquiescence score by using principal components analysis on the first order inter-item partial correlation matrix after statistically controlling for acquiescence. Although the procedure improved the subjectively-assessed interpretability of the outcomes, the authors still observed two- or three-factor solutions from an eight-item measure after the transformations.

Nowhere is the practice of reversing the polarity of scale items more heartily endorsed than in a stream of research on acquiescence from Ray (1979; 1983) and Heaven (1983). To summarize their findings:

> On the present evidence we must draw the exceedingly melancholic conclusion that any investigation with one-way-worded scales is not only of unknown meaning but is in fact even of unknowable meaning. Data from balanced scales can at least subsequently be reanalyzed to examine whether there was much evidence of meaningless acquiescence present. Unbalanced scales cannot possibly be checked, and all of

> their relationships could be due to the artifactual influence of acquiescent response style (Ray 1983, p. 94).

**Conflicting Evidence**

In spite of the aforementioned benefits derived from their application, reversed-polarity items have been presenting problems for marketing scale developers even though the details of item generation and purification are often not discussed in detail. For example, in an empirical test of the impact of acquiescence, Terborg and Peters (1974) found that differences in scores between reversed- and standard-polarity items "occur independent of the effects of acquiescence" (p. 465). They concluded, however, that the additional variance had little, if any, effect on the validity of summated attitude scores, thus suggesting that the unnamed effects were not a problem for scale developers.

Goldsmith and Besborde's (1991) assessment of an opinion leadership measure revealed that eliminating an item from the measure in question would drive up coefficient α. Citing Nunnally (1978) and Falthzik and Jolson (1974) they concluded that the renegade item "is the only one of the seven items worded in the negative direction. This suggests that perhaps other items should be reverse-worded in order to place explicit controls on the direction-of-item wording problem" (p. 16). (It is important to note that the criterion to be maximized in this situation was assumed to be internal consistency while effects on dimensionality were not discussed.)

Parasuraman, Barry and Zeithaml (1991), in their response to Carman's (1990) criticism of their twenty-two item SERVQUAL scale, "corrected" the polarity of all six reversed polarity items through re-wording. Their justification for the scale revision was based on three criteria targeting the negative-polarity items: 1. larger standard deviations, 2. a perception of potential confusion from awkward wording in a test of executive managers, and 3. poor reliability (Cronbach's α) (p. 422). Interestingly, they did note that dimensionality was an issue in the measure: "[a] plausible explanation for the difference in dimensional distinctiveness between the original and revised SERVQUAL scales is the conversion of negatively worded items to a positive format" (p. 425). In spite of this recognition, internal consistency was cited as the predominant criterion applied to the situation and no further mention of dimensionality (as it applied to reversed-polarity items) was made.

DeVellis (1991) prescribed a cautious approach to reversed-polarity items. While recognizing that reversing item polarity addresses the problem of acquiescence, he also saw potential for confusion, especially when completing a long questionnaire. Although no empirical evidence was cited supporting his position, his solution was to "...be aware of both the acquiescence and confusion problems and to write questions and instructions as clearly as possible" (p.60). Respondent confusion suggests a non-systematic variation in responses, reducing internal consistency of the items but not necessarily impacting scale dimensionality. Nunnally and Bernstein (1994, p. 314) went further by suggesting development of an equal number of positive and negative polarity items and selection of an equal number of items from each list (balanced scales). Then, using the development of the California F scale as a guide (Adorno, Frenkel-Brunswik, Levinson and Sanford 1950), additional items could be added to both the positively and negatively worded item lists. Nunnally and Bernstein (1994) provided the following observation: "...when items are keyed in different directions; factors tend to arise based upon item keying because endorsing a trait is not the same as denying its absence" (p. 573). When "factors tend to arise" whether from trait or method sources, the dimensionality of the scale is adversely affected.

**Item Polarity and Scale Dimensionality**

The notion of unidimensionality in measurement theory refers to a condition in which a set of indicators share only a single underlying factor (McDonald 1981). More than simply "desirable," unidimensionality has been identified as a "most critical and basic assumption of measurement theory"

(Hattie 1985, p. 49). The effort to obtain unidimensional measures has been regarded as "a crucial undertaking in theory testing and development research" (Anderson, Gerbing and Hunter 1987, p. 432). Gerbing and Anderson (1988) articulated an assessment approach and suggested that dimensionality evaluation be incorporated as critical step in Churchill's (1979) measurement development paradigm as a necessary, but not sufficient, condition for construct validity.

Our review of the literature suggests that the relationship between statement polarization and measure dimensionality has not been adequately discussed, much less empirically evaluated. Apart from DeVellis' (1991) brief reference to confusion and Winkler, Kanouse and Ware's (1983) proposed transformations to improve factor structure interpretability, no cautionary appeals are to be found in the contemporary scale development marketing literature. This is perhaps due to dimensionality's recent recognition as a necessary, but not sufficient pre-requisite to construct validity.

Accordingly, while the use of reversed-polarity items to control for acquiescence bias has become a widespread practice, there is sufficient indication as described above to suggest that the practice may have some adverse effects on dimensionality. Is there a theoretical basis for this phenomenon? We now turn to attribution theory to seek a possible explanation for the relationship between reversed-polarity statements and fragmentation of scale dimensionality.

## ATTRIBUTION THEORY

Attribution theory (Heider 1944, 1946 and 1958) and its derivative research are generally concerned with the meanings that people ascribe to people, places and events in their lives. Some of this research has addressed the significance that respondents attach to alternative word choices used by scale developers. In the process of responding to a scale question, respondents react to the words and phrases chosen by the scale developer, and the choices made obviously can have a significant effect on the response. Attribution research has supported the notion that there is an asymmetrical relationship between positive and negative phrasing of response alternatives. Anderson (1965) and Feldman (1966) both found that negative adjectives are more powerful than positive adjectives in impacting a person's overall evaluation. Indeed, highly-polarized negative adjectives produce a disproportionate influence on evaluation, while no evidence was found that highly-polarized positive adjectives produce the opposite effect. Jordon (1965) concluded on the basis of several experiments that "the custom of finding an arithmetic average of attitude and opinion ratings that includes both positive and negative ratings now seems unjustifiable; it may literally be a mixing of apples and cabbages" (p. 322).

In confirming the asymmetrical hypothesis, Kanouse and Hanson (1971) concluded that "...negative information carries greater weight than positive [information]" and "...surprisingness and frequency of usage do not seem to be very important in determining the greater impact of negative traits in impression formation" (p. 49-50). The primary explanation offered by Kanouse and Hansen (1971) is based upon the positivity bias which influences an individual's attributions regarding persons, places and objects. Because individuals generally place a favorable spin on the people and events in their lives, they tend to form positive expectations with respect to relationships and choices of descriptive terminology. Thus, they weigh positive information more lightly than negative information.

When individuals are confronted with negatively-connotated information, there's a contrast effect which is evident. As perceived against a generally positively-viewed world, negative information stands out like the proverbial "sore thumb." Accordingly, descriptive statements of negative traits and behaviors provide greater distinctiveness than equivalent statements about positive traits and behaviors. For example, if an individual perceives most managers as industrious, he or she will be relatively unimpressed by a manager who is industrious. However, if the manager is lazy, that characteristic stands in contrast to the norm, and will increase the importance and centrality of the trait. Kanouse and Hansen (1971) summarized by stating that "an implicit assumption is that there is a single good-bad dimension. There is reason to believe, however, that this assumption may be unwarranted" (p. 60).

More recently, researchers have confirmed differences in the weighting of positive and negative information in a number of research areas, including consumer affect (Conway, DiFazio and Bonneville 1990; Oliver 1993; Westbrook 1987), individual performance (Jaworski and Kohli 1991; Whitehead 1987), purchase involvement (Maheswaren and Meyers-Levy (1990), response to price change (Kalwani et al. 1990), valuation (Hauser, Urban and Weinberg 1993; Mowen and Mowen 1991), and advertising effectiveness (Pechmann 1992). This review of the literature tends to confirm the Kanouse and Hanson (1971) contention that positive and negative are not necessarily perceived as lying on the same dimension, and leads us to expect a different weighting of scale items that are of opposite polarity.

The first item of Shimp and Sharma's (1987) seventeen-item CETSCALE can serve as an illustrative example. The positively-worded item states, "American people should always buy American-made products," and a typical respondent with positive expectations about human behavior and exchange relationships will likely respond to this statement consistent with his or her individual beliefs. However, when the item is recast to the negatively-phrased "American people should never buy American products" or "American people should not always buy American products" the negative wording should trigger a higher degree of perceived distinctiveness than before. Because the item stands in greater contrast to the respondent's normal expectations, response to the new item should tend to be asymmetric to the original. When scoring the item, the researcher's reverse-coding will be inadequate to "correct" the response profile. The reversed-polarity item will tend to behave as a new item, unlike its positively-worded counterpart, and will likely "read" as if it indicated a different construct.

Similarly, if the negatively-phrased item is administered to a new respondent population with different expectations about human behavior and exchange relationships than the first, differential contrast levels should impact the perception of distinctiveness, thereby altering its meaning. The negative wording should provoke a changed sensitivity, and concomitant change in response profile. Thus, we expect that the stability and dimensionality of negatively-phrased items will be less forgiving to changes in respondent populations, than will positively-phrased items.

In view of the previous discussion, we propose the following research hypotheses:

> H1: In administrations to different populations, scale unidimensionality will tend to be adversely affected by the presence of reversed-polarity (RP) items.
>
> H2: In administrations to the same population, scale unidimensionality will tend to be adversely affected by the presence of items recast by changing polarity (either from positive to negative, or from negative to positive).

## METHODOLOGY

### Methodology for Test of H1

To test the first hypothesis, three established marketing scales were selected. The first was a 24-item measure designed to evaluate salespeople's customer orientation (SOCO). The scale was initially introduced and validated by Saxe and Weitz (1982), and was subsequently used in several other studies (Michaels and Day 1985; Brown, Winding and Coulter 1991; Swenson and Herche 1994). Although the number of points used in some administrations apparently underwent minor modifications, evidence of the reliability and construct validity of the SOCO appeared to be strong. Half of the twenty-four items in the SOCO possess reverse-polarization characteristics.

The second measure included in this study was Spiro and Weitz' (1990) ADAPTS, a sixteen-item scale developed to assess the degree to which salespeople practice adaptive selling. The construct has been cited in the sales management literature (Weitz, Sujan and Sujan 1986) and the ADAPTS scale continues to gain the interest of sales force researchers (Badovick and Thomposon 1994; Humphreys 1994). Six of the sixteen items in ADAPTS are negatively worded.

The third scale used for assessment in this test of hypothesis was Shimp and Sharma's (1987) seventeen-item CETSCALE that was mentioned earlier. The measure was designed to assess the perceived morality of purchasing foreign products. The CETSCALE was found to possess nearly equivalent goodness-of-fit indices across the four regions studied (Shimp and Sharma 1987) and has also shown strong psychometric properties that are robust across cultural settings (Netemeyer, Durvasula and Lichtenstein 1991). The original CETSCALE does not contain reversed-polarity items.

As shown in Table 1, a multi-survey/multi-national design was employed. SOCO and ADAPTS were administered in two independent surveys of salespeople in the United States, and one in The Netherlands. The questionnaire used in the Dutch survey was subjected to a rigorous backtranslation of the questionnaire as suggested by Douglas and Craig (1983). Survey 4 employed a nationwide administration of a revised version of the CETSCALE that included seven items that were reverse-polarized. The revised version of the CETSCALE was pre-tested on fifty-two arbitrarily selected individuals for readability, clarity and reliability before the national sample was drawn. The differences in wording are presented in Table 2.

Principal components factor analysis was then employed to evaluate the degree to which negatively-worded items tended to load onto a different factor than positively-worded items. If Hypothesis Hl was correct, we expected to see evidence that the negative scale items loaded onto a different dimension. Because a comparison of measurement validation characteristics rather than parameter estimation was the objective, details of sample characteristics are not reported.

Insert Tables 1 and 2 Here

**Methodology for Test of H2**

To test the second hypothesis, a field experiment was conducted as part of a scale development effort relating to new product innovation in organizations. Twelve indicators (six of which were positively phrased and six negatively phrased) were identified by a group of eight experts as representing the construct of interest (product innovativeness). All twelve were included in a questionnaire mailed to a national sample of product development executives. A seven-point Likert-type response format was employed. Data collection resulted in 142 usable responses (33% response rate).

Using coefficient alpha as a guide, the data were analyzed to develop two alternative "purified" scales. The first (scale 1A) was constructed to comprise the six best performing items, no matter what their polarity. All six were positively-worded. The second scale (scale 1B) was constructed to comprise the best combination of three positively-phrased items and three negatively-phrased items. Each scale was then subjected to confirmatory factor analysis to assess unidimensionality.

Subsequently, both scales were revised by recasting some items to create two new scales. Scale 2A consisted of a revision of scale 1A created by retaining three positive items and by re-stating the three other items from positive to negative. Scale 2B consisted of a revision of 1B constructed by recasting the three negative items to positive (see Table 3). The recast scales were included in a new instrument sent to a second sample of product development executives, resulting in 200 usable responses (29% response rate). Again, unidimensionality was assessed using confirmatory factor analysis.

Based upon the second hypothesis, we expected that the evidence of unidimensionality of scale 2A would be weaker than scale 1A, because of the recasting of positive items to negative. We also expected that the unidimensionality of scale 2A would be stronger than scale 2B because of the reversed polarity.

Insert Table 3 Here

## RESULTS

### Results for Test of H1

The results of an exploratory assessment of factor loading patterns using principal components analysis with varimax rotation of extracted factors is presented in Table 4. The solutions were constrained to two-factor outcomes to evaluate the degree to which the positive- and negative-polarity items would load on separate, orthogonal factors. The measure fragmentation is plainly shown in Table 4. In studies 1 and 2, all of SOCO's negative polarity items with significant loadings (over .4) were associated with the same factor, with all of the positive-polarity items loading on the second factor. The factor importance was reversed for the Dutch sample, but the pattern remained the same. With the exception of Item 12, the loading pattern also held for ADAPTS. The revised CETSCALE with seven of its seventeen items negatively worded, also clearly revealed a positive/negative factor structure, although two of the seven reversed items did not load on either factor.

Insert Table 4 Here

The dimensionality of the measures also appeared to be impacted by the pattern of factor loadings. For SOCO, the first factor accounted for only twenty to thirty percent of variation in the three studies. Although the percentage of variation explained by the first factor was better for ADAPTS (.33 to .36) the figures were still far below Hair, Tatham and Anderson's (1987) suggested benchmark of sixty percent. The revised CETSCALE appeared to have the strongest claim to unidimensionality, however, a second factor with an eigenvalue of greater than one was extracted for it as well.

For each of the scales with reversed-polarity items (SOCO, ADAPTS and the revised CETSCALE), a dimensionality assessment was conducted using confirmatory factor analysis. Two contrasting models consisting of a simple single-factor constraint, and a two-factor solution in which the reversed-polarity items were constrained to load onto the second factor were compared for fit characteristics. The results, reported in Table 5, show that for all of the scales, in all of the surveys, a significant improvement in goodness-of-fit resulted from the inclusion of a second factor in the analysis. Seventeen of the twenty-one fit statistics showed improvement by adding the second dimension, and the improvement in the Chi-Squared statistic was statistically significant ($\alpha$=.01) in all seven tests. Thus, hypothesis H1 is strongly supported.

The findings also highlight the measures' relatively weak claim to unidimensionality, although sample size distortions can explain much of the poor fit statistics of the CETSCALE (Anderson and Gerbing 1984). It should also he noted that all of the measures exceeded Rust and Cooil's (1994) suggested minimum $\alpha$ of .7, highlighting one shortcoming of treating internal consistency measures as surrogate indicators of dimensionality.

Insert Table 5 Here

**Results for Test of H2**

Unidimensionality assessment results computed by LISREL 8.0 software for the four innovativeness scales are presented in Table 6. Results demonstrate favorable evidence of unidimensionality for scales 1A and 1B. P-values associated with the $X^2$ goodness-of-fit test statistic exceeded the .01 minimum cut-off value; the $X^2$/D.F. ratio was less than 2.0; the goodness-of-fit and adjusted goodness-of-fit indices were .94 or greater; and the root mean square residuals were less than .05 (Table 6). However, results associated with unidimensionality assessment for scales 2A and 2B were another matter.

Research hypothesis H2 predicted that changing the polarity of scale items will degrade the CFA evidence of unidimensionality in this experiment, and that is consistent with the results achieved. Scale 2A, the modification of scale 1A created by re-phrasing three positive items as negative ones, generated weak goodness-of-fit values when subject to CFA testing. The p-value failed to exceed the .01 minimum; the $X^2$/D.F. ratio exceeded 2.0; adjusted goodness-of-fit index fell to .90; and RMR exceeded the .05 guideline. Scale 2B, the modification of 1B created by re-phrasing three negative items to positive items, also generated weak goodness-of-fit results. All appropriate indices deteriorated further. Since the recast scales 2A and 2B demonstrated weaker evidence of unidimensionality, hypothesis H2 is supported.

Insert Table 6 Here

## DISCUSSION AND CONCLUSIONS

Because research in marketing usually deals with constructs that are not directly observable and are often complex in their interpretation, the movement toward multi-item measurement methodologies should be encouraged. In order to validate consumer research, it is incumbent upon the researcher to demonstrate the validity of the measures employed. Recently it has been recognized that part of that validation process should involve providing evidence for claiming unidimensionality of all the measures (Anderson and Gerbing 1987; Gerbing and Anderson 1988; Kumar and Dillon 1987).

Response acquiescence or "yea-saying" continues to be a concern for consumer researchers. The conventional solution has been to incorporate reversed polarized (RP) items to force respondents with strong positive or negative attitudes to use both ends of a scale, yet little concern regarding the impact of this practice on the dimensionality of measures has been voiced to date. The results presented here support our two research hypotheses which were developed from an attribution theory perspective. The presence of negatively-phrased items appeared to adversely affect unidimensionality when a scale is applied to populations that have different characteristics than the population in which the scale was originally developed. In addition, the practice of recasting scale items to opposite polarity causes diminution of scale dimensionality even when administered to the same population in which the measure was developed.

The primary contribution of this research is to highlight the fact that the item polarization decision should be seen as a tradeoff between two suboptimal extremes due to positivity bias and differential contrast thresholds associated with negative wording. The empirical evidence presented in this study suggest that there is a tradeoff between the unidimensionality of measures, maximized by the exclusive use of uni-polar items, and the control of acquiescence bias introduced by the "agreement phenomenon" and controlled by the use of reversed-polarity items. Since neither scenario is desirable, alternative approaches to measurement development need to be explored.

One possible solution involves coordinating the development and administration of several scales to be complementary in their polarity between measures, yet mono-polar within any given scale. For example, assume a researcher is interested in measuring six constructs across several respondent populations. Three sets of items corresponding to the first three constructs would be worded positively, three in a negative fashion. The resulting items would then be positionally blended on the instrument so that no two items from the same construct would be administered in a contiguous sequence. The result would be a series of statements or questions with an equal number of positive- and negative-polarity items, but also with no measure containing items with conflicting polarity.

This approach has the advantage of preserving dimensionality through uni-polar scale administration and identifying acquiescence bias by utilizing both ends of the agreement/disagreement continuum. Of course, this approach requires compatible scale formats (anchor labels must be the same, all scales must use a Likert or semantic differential format, etc.), a single set of directions must be applicable, and a consistent number of points must be employed for each item. These limitations may require further validation exercises when established measures are modified, as changing anchor labels or the number of points in a scale can alter its psychometric properties (Martin 1973; 1978).

To control for attribution effects in situations where the above solution may not be practical, reversed polarity (RP) items can be included among multi-item measures, but they need not be treated as part of the construct measurement per se. RP items can be used to disqualify yea-saying respondents from further analyses, to force them to more carefully read each item in a series and to generate scores to be used to statistically control for acquiescence (e.g., Winkler et al. 1983). The RP items would not be part of a summation into composite scores, nor would they be included in any factor analyses seeking to obtain latent scores for the construct in question. This "middle ground" strategy carries most of the benefits of RP items without their inherent fragmentation of measure dimensionality. Of course, any approach will be subject to questionnaire space constraints.

This cautionary appeal is intended to encourage multi-item measurement development in marketing from an informed basis. Attribution effects negatively impact measurement validity and should be viewed as a topic for further research.

**Table I**
**Sample Characteristics**

| Study No. | Sample Size | Respondents | Scales Tested | Reversed Items/ Tot. Items | National Origin | Response Rate |
|---|---|---|---|---|---|---|
| 1 | 271 | Salespeople | SOCO ADAPTS | 12/24 7/16 | United States | 17% |
| 2 | 129 | Salespeople | SOCO ADAPTS | 12/24 7/16 | United States | N/A |
| 3 | 245 | Salespeople | SOCO ADAPTS | 12/24 7/16 | Holland | 30% |
| 4 | 806 | Consumers | CETSCALE[a] | 7 17 | United States | 42% |
| 5 | 142 | Executives | 1A, 1B | 6/12 | United States | 34% |
| 6 | 200 | Executives | 2A, 2B | 3/9 | United States | 29% |

A - The CETSCALE version administered in this survey was revised as described in Table 2

**Table 2**
**Altered Wording of the CETSCALE**

| Item | Original Wording |
|---|---|
| 1. | American People should always buy American-made products. |
| 5. | Purchasing foreign-made products is un-American. |
| 7. | A real American should always buy American-made products. |
| 9. | It is always best to purchase American products. |
| 12. | Curbs should be put on all imports. |
| 14. | Foreigners should not be allowed to put their products on our markets. |
| 17. | American consumers who purchase foreign products are responsible for putting their fellow Americans out of work. |

**Reverse Polarity Wording (used in Survey #4)**

| Item | Reverse Polarity Wording |
|---|---|
| 1. | American people should not always buy American-made products. |
| 5. | Purchasing foreign-made products is not un-American. |
| 7. | A real American should not always buy American-made products. |
| 9. | It is not always best to purchase American products. |
| 12. | Curbs should be taken off of all imports. |
| 14. | Foreigners should be allowed to put their products on our markets |
| 17. | American consumers who purchase foreign products are not responsible for putting their fellow Americans out of work. |

**Table 3**
**Scales 1A, 1B, 2A, and 2B**

**Item** **Scale Item**

**Scale 1A:**

1. Engineers make a significant contribution to our success.
2. Consumers inspire our product development program.
3. We set high goals for the number of products we develop.
4. Our management encourages us to "brainstorm. "
5. We take great pride in our ability to adapt new technology.
6. We strive for greater productivity from our product development efforts each year.

**Scale 1B:**

1. We seldom monitor technological developments. (RP)
2. Our efforts are focused more on "refinements" than on " breakthroughs. " (RP)
3. Our products are rarely "firsts" in the industry. (RP)
4. Our management encourages us to "brainstorm."
5. We take great pride in our ability to adapt new technology.
6. We strive for greater productivity from our product development efforts each year.

**Scale 2A:**

1. Engineers have little to do with our product success. (RP)
2. Consumers rarely inspire our product development program. (RP)
3. We set easy goals for the number of new products we develop. (RP)
4. Our management encourages us to "brainstorm."
5. We take great pride in our ability to adapt new technology.
6. We strive for greater productivity from our product development efforts each year.

**Scale 2B:**

1. We frequently monitor technological developments.
2. Our efforts are focused more on "breakthroughs" than on "refinements."
3. Our products are often "firsts" in the industry.
4. Our management encourages us to "brainstorm."
5. We take great pride in our ability to adapt new technology.
6. We strive for greater productivity from our product development efforts each year.

**Table 4**
**Exploratory Factor Loading Assessment**

**SOCO**

| | **Study 1** | | **Study 2** | | **Study 3** | |
|---|---|---|---|---|---|---|
| **Item[a]** | **Factor 1** | **Factor 2** | **Factor 1** | **Factor 2** | **Factor 1** | **Factor 2** |
| 1 | | .648 | | .546 | .591 | |
| 2 | | .611 | | | .438 | |
| **3** | .411 | | .571 | | | |
| 4 | | .655 | | .569 | .719 | |
| **5** | .622 | | .516 | | | .707 |
| 6 | | .750 | | .739 | .551 | |
| 7 | | .690 | | .670 | .743 | |
| **8** | .781 | | .817 | | | .693 |
| 9 | | .671 | | .765 | .721 | |
| **10** | .769 | | .691 | | | .696 |
| **11** | .639 | | .659 | | | .500 |
| 12 | | .634 | | .748 | .612 | |
| **13** | .698 | | .768 | | | .682 |
| **14** | .687 | | .784 | | | .605 |
| 15 | | .786 | | .720 | .617 | |
| 16 | | .460 | | .679 | .680 | |
| **17** | .659 | | .792 | | | .575 |
| **18** | .596 | | .487 | | | .433 |
| 19 | | .527 | | .494 | .438 | |
| **20** | .555 | | .652 | | | .454 |
| 21 | | | | .474 | | |
| **22** | .443 | | .449 | | | |
| 23 | | .405 | | | | |
| **24** | .670 | | .828 | | | |
| Eigen. | | | | | | |
| | 6.77 | 3.12 | 7.18 | 3.48 | 4.87 | 3.39 |
| % Var. Exp. | | | | | | |
| | 0.28 | 0.41 | 0.30 | 0.44 | 0.20 | 0.34 |

**Table 4 (Continued)**

**ADAPTS**

| | **Study 1** | | **Study 2** | | **Study 3** | |
|---|---|---|---|---|---|---|
| **Item[a]** | **Factor 1** | **Factor 2** | **Factor 1** | **Factor 2** | **Factor 1** | **Factor 2** |
| 1 | | | .423 | | .490 | |
| 2 | .721 | | .795 | | .730 | |
| 3 | .450 | | .552 | | .588 | |
| 4 | .736 | | .772 | | .774 | |
| **5** | | .761 | | .732 | | .707 |
| **6** | | .759 | | .700 | | .637 |
| 7 | .655 | | .833 | | .657 | |
| **8** | | .660 | | .761 | | .735 |
| 9 | .769 | | .796 | | .582 | |
| **10** | | .847 | | .805 | | .807 |
| 11 | .568 | | .485 | | .571 | |
| **12** | .482 | | .419 | | | .523 |
| 13 | .699 | | .674 | | .625 | |
| 14 | .597 | | .544 | | .452 | |
| 15 | .723 | | .633 | | .665 | |
| **16** | | .774 | | .826 | | .811 |
| Eigen. | 5.73 | 2.10 | 5.70 | 2.37 | 5.22 | 2.15 |
| % Var. Exp. | 0.36 | 0.49 | 0.36 | 0.50 | 0.33 | 0.46 |

**Table 4 (Continued)**

**CETSCALE**

| | Study 4 | |
|---|---|---|
| **Item**[a] | **Factor 1** | **Factor 2** |
| **1** | | .725 |
| 2 | .729 | |
| 3 | .777 | |
| 4 | .752 | |
| **5** | | .656 |
| 6 | .697 | |
| **7** | | .706 |
| 8 | .826 | |
| **9** | | .757 |
| 10 | .674 | |
| 11 | .720 | |
| **12** | | |
| 13 | .671 | |
| **14** | | |
| 15 | .667 | |
| 16 | .737 | |
| **17** | .415 | .559 |
| Eigen. | 8.35 | 1.14 |
| % Var. Exp. | 0.49 | 0.56 |

[a] - Items in bold were negatively worded

**Table 5**
**Fit Comparisons of One- and Two-Factor Models**

| Measure/Study | Unidimensional Models | Bidimensional Models[a] | p-value[b] | $\Phi_{2,1}$ Correlation |
|---|---|---|---|---|
| **SOCO/1 ($\alpha$=.88)** | | | .000 | .410 |
| $X^2$/D.F. | 3.953 | 1.888 | | |
| Goodness of Fit | 0.652 | 0.867 | | |
| Adj. G.F.I. | 0.588 | 0.841 | | |
| Root Mean Res. | 0.118 | 0.066 | | |
| **SOCO/2 ($\alpha$=.89)** | | | .000 | .357 |
| $X^2$/D.F. | 2.870 | 1.845 | | |
| Goodness of Fit | 0.591 | 0.753 | | |
| Adj. G.F.I. | 0.515 | 0.704 | | |
| Root Mean Res. | 0.143 | 0.093 | | |
| **SOCO/3 ($\alpha$=.81)** | | | .000 | .210 |
| $X^2$/D.F. | 3.708 | 2.299 | | |
| Goodness of Fit | 0.673 | 0.819 | | |
| Adj. G.F.I. | 0.613 | 0.783 | | |
| Root Mean Res. | 0.125 | 0.091 | | |
| **ADAPTS/1 ($\alpha$=.87)** | | | .000 | .561 |
| $X^2$/D.F. | 5.163 | 4.769 | | |
| Goodness of Fit | 0.740 | 0.827 | | |
| Adj. G.F.I. | 0.659 | 0.774 | | |
| Root Mean Res. | 0.102 | 0.146 | | |
| **ADAPTS/2 ($\alpha$=.87)** | | | .000 | .404 |
| $X^2$/D.F. | 3.875 | 2.952 | | |
| Goodness of Fit | 0.671 | 0.671 | | |
| Adj. G.F.I. | 0.569 | 0.569 | | |
| Root Mean Res. | 0.134 | 0.134 | | |
| **ADAPTS/3 ($\alpha$=.85)** | | | .000 | .524 |
| $X^2$/D.F. | 4.654 | 3.788 | | |
| Goodness of Fit | 0.740 | 0.837 | | |
| Adj. G.F.I. | 0.660 | 0.787 | | |
| Root Mean Res. | 0.103 | 0.127 | | |
| **CETSCALE/4 ($\alpha$=.93)** | | | .000 | .848 |
| $X^2$/D.F. | 7.706 | 4.949 | | |
| Goodness of Fit | 0.851 | 0.917 | | |
| Adj. G.F.I. | 0.809 | 0.892 | | |
| Root Mean Res. | 0.041 | 0.038 | | |

[a] - constrained the reversed polarity items to load on a second factor

[b] - significance of improvement in fit between unidimensional and bidimensional models

**Table 6**
**Unidimensionality Assessment of Scales 1A, 1B, 2A, and 2B**

| Fit Statistics | Scale 1A | Scale 1B | Scale 2A | Scale 2B |
|---|---|---|---|---|
| $X^2$ (9 D.F.) | 7.51 | 11.20 | 25.86 | 51.45 |
| (p-Value) | (0.58) | (0.26) | (0.002) | (0.000) |
| $X^2$/D.F. | .834 | 1.244 | 2.873 | 5.717 |
| Goodness of Fit | .98 | .97 | .96 | .92 |
| Adj. G.F.I. | .96 | .94 | .90 | .82 |
| Root Mean Res. | .033 | .043 | .065 | .062 |
| Coefficient α | .76 | .75 | .60 | .80 |

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