BERT WEIJTERS and HANS BAUMGARTNER*

There are important advantages to including reversed items in questionnaires (e.g., control of acquiescence, disruption of nonsubstantive responding, better coverage of the domain of content of a construct), but reversed items can also lead to measurement problems (e.g., low measure reliability, complex factor structures). The authors advocate the continued use of reversed items in measurement instruments but also argue that they should be used with caution. To help researchers improve their scale construction practices, the authors provide a comprehensive review of the literature on reversed and negated items and offer recommendations about their use in questionnaires. The theoretical discussion is supplemented with data on 1330 items from measurement scales that have appeared in *Journal of Marketing Research* and *Journal of Consumer Research*.

*Keywords:* survey methods, Likert items, reversed items, negations, misresponse, method effects

### Misresponse to Reversed and Negated Items in Surveys: A Review

When constructing a scale or selecting multi-item measures for use in a questionnaire, marketing researchers face a dilemma: Should they include reversed items, or should they rely exclusively on items that are all worded in the same direction? In addition, if reversed items are to be used, does it matter how the reversal is achieved (i.e., by negating regular, nonreversed items or by formulating nonnegated items that are opposite in meaning to regular items)?

There are important advantages to including reversed items in questionnaires. First, reversed items implicitly correct for acquiescence or agreement bias, particularly if the scale is balanced (i.e., the total scale consists of an equal number of regular and reversed items; see Baumgartner and Steenkamp 2001). Second, reversed items may act as cognitive “speed bumps” (Podsakoff et al. 2003) and disrupt nonsubstantive response behavior. Third, reversed items can improve scale validity by broadening the belief sample on which responses are based, thus ensuring more complete coverage of the domain of content of the underlying construct and enhancing the prediction of other constructs (Tourangeau, Rips, and Rasinski 2000). For these reasons, it is not surprising that measurement experts have frequently advocated the routine use of reversed items (e.g., Churchill 1979; Nunnally 1978, Chapter 15; Paulhus 1991).

Unfortunately, there is also a substantial amount of empirical evidence indicating that the inclusion of reversed items can have several undesirable consequences. To begin, reversed items often have lower item-total correlations than regular items, and as a result, scales containing reversed items tend to have lower reliability (e.g., Schriesheim, Eisenbach, and Hill 1991). Furthermore, factor models including reversed items generally fit more poorly, and reversed items often exhibit smaller factor loadings. At times, reversed items may even distort the factor structure and lead to the erroneous specification of multiple substantive factors based on sets of items varying in their coding direction (e.g., Marsh 1996).

Because of these problems, some experts have argued against the use of reversed items in measurement scales (e.g., DeVellis 2003). However, while dropping reversed items may improve the reliability of the resulting scale and lead to simpler factor structures, these desirable internal psychometric properties may simply signal mindless and mechanical repetition of responses to items that are minor

---

* Bert Weijters is Assistant Professor of Marketing, Vlerick Leuven Gent Management School and Ghent University (e-mail: bert.weijters@vlerick.com). Hans Baumgartner is the Smeal Professor of Marketing, Smeal College of Business, Department of Marketing, Pennsylvania State University (e-mail: hansbaumgartner@psu.edu). Both authors contributed equally to this research. The authors thank Rik Pieters, Mario Pandelaere, and Elke Cabooter for their feedback on previous versions of this article. They also acknowledge the constructive comments of the review team. Scott MacKenzie served as associate editor for this article.

© 2012, American Marketing Association
ISSN: 0022-2437 (print), 1547-7193 (electronic)
and redundant variations of the same basic question (Weijters, Geuens, and Schillewaert 2009). Furthermore, items that all share the same coding direction contain their own systematic method biases (e.g., responses may be biased in the direction in which the items are worded), and when there are no reversed items, method variance is completely confounded with content variance and becomes undetectable. Finally, items can be reversed in various ways (i.e., through negations or antonyms), and even if some reversals are error prone (e.g., negated items), this does not mean that all reversed items should be eliminated.

In this study, we advocate the use of reversed items in measurement instruments, but we also argue that they should be used with caution. Responses to reversed items can be susceptible to response inconsistencies or misresponse (MR; Swain, Weathers, and Niedrich 2008), so a careful analysis of the problem of MR to reversed and negated items is required. There are different types of MR depending on how the reversal is achieved; response inconsistencies can arise at different stages in the survey response process; and depending on the psychological mechanism leading to the MR, different strategies should be used to prevent inconsistencies in responding. Our goals in the current research are to provide a detailed discussion of the problem of MR to reversed and negated items and to help researchers improve their scale construction practices.

We organize the remainder of the article as follows: First, we propose a conceptualization that distinguishes item reversal and the closely related concept of item negation. We offer typologies of reversed and negated items and integrate the two concepts. Second, on the basis of these distinctions, we develop the notions of reversal MR, negation MR, and polar opposite MR, which reflect distinct types of response inconsistencies. Third, we survey the literature that has examined the psychological mechanisms underlying MR to reversed and negated items, and on the basis of this review, we formulate recommendations about how to reduce MR ex ante. Our main contribution to the marketing literature is that we provide a nuanced discussion of how to formulate reversed and negated items that will help researchers enhance the validity of their questionnaires while avoiding the problems created by MR to reversed and negated items.

**CONCEPTUALIZATION OF ITEM REVERSAL AND ITEM NEGATION**

Although in practice item reversal is frequently achieved through item negation, the two concepts must be distinguished carefully because a reversed item may or may not contain a negation, and an item containing a negation may or may not be reversed. The following three items from the happiness factor of the material values scale (Richins and Dawson 1992) effectively illustrate this point: (1) "It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like" (no reversal, negation); (2) "I have all the things I really need to enjoy life" (reversal, no negation); and (3) "I wouldn't be any happier if I owned nicer things" (reversal, negation). Many authors do not draw a clear distinction between reversed and negated items and use terms such as "negatively worded items," which obscure whether they mean reversed or negated items. In the remainder of this section, we first develop the notions of reversal and negation and then integrate the two concepts. We illustrate our discussion with data based on an analysis of 1330 items measuring 314 (sub)factors found in Volumes 1–46 of *Journal of Marketing Research* (1964–2009) and Volumes 1–36 of *Journal of Consumer Research* (1974–2009; for details, see the Web Appendix at www.marketingpower.com/jmr_webappendix).

**Item Reversal**

In general, a reversed item can be defined as an item whose meaning is opposite to a relevant standard of comparison (e.g., the polarity of the construct being measured). Whether an item is reversed is a semantic issue and cannot be judged for an item in isolation, because the answer depends on the meaning of the item relative to the standard. Depending on the standard chosen, different senses of reversal can be distinguished.

First, an item may be reversed relative to the polarity of the construct being measured. This is the traditional meaning of item reversal, and a scale developer will usually define the polarity of the construct and indicate which items in the scale are reverse-coded (or keyed false). Because respondents usually do not know which construct is being measured (unless the instructions explicitly mention the target construct or respondents can easily infer the construct being measured), a researcher's designation of whether an item is reversed may not be particularly relevant to respondents' reactions to items and therefore cannot explain MR.

Second, an item may be reversed relative to the other items measuring the same construct, particularly relative to the polarity of the majority of the items in the scale (or possibly the polarity of the first item measuring the construct of interest). In the special case of a balanced scale, in which the number of regular and reversed items is equal, item reversal in the second sense is undefined. Because the items in the dominant coding direction may create a response set that influences people's answers to subsequent questions—particularly if multiple items coded in the same direction precede a reversed item (Budd 1987; Drolet and Morrison 2001; Weijters, Geuens, and Schillewaert 2009)—unbalanced scales may be prone to MR.

Third, an item may be reversed relative to a respondent's true position on the issue under consideration. Researchers do not usually think of item reversal in this third sense, but in a recent article, Swain, Weathers, and Niedrich (2008) argue that incongruence between an item's polarity and a respondent's true beliefs has a pronounced effect on MR to reversed Likert items (e.g., an extrovert may find it difficult to respond to an item about being introverted). Defining item reversal relative to a respondent's true position is a novel idea, and it makes intuitive sense that responding to items that are opposite in meaning to what the respondent really believes is difficult. However, it may not be realistic to assume that respondents have ready-made opinions on any topic that researchers might question them about. Moreover, from a practical perspective, the goal of a survey is to ascertain a respondent's position on an issue, so assuming that the response depends on what the researcher wants to measure is not helpful.

We examined the frequency of item reversals in the marketing literature by conducting a survey of 1330 items reported in *Journal of Marketing Research* (1964–2009).
and Journal of Consumer Research (1974–2009). To do this, we coded how many items were reversed according to reversal relative to the polarity of the construct and relative to the dominant keying direction (we cannot code reversals according to respondents’ true beliefs). Overall, 83% or 84% of items were nonreversed in the first two senses. Alternatively, if we examine the percentage of factors (or subfactors, in the case of multifactor constructs) that do not contain reversed items, this proportion is 70%. Only 8% of factors (of 314) were composed of an equal number of reversed and nonreversed items (i.e., the scale was balanced). We also regressed a binary indicator of whether a scale contained at least one reversed item (across the 314 factors) on the linear and quadratic effects of year of publication (mean-centered) and journal (using logistic regression and taking into account correlated errors of observations from the same study). Both the linear and quadratic terms of year of publication were negative and highly significant (p < .005). The relationship between the probability that a factor contained at least one reversed item and year of publication was an inverted U, with the estimated probability at its maximum in 1987. Notably, the incidence of reversed items has decreased substantially during the past decade. One possible reason for this decline may be the more widespread use of confirmatory factor analysis during scale development, which imposes more stringent demands on the clarity of the factor structure and model-data fit. Although the application of confirmatory factor analysis has generally been a positive trend, the elimination of reversed items might be a detrimental side effect. The difference between journals was also significant (p < .05), with Journal of Consumer Research articles containing more reversed items. Overall, these findings suggest that reversed items are not very common in marketing scales, that balanced scales are particularly rare, and that the use of reversals has declined during the last decade under study.

Item Negation

An item in a survey can be stated either as an affirmation or as a denial (disaffirmation) of something (Horn 1989). In the latter case, we say that the item is negated or contains a negation. Whether an item is negated is essentially a grammatical issue and can be decided relatively unambiguously for each item in isolation. Negation is often equated with the negation of a verb with the particle “not,” but items can be negated in many other ways. The Web Appendix (www.marketingpower.com/jmr_webappendix) presents a classification of negations in terms of two dimensions: which part of speech is negated (i.e., verbs, nouns/pronouns, adjectives, adverbs, or propositions/conjunctions) and how the negation is achieved (i.e., by means of the particle “not,”) the addition of “no,” the use of negative affixes such as “un-” or “dis-,” negative adjectives or adverbs such as “few” or “never,” negative pronouns such as “nobody” or “nothing,” and negative prepositions such as “without”).

In our pool of 1330 items, 20% contained at least one negation. We coded the negations in terms of the two dimensions in our classification scheme, and as expected, the most common negation type was the negation of a verb with the particle “not” (e.g., “This salesperson does not make false claims”), which accounted for approximately 43% of all negations. However, more than half of all negations consisted of 17 other negation types, including affixal negation of adjectives (e.g., “Most charitable organizations are dishonest”), the use of negative adjectives or adverbs to negate a verb (e.g., “I seldom daydream”), or the negation of a noun or pronoun with “no” (e.g., “Clipping coupons is no fun”). The point we want to emphasize is that items can be negated in many ways and that some forms of negation may not be recognized as such.

Integrating Item Reversal and Item Negation

If we cross-classify item reversal and item negation, four cases can be distinguished (e.g., Bentler, Jackson, and Messick 1971; Schriesheim, Eisenbach, and Hill 1991): Items may be nonreversed and nonnegated (regular items), reversed and nonnegated (polar opposite items), nonreversed and negated (negated polar opposite items), and reversed and negated (negated regular items). Depending on the type of reversal and the type of negation, many combinations are possible, but for purposes of illustration, consider a situation in which a researcher wants to measure individual differences in extroversion. Table 1 illustrates the four possibilities when item reversal is defined in the first sense (reversal relative to the polarity of the construct of extroversion) and negation is operationalized by negation of a verb (or adjective) with the particle “not.”

We refer to the main idea expressed in an item, ignoring the negation (if there is one), as the core concept. In Table 1, the core concept of the statements on the main diagonal is extroversion (talkative, enjoying talking to people), whereas the core concept of the statements in the off-diagonal is introversion (quiet, preferring to do things alone). Because the construct of interest is extroversion, the item in the top left-hand cell of Table 1 (e.g., “talkative”) is regarded as the regular item. There are two ways we could reverse this item: We could find a polar opposite item or antonym (by replacing extroversion with introversion as the core concept, i.e., “quiet”), or we could negate the regular item (which yields a negated regular item, i.e., “not talkative”). Negating a polar opposite item (i.e., “not quiet”) results in a negated item that is nonreversed relative to the polarity of the construct of extroversion (similar to double negation).

Because previous research has often confounded reversal and negation, it is important to study their co-occurrence in actual scales. If we cross-classify the 1330 items in our item pool in terms of item reversal (in the first or second sense)

Table 1

<table>
<thead>
<tr>
<th>Item Nonreversed</th>
<th>Item Reversed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item nonnegated</td>
<td>Regular item: Talkative, enjoying talking to people</td>
</tr>
<tr>
<td>Item negated</td>
<td>Negated polar opposite item: Not quiet, preferring not to be by oneself</td>
</tr>
</tbody>
</table>

Notes: Relative to the polarity of the construct of extroversion, “talkative” and “enjoying talking to people” are nonnegated, nonreversed items (reversal in the first sense). Items are negated with the particle “not.”
and item negation (using all negation types), approximately 70% of the items are nonreversed and contain no negation. For reversal relative to the polarity of the construct, 9% of the items are reversed but contain no negation, and 9% are reversed and also contain a negation. Approximately 12% of the items contain a negation but are not reversed. These figures demonstrate that reversal and negation should not be equated. Although most items are nonreversed and nonnegated (because overall there are relatively few reversed and negated items), reversed items may or may not contain a negation, and items containing a negation may or may not be reversed.

When researchers use multiple items to measure a construct of interest, the goal is to maximize the construct validity of the scale. Including reversed items can serve this purpose, but it is necessary to avoid response inconsistencies. As we demonstrated in the last paragraph, item reversal is often achieved with either antonyms or negations; however, sometimes items are negated even though the item is not reversed. The question arises how researchers can formulate and use reversed items most effectively (e.g., antonyms may be beneficial, even if negation is not a good way to reverse the meaning of an item) and whether item negation is useful when it does not serve the purpose of reversing an item. Although relevant prior research regarding these questions is available, no integrative treatment has appeared in the literature. In the remainder of this article, we first define the notion of MR more carefully and distinguish different types of MR. Then, we review various explanations of MR to reversed and negated items and, on the basis of our review of the psychological mechanisms leading to response inconsistencies, recommend different strategies for preventing MR to reversed and negated items.

**MR TO REVERSED AND NEGATED ITEMS**

We define MR as a within-participant inconsistency in responding to multiple items that are intended to measure the same construct. It should be noted that this definition of MR depends crucially on the assumption that all items are valid indicators of the underlying construct; otherwise, a seemingly inconsistent response is only an apparent MR. We hypothesize MR to be a function of characteristics of the respondent (e.g., acquiescent response tendencies), item properties (e.g., an item’s extremity), and situational factors (e.g., the distribution of nonreversed and reversed items in the questionnaire), as well as interactions between these factors. Response inconsistencies in surveys are a general problem that may be caused by many factors, but we are specifically interested in three specific types of MR: MR to reversed items (reversal MR), MR to negated items (negation MR), and MR to reversed core concepts (polar opposite MR).

Reversal MR is a within-participant response inconsistency that is attributable to an item being reversed (a polar opposite or negated regular item). In other words, reversal MR reflects a failure to respond appropriately to reversals, and it leads to a response inconsistency for pairs of items in which one item in the pair is reversed. Bentler, Jackson, and Messick (1971) refer to this as “agreement acquiescence,” but there are other mechanisms besides acquiescence that can lead to this MR pattern. Negation MR is a within-participant response inconsistency that is attributable to an item containing a negation (either a negated polar opposite or a negated regular item). That is, respondents answer affirmations appropriately but have difficulties with negations. The result is a response inconsistency for pairs of items in which one of the items is negated (Swain, Weathers, and Niedrich 2008). Polar opposite MR is a within-participant response inconsistency that is attributable to an item’s core concept being the polar opposite (or antonym) of the core concept in the reference item (a polar opposite or negated polar opposite item). Polar opposite MR indicates inappropriate responding to antonyms, and it results in a response inconsistency for pairs of items in which the polarity of the core concept differs. Bentler, Jackson, and Messick (1971) refer to this as “acceptance acquiescence” (or “endorsement bias”). Table 2 illustrates the three types of MR in the context of an extroversion scale.

**THEORETICAL EXPLANATIONS OF THE THREE TYPES OF MR**

In this section, we discuss several explanations of MR to reversed, negated, and polar opposite items that researchers have proposed in the literature. In the next section, we provide recommendations for scale construction. We structure the discussion by relating the MR mechanisms to the cognitive processes that survey participants must execute when responding to questionnaire items (Tourangeau, Rips, and Rasinski 2000): (1) comprehension (attending to a question and interpreting it), (2) retrieval (generating a retrieval strategy and then retrieving relevant beliefs from memory), (3) judgment (integrating the information into a judgment), and (4) response (mapping the judgment onto the response categories provided and answering the question). In practice,

Table 2: MISRESPONSE AS A FUNCTION OF ITEM REVERSAL AND ITEM NEGATION

<table>
<thead>
<tr>
<th>Item</th>
<th>(1) Consistent Responding</th>
<th>(2) Misresponse to Reversed Items (Reversal MR)</th>
<th>(3) Misresponse to Negated Items (Negation MR)</th>
<th>(4) Misresponse to Polar Opposites (Polar Opposite MR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talkative (regular item)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Not talkative (negated regular item)</td>
<td>D</td>
<td>A</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>Quiet (polar opposite item)</td>
<td>D</td>
<td>A</td>
<td>D</td>
<td>A</td>
</tr>
<tr>
<td>Not quiet (negated polar opposite)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>D</td>
</tr>
</tbody>
</table>

Notes: The columns illustrate different response patterns corresponding to consistent responding, MR to reversed items (reversal MR), MR to negated items (negation MR), and MR to polar opposites of the core concept (polar opposite MR) for an extroverted respondent. A = agree response, and D = disagree response. The ellipses indicate the item for which an MR occurs (relative to consistent responding). (For an explanation of regular, negated regular, polar opposite, and negated polar opposite items, see Table 1.)
the various steps need not be strictly sequential, and there may be considerable overlap and interactions between the cognitive processes at each step. Nevertheless, the four processes provide a meaningful conceptual framework for structuring previous research.

We attempt to clearly state whether a given mechanism leads to MR to reversed, negated, or polar opposite items. Unfortunately, this is not always possible, because the three MR types are not orthogonal and the mechanisms to be discussed were not always developed according to a careful distinction between reversal and negation. Furthermore, to distinguish the MR types empirically, we need all four combinations of reversal and negation, and often only two kinds of items are available (e.g., reversal MR and polar opposite MR are confounded when only regular and polar opposite items are compared; see Table 2).

**Comprehension-Related MR**

During the comprehension stage, respondents must attend to an item and interpret it (Tourney, Rips, and Rasinski 2000). We distinguish two major reasons MR can occur at this stage: careless responding and reversal ambiguity.

**Careless responding.** Schmitt and Stults (1985) suggest that MR to reversed items is due to careless responding—that is, a failure to notice that an item was reversed. More specifically, they suggest that respondents might form expectations about what the survey is meant to assess and answer individual items according to their overall position with regard to the issue rather than specific item content. Drolet and Morrison (2001) further propose that careless responding is especially likely when a reversed item is preceded by several nonreversed items. In scales that do not contain reversed items, grouping the items by construct may actually lead to higher internal consistency when respondents are careless (Budd 1987). However, when there are reversed items, carelessness generates reversal MR. We should emphasize here that the higher internal consistency of scales containing no reversed items does not necessarily justify the elimination of reversed items. High internal consistency may simply be due to systematic method variance, whereas the use of reversed items allows the researcher to identify careless responders and at least control for careless responding post hoc.

**Reversal ambiguity.** Even if respondents pay close attention to item wording, they may not perceive an antonym intended as a reversal by the researcher as being opposite in meaning to regular items (e.g., “relaxed” may not be viewed as an antonym for “stimulated”). This can lead to polar opposite MR.

There are also response patterns that look like a response inconsistency on the surface but may actually be logically justified. To understand this point, it is necessary to distinguish contradictories and contraries (Horn 1989). Two statements A and B are contradictory if the truth of A implies the falsity of B, and vice versa. Thus, if respondents agree with A, they should disagree with B. In contrast, two statements are contrary if they cannot both be true but they can both be false. Although respondents should not simultaneously agree with both A and B, they can disagree with both.

When a polar opposite (or antonymous expression) is used to reverse the meaning of a statement, the reversal is contradictory when the antonym is bounded (e.g., “dead” vs. “alive,” which are mutually exclusive) and contrary when the antonym is unbounded (e.g., “empty” vs. “full,” which are not mutually exclusive; see Paradis and Willners 2006). In the former case, simultaneous agreement or disagreement with both items signals MR (either reversal MR or polar opposite MR), but in the latter case, respondents could justifiably disagree with both items and a pattern of simultaneous disagreement may only be an apparent MR.

McPherson and Mohr (2005) argue that simultaneous disagreement with contrary statements is particularly likely if regular and reversed items are worded extremely, and they demonstrate this effect with the Life Orientation Test. For example, it is logically consistent to disagree with the following two extreme items: “I always look on the bright side of things,” and “If something can go wrong for me, it will.” The number of respondents who disagreed with both items dropped substantially in a modified version of the scale in which the items were worded more moderately (e.g., “I usually look on the bright side of things”; “If something can go wrong for me, it quite often will”). The extremity phenomenon illustrates that seemingly inconsistent response patterns can actually be logically justified. The problem lies with the wording of the item, not with the respondent.

The meaning of a statement can also be reversed through negation. When the core concept in two items is identical and one of the items is negated (e.g., “talking” and “not talking”), the two items are contradictories, and simultaneous agreement or disagreement with both items is an instance of MR (either negation MR or reversal MR). The situation is less obvious when the core concepts differ. Paradis and Willners (2006) argue that for bounded adjectives (e.g., “dead” vs. “alive”), a negated antonym has the same meaning as a synonym (e.g., “not dead” is the same as “alive”), but for unbounded adjectives (e.g., “full” vs. “empty”), this is not the case (e.g., “not full” does not necessarily mean the same as “empty”). Therefore, inconsistent responses to negated bounded antonyms are true MRs (either negation MR or polar opposite MR), but a seemingly inconsistent response to a negated unbounded antonym may only be an apparent MR.

The problem of reversal ambiguity can be particularly acute in cross-cultural research. Recent evidence suggests that the distinction between contradictories and contraries may be culture specific because certain cultures have a tendency to interpret statements that seem contradictory by Western standards in a more inclusive and compatible manner. For example, Wong, Rindfleisch, and Burroughs (2003, p. 86) argue that “Buddhism’s ontology and epistemology appear to make East Asians relatively comfortable with apparent contradictions. In a study with respondents from the United States, Singapore, Thailand, Japan, and Korea, Wong, Rindfleisch, and Burroughs (2003) demonstrate that the correlation between regular and (re-coded) reversed items in Richins and Dawson’s (1992) materialism scale was positive and substantial for Americans (as expected) but was weak or even negative for East Asians. Thus, agreeing with both a regular and reversed item seems more common and acceptable for respondents in East Asian cultures, resulting in response patterns that can be classified as reversal MR (because reversals in the materialism scale are achieved through a mix of negations and polar opposites
and East Asians responded inconsistently to both; see Table 2).

**Retrieval-Related MR**

It is unlikely that respondents have ready answers to any attitudinal question that researchers might ask them. According to the belief sampling model that Tourangeau, Rips, and Rasinski (2000) propose, respondents construct a response to a survey question according to relevant beliefs that they retrieve from memory. Which beliefs are retrieved from memory depends on the wording of an item and its position relative to related items in the questionnaire.

**Item wording effects on retrieval.** Research indicates that people have a tendency to retrieve primarily beliefs in support of a statement. This effect is an instance of the well-known confirmation bias during information search (Davies 2003). Kunda et al. (1993) investigate the effect of directional questions (e.g., “Are you extroverted?” vs. “Are you introverted?”) on self-ratings of extroversion/introversion. As expected, respondents asked about being extroverted rated themselves as more extroverted than respondents asked about being introverted. The effect was due to a positive-test strategy in which people engaged in a biased search of their memories. However, the direction of the question only mattered if the memory base was diverse enough to allow the retrieval of evidence supporting either position. When prior evidence consistently supported one pole of the question, or when respondents rated themselves as low in variability across situations in terms of extroversion, there was no question wording effect.

Kunda et al.’s (1993) findings and related research imply that when all items are worded in the same direction, the responses will be biased in the direction in which the items are worded. This contrasts with the situation in which the same respondent is asked questions about both poles of an underlying dimension (using both regular and polar opposite items) and different belief samples corresponding to the wording of the items are retrieved (which is particularly likely when the opposing questions are asked in different parts of the questionnaire; see the subsection “Positioning Effects on Retrieval”). In the latter case, confirmation bias should be mitigated, though the incidence of apparent MR may increase. Thus, the researcher is faced with the following dilemma: On the one hand, more balanced sampling of content relevant to the construct will lessen retrieval biases and increase construct validity; on the other hand, the internal consistency between regular and polar opposite items may suffer.

The effect that Kunda et al. (1993) investigate applies most directly to polar opposite reversals (e.g., extroverted vs. introverted), but what happens when negations are used for the reversed items? Assume, for example, that survey participants are asked to indicate their agreement or disagreement with the item “Most advertising isn’t informative.” One possibility is that respondents first retrieve information consistent with the notion that advertising is informative and then take into account the negation when answering the question. In this case nonnegated and negated statements will evoke largely the same associations, and MR should be low (provided the negation is noted), though the belief samples will be narrow. A second possibility is that respondents spontaneously recode the negated statement as a polar opposite (e.g., “Most advertising is persuasive”) and retrieve information consistent with this representation. In this case, different content may be retrieved (similar to the situation in which a polar opposite is used in the reversed item), and MR will be higher, though the belief samples should be richer.

Mayo, Schul, and Burnstein (2004) suggest that recoding is more likely when a (nonnegated) schema summarizing the meaning of the negated statement is readily available (e.g., “Advertising is persuasive”). According to Mayo, Schul, and Burnstein, this will happen for bipolar constructs with well-defined end poles (i.e., “Advertising is informative” vs. “Advertising is persuasive”). In contrast, if an opposite schema is unavailable, the statement will be coded as the core concept in the original statement (i.e., “Advertising is informative”) with a negation tag added. The authors suggest that this occurs for unipolar constructs (i.e., “Advertising is informative vs. not informative”).

**Positioning effects on retrieval.** If researchers use multiple items to measure a given construct, these items may be grouped together or dispersed throughout the questionnaire. The advantage of using a dispersed scale is that it reduces the likelihood of carryover effects (Feldman and Lynch 1988). The disadvantage is that the task is more taxing for respondents because they must retrieve relevant information from memory whenever they respond to a new item. The more unrelated content respondents encounter between two related items, the lower the likelihood that overlapping belief samples will still be available (Tourangeau, Rips, and Rasinski 2000). As a result, response inconsistencies may occur because responses to related questions are based on different retrieved content. Again, a somewhat paradoxical situation arises in which more diverse belief samples result in better coverage of the domain of content of the construct (Weijters, Geuens, and Schillewaert 2009), but internal consistency is lower.

When items measuring the same construct are grouped together, the degree of similarity between the items is likely to influence retrieval. If a nonreversed item (e.g., “In general, I am among the first to buy new products when they appear on the market”) is followed immediately by a reversed item that is dissimilar in wording (e.g., “If I like a brand, I rarely switch from it just to try something new”), respondents may interpret this as a cue to consider the issue from multiple perspectives and retrieve additional information. If different belief samples show little overlap, inconsistent responses may result, even though respondents provide much richer data (Weijters, Geuens, and Schillewaert 2009). In contrast, if the redundancy between items is blatantly obvious, as when an item (“I feel satisfied”) is immediately followed by the negation of the same item (“I don’t feel satisfied”), respondents are not likely to engage in extra retrieval. As a result, there may be little MR (as long as the reversal is noted), but it is questionable whether the high response consistency has much meaning. Indeed, respondents may dislike these redundancies and become less motivated, which could lead to careless responding.

In summary, both item wording and item positioning can influence the retrieval of relevant information from memory. Although antonyms, negations that are spontaneously recoded as antonyms, and the dispersal of related items throughout the questionnaire can lead to higher (apparent)
MR, respondents may actually generate richer belief samples, which should lessen confirmation bias and improve construct validity.

**Judgment-Related MR**

During the judgment stage, respondents must form an overall evaluation by comparing their own beliefs with the proposition contained in the item. Building on Carpenter and Just's (1975) model, Swain, Weathers, and Niedrich (2008) propose an item verification difficulty explanation of MR to reversed Likert items that is applicable to the judgment stage. According to this account, MR is a function of the complexity of verifying the truth or falsity of an item relative to a respondent's own beliefs (item reversal in the third sense; i.e., reversal relative to a respondent's true position on an issue). This comparison depends crucially on whether an item is stated as an affirmation or a negation. The details of the verification process are somewhat complex (for a complete explanation and illustrative example, see Swain, Weathers, and Niedrich 2008), but the pattern of MR this model predicts is such that true affirmations (e.g., "I am extroverted" for an extrovert) are easiest to verify and result in the lowest MR, followed by false affirmations ("I am introverted"), false negations ("I am not extroverted"), and true negations ("I am not introverted"). Essentially, the model predicts an interaction of truth value, or reversal in the third sense (i.e., whether an item is coded true or false relative to a respondent's true beliefs), and affirmation/negation. In addition, the model implies a main effect of negation on MR, with negated items leading to higher MR than affirmed items (negation MR).

**Response-Related MR**

In the final stage, respondents must map their judgment onto the response categories provided (e.g., by translating moderate agreement to a "slightly agree" response). Two response mechanisms can result in MR at this stage: acquiescence and asymmetric scale interpretation.

**Acquiescence.** Acquiescence (disacquiescence) refers to respondents' tendency to (dis)agree with items regardless of content. Because acquiescent responders agree with both regular and reversed items measuring the same construct, acquiescence leads to reversal MR (see Table 2). Knowles and Condon (1999) propose a dual-process theory of acquiescence, according to which people initially accept a statement and subsequently reevaluate it. The first stage occurs largely automatically, whereas the second stage demands effort. If motivation and/or ability are limited, respondents may not engage in the effortful processing required during the reconsideration stage. Respondents who skip the second stage will tend to agree with both a statement and its reversal, and reversal MR will result. In support of this theory, Knowles and Condon (1999) show that a cognitive load manipulation increases the number of "yes" responses to a Big Five inventory significantly (consistent with the notion of agreement acquiescence in Bentler, Jackson, and Messick [1971] or, in our terminology, reversal MR).

Notably, these authors orthogonally varied (within-participant) both item reversal and item negation (e.g., "enjoying talking to people," "not getting much pleasure chatting with people," "preferring to do things alone," and "preferring not to be by oneself" for the trait of extroversion). In addition to a higher rate of agreement acquiescence in the high-cognitive-load condition, there was also a strong bias toward answering "yes" to assertions and "no" to negations (consistent with the notion of acceptance acquiescence in Bentler, Jackson, and Messick [1971] or, in our terminology, polar opposite MR). However, acceptance acquiescence was independent of agreement acquiescence and did not depend on the cognitive load manipulation (i.e., it occurred for both low and high cognitive load, whereas agreement acquiescence was more pronounced under high cognitive load). This means that, at least in personality inventories, MR during the response stage is caused by both reversal MR and polar opposite MR, and reversal MR is stronger under cognitive load.

**Asymmetric scale interpretation.** Recent evidence has suggested that MR in the response stage may also be caused by respondents' failure to accurately identify the midpoint as the boundary between agreement and disagreement. It is generally assumed that the midpoint of a rating scale serves as the dividing point between responses expressing disagreement and agreement (Marsh and Parducci 1978). However, not all rating scales have explicit labels for all response categories, and often only the endpoints of the rating scale are labeled (Weijters, Cabooter, and Schillewaert 2010). When response scales are not fully labeled, respondents may interpret the rating scale in asymmetric ways, and Gannon and Ostrom (1996) show that this can indeed occur. For example, respondents may interpret a seven-point bipolar rating scale ("innocent" vs. "guilty") such that only the most negative response category evokes associations with one pole of the construct ("innocent"), whereas the other six response categories are interpreted as variations in the intensity of the other pole ("somewhat guilty" to "completely guilty"). If respondents use scales asymmetrically, reversal MR may result (Weijters, Cabooter, and Schillewaert 2010).

**Conclusions Regarding Mechanisms Leading to MR**

We identify several psychological mechanisms that may result in MR. Few studies are available that examine particular mechanisms or compare different mechanisms by manipulating reversal and negation orthogonally, so it is often difficult to decide which particular type of MR is implicated by a given mechanism. However, in general, there is evidence in support of each type of MR. Reversal MR occurs at the comprehension stage (especially when respondents are careless, when contradictories are interpreted incorrectly, and when cultural models make respondents more comfortable with contradictions), at the retrieval stage (though seemingly inconsistent responses may simply reflect more diverse belief samples), and at the response stage (when respondents are prone to acquiescent responding or use unlabeled scales asymmetrically). Polar opposite MR is most likely during the comprehension stage (when presumed antonyms are not interpreted as contradictories but may also occur during the retrieval stage (though broader construct coverage in response to antonyms has definite advantages) and the response stage (when respondents' answers reflect acceptance acquiescence or endorsement bias)). Finally, negation MR appears to be most detrimental during the judgment stage because respondents find it difficult to assess their agreement or disagreement with
the proposition expressed in an item when the item contains a negation.

RECOMMENDATIONS

In this section, we formulate recommendations on how to minimize the risk that MR will contaminate survey responses. Our focus is on avoiding MR during questionnaire design, rather than trying to accommodate MR after it has occurred. We base our recommendations on the psychological mechanisms identified in the literature review and structure them along the same lines, using the stages of comprehension, retrieval, judgment, and response as an organizing framework. Table 3 provides an overview.

Improving Comprehension

Preventing careless responding. Schmitt and Stults (1985) mention three considerations in dealing with the problem of careless responding. First, researchers can alert respondents to the presence of reversed items through explicit instructions to pay attention to possible coding differences in the items. Alternatively, researchers could begin the questionnaire with a pair of regular and reversed items, thus signaling the presence of mixed coding from the beginning of the survey. Second, carelessness is encouraged by factors that create respondent tedium, such as long questionnaires and similar response formats across items. Third, careless responding may be more likely when survey participation is involuntary. In all these situations, lack of involvement is at the heart of the problem, so anything that increases respondents’ processing motivation should be beneficial. In addition, researchers should try to create conditions in which respondents are capable of comprehending the information and distractions are minimized. For example, when using online surveys, researchers can ask respondents to close other windows and encourage them not to engage in tasks that compete for their attention while filling out the questionnaire. Because careless responding is more likely in multi-item scales with dominant keying, particularly if a reversed item follows a block of similarly worded regular items, three complementary solutions are to use balanced scales, to alternate the keying of the items so that no erroneous expectations are induced, and to distribute related items throughout the questionnaire, separated by unrelated buffer items (Weijters, Geenens, and Schillewaert 2009). In general, the problem of careless responding is not solved by making it impossible to detect carelessness through the removal of reversed items. Instead, the problem must be addressed head-on by minimizing careless responding even though opportunities for reversal MR exist.

Reducing reversal ambiguity. Antonyms that are not interpreted as being opposite in meaning to a regular item result in higher polar opposite MR. Therefore, researchers should use specific procedures for identifying appropriate polar opposites. In particular, in a procedure akin to back-translation, respondents could be asked to formulate linguistic contrasts (antonymic expressions) of regular target items. Then researchers could ask an independent group of respondents to generate linguistic contrasts for the items generated in the first stage, which should result in the original (nonreversed) items. Polar opposites suitable for use in reversed items are those that are closely associated with the original item in the two contrast-generation stages. Deese (1965) initially proposed this approach in a more general context, and Dickson and Albaum (1977) introduced it into marketing research by employing it to generate antonyms

Table 3

<table>
<thead>
<tr>
<th>Process</th>
<th>Mechanism</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>Careless responding</td>
<td>• Alert respondents to the presence of reversed items (through explicit instructions and/or by beginning the questionnaire with a pair of nonreversed/reversed items), avoid respondent tedium (long questionnaires, similar response format), and be wary of involuntary survey participants.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eliminate distractions and other influences that negatively affect respondents’ processing capacity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Employ balanced scales (equal number of regular and reversed items), alternate the keying of the items, and separate related items by unrelated buffer items.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reversal ambiguity: • During scale construction, use a two-stage contrast-generation process to formulate polar opposite items.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In cross-cultural research (particularly with East Asian respondents), ascertain that intended reversals are actually interpreted as reversals or use an interrogative scale format.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conduct conceptual or empirical analyses to determine whether antonyms are (perceived to be) unbounded, in which case simultaneous disagreement with regular and reversed items is logically justified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eliminate extreme modifiers (e.g., “very”) from items.</td>
</tr>
<tr>
<td>Retrieval</td>
<td>Biased retrieval due to item wording</td>
<td>• Use polar opposite items to encourage broader belief samples, even if this increases response inconsistency to some extent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assess bias in the retrieval process through cognitive interviews and rephrase problematic items.</td>
</tr>
<tr>
<td></td>
<td>Biased retrieval due to item positioning</td>
<td>• Disperse regular and reversed items throughout the questionnaire, separated by unrelated buffer items.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assess bias in the retrieval process through cognitive interviews and rephrase problematic items.</td>
</tr>
<tr>
<td>Judgment</td>
<td>Item verification difficulty</td>
<td>• Use negations sparingly (including negation types that are less common or obvious; see the Web Appendix [<a href="http://www.marketingpower.com/jmr_webappendix">www.marketingpower.com/jmr_webappendix</a>]), and avoid negated polar opposite items in which the core concept is contrary to most respondents’ true beliefs.</td>
</tr>
<tr>
<td>Response</td>
<td>Acquiescence</td>
<td>• Minimize cognitive load (e.g., counteract online multitasking).</td>
</tr>
<tr>
<td></td>
<td>Asymmetric scale interpretation</td>
<td>• Use fully labeled five- or seven-point rating scales (with explicit midpoints).</td>
</tr>
</tbody>
</table>
Misresponse to Reversed and Negated Items

(adjectives and short phrases) for a bipolar semantic differential scale to measure store image.

Although scale developers may begin with a pool of items containing both regular and reversed items, a disproportionate number of the latter are often eliminated during scale analysis because of poor psychometric properties (e.g., low item-total correlations). This may explain the low incidence of reverse-coded items in many measurement instruments. A possible advantage of the proposed procedure is that it generates a better initial pool of reversed items. The method may be especially beneficial in cross-cultural research, particularly when data are collected in cultures that have been found to be more prone to reversal MR (e.g., East Asian respondents; Wong, Rindfleisch, and Burroughs 2003). In that context, the procedure can complement standard back-translation practices. Basically, translated reversed items should be compared not only with their original, nontranslated versions but also with their translated nonreversed counterparts. Another possibility is to follow Wong, Rindfleisch, and Burroughs’s (2003) recommendation and use an interrogative scale format (e.g., “How do you feel about people who own expensive homes, cars, and clothing?” rated on a scale from “do not admire” to “greatly admire”) instead of the typical Likert format (“I admire people who own expensive homes, cars, and clothing,” rated on an agree/disagree scale). The authors demonstrate that the interrogative format eliminates reversal MR, at least to some extent.

Sometimes, apparent response inconsistencies do not indicate a true MR on the part of the respondent but may instead signal a problem with the item because the researcher has not paid sufficient attention to the distinction between contradictories and contraries. If inconsistencies in response to regular and reversed items are primarily due to simultaneous disagreement with both sets of items, the presence of contraries is the likely culprit. Specifically, if antonyms are unbounded (e.g., “full” vs. “empty”) or negations of unbounded antonyms are used (e.g., “not full” vs. “empty”), it is logically justified to disagree with both items because the reversals are contraries, rather than contradictories. The researcher must conceptually analyze whether it is logically possible to disagree with both poles of an underlying scale or conduct empirical research to determine whether some respondents disagree with both a statement and its presumed opposite.

Importantly, regular and reversed items should not be worded extremely, because extreme wording has been shown to encourage simultaneous disagreement with opposite items (e.g., “I really love this brand” vs. “I really hate this brand”). Moderately worded reversed items lead to more consistent responses (McPherson and Mohr 2005). Dropping modifiers that increase the extremity of a statement (e.g., “very” in “X is very important to me”) can be a simple and effective means of decreasing the risk of apparent MR.

Controlling Biased Retrieval Due to Item Wording and Positioning

The retrieval stage is critical in determining the validity of survey measurement. If respondents retrieve only a narrow sample of relevant beliefs, their responses may be consistent, but validity will suffer in two ways. First, content validity is reduced because only a small portion of the full domain of the construct is considered. Second, criterion-related and/or predictive validity will be compromised because the sampled content is not representative of the construct across situations. Restricted belief samples may be beneficial for enhancing internal consistency, but internal consistency should never be the ultimate goal (Weijters, Geuens, and Schillewaert 2009). If a trade-off must be made between construct validity and internal consistency, we recommend focusing on validity.

If all items are worded in the same direction, respondents are prompted to engage in biased retrieval. Although responses may be internally consistent, they are biased in the direction of the question. Reversing items through the use of polar opposites will offset this bias, but it may lead to apparent MR. It is our impression that researchers tend to focus too much on internal consistency at the expense of breadth of content. At the extreme, this encourages the use of items that are coded in the same direction and worded similarly. Although this may result in a scale that yields an excellent coefficient alpha, respondents’ answers are based on a narrow belief sample, and a positive test strategy and the resulting confirmation bias can lead to misleading conclusions.

On the basis of the foregoing considerations, we recommend the use of polar opposite reversals. Such items tend to be less obviously similar to regular items and should encourage respondents to consider the issue of interest from a different angle. Admittedly, this may come at the risk of somewhat lower internal consistency, but little is gained by maximizing coefficient alpha at the expense of validity. In contrast, we do not perceive retrieval benefits in using negation reversals. Negation reversals, particularly those that restate the original item with the addition of “not,” are unlikely to stimulate the retrieval of additional information; because negations are error prone at other stages in the response process, they should be avoided. One circumstance in which negations might serve a useful purpose is when respondents automatically recode the negation into the appropriate antonym. However, researchers are likely to use negations primarily when there is no obvious antonym (otherwise, why not use the antonym to begin with?), so this situation is probably rare.

With respect to item positioning, our recommendation is that regular and reversed items should be dispersed throughout the questionnaire and mixed with unrelated buffer items, even if this results in somewhat lower reliability. Again, the reason is that this item arrangement encourages the generation of distinct belief samples and more complete coverage of the domain of content of the construct. In contrast, grouping related items together may not serve this purpose well because the belief sample retrieved in response to the first item or the first few items is likely to carry over to the remaining items when respondents want to satisfy (Krosnick 1991). This is particularly the case if the items are similar, such as when a previous item is negated with “not” (e.g., “I’m satisfied” and “I’m not satisfied”). It is possible that respondents do not view polar opposite reversals as redundant even when they immediately follow regular items, but no firm guidelines from prior research are available.

One underutilized procedure for assessing whether retrieval is biased by item wording and/or positioning is cognitive interviewing, especially think-aloud protocols by
respondents completing a survey (DeMaio and Rothgeb 1996). This approach should be particularly useful in the questionnaire development stage. The objective of cognitive interviews in the present case is to better understand how respondents process different types of items (regular, polar opposite, negated regular, and negated polar opposite) in specific positions in the questionnaire. According to Ericsson and Simon (1980), verbalizing cognitive processes provides valid insights into thought processes if respondents report their thoughts while they occur (i.e., concurrently rather than retrospectively). Respondents think aloud as they process items and respond to them. This enables researchers to evaluate the extent to which respondents refer to previous items and/or previously retrieved beliefs and how respondents use item type and the position of the item in the questionnaire as cues in the processes of comprehension, retrieval, and judgment. If cognitive interviewing shows that there are problematic items, they can be reworded or omitted.

Facilitating Judgment

Item verification difficulty theory implies that negations are problematic at the judgment stage because they require additional mental steps during item processing, which increases the likelihood of making mistakes (Swain, Weathers, and Niedrich 2008). To effectively mitigate the damaging effects of negation, researchers must be cognizant of the many guises in which negations may occur (see the Web Appendix at www.marketingpower.com/jmr_webappendix). Although researchers have studied only a few negation types (primarily negation of a verb or adjective with "not" and possibly affixal negation), it is likely that more complicated forms of negations are even more confusing to respondents. In general, the major implication of item verification difficulty for survey research is that negations should be avoided. In addition, if the researcher has reason to expect that most respondents will either agree or disagree with the issue under investigation, negated core concepts that are opposite to the true beliefs of most respondents (reversal in the third sense) should be avoided because they create the most confusion (e.g., "not quiet" for an extrovert).

Promoting Accurate Response Mappings

Even if reversed and/or negated items do not lead to mistakes during the comprehension, retrieval, and judgment stages, observed responses may not accurately reflect respondents' true opinions if a problem occurs during the mapping from subjective categories of judgment to the response categories provided. According to the dual-process account of acquiescence (Knowles and Condon 1999), acquiescence occurs because respondents spontaneously agree with statements and fail to engage in the more effortful reconsideration stage, which leads to reversal MR. The solution to this problem is to encourage respondents to carefully evaluate each item before providing a response. For example, surveys should minimize the cognitive load that respondents experience during questionnaire administration (Krosnick 1991). The recent popularity of online surveys poses a challenge to this goal because researchers have little control over the context in which the questionnaire is completed and respondents are known to multitask in online surveys (e.g., checking e-mails while filling out the questionnaire). Further research should investigate ways respondents can be stimulated to put appropriate effort into the completion of surveys.

Another aspect that may cause reversal MR at the response stage is the format of the rating scale. It is important that respondents unambiguously interpret the response categories. Research shows that respondents do not always perceive intermediate scale positions in the intended way when only the extremes of the rating scale are labeled (Arce-Ferrer 2006). In particular, the midpoint should clearly define the boundary between disagreement and agreement, because when respondents do not interpret the response scale symmetrically, the midpoint the researcher uses to reflect responses to reversed items may not be equivalent to respondents' subjective reflection point. Furthermore, although more scale categories enable more fine-grained distinctions, they also increase the potential for idiosyncratic mappings from subjective categories of judgment onto the response categories available on the rating scale. Our recommendation is that researchers use five- or seven-point rating scales on which all response categories are assigned a label and an explicit midpoint is provided (Weijters, Cabooter, and Schillewaert 2010). For example, for a five-point Likert scale, the labels could be "completely disagree," "disagree," "neither agree nor disagree," "agree," and "completely agree."

CONCLUSION

We take it as a given that, except for special circumstances, multiple items are needed to capture the full meaning of a construct. It appears that the use of reversed items in measurement instruments has fallen into disfavor because of the negative consequences on internal psychometric properties caused by MR to reversed and/or negated items. While we acknowledge that responding to reversed items can be error prone, eliminating them from questionnaires and wording all questions in one direction does not solve the problem and may create a false sense of security by masking nonsubstantive responding. Furthermore, apparent response inconsistencies do not always indicate an MR on the part of the respondent and may instead signal a problem with the item. We advocate the continued use of reversed items in survey research but caution researchers to use them with care. At the risk of oversimplification, negations should probably be employed sparingly, and we believe that there are few benefits to using negations that do not result in an item reversal. Researchers also should be cognizant of the many ways negations may appear in questionnaire items. In contrast, the use of polar opposite reversals has important advantages, especially at the retrieval stage of the response process, when nonnegated reversed items can encourage better coverage of the domain of content of the construct of interest. We hope that our review of the literature on the psychological mechanisms leading to MR to reversed and negated items will help researchers formulate better item reversals and construct more valid measurement instruments.

REFERENCES

Misresponse to Reversed and Negated Items


Drolet, Aimée and Donald G. Morrison (2001), "Do We Really Need Multiple-Item Measures in Service Research?" Journal of Service Research, 3 (3), 196-204.


McPherson, Jason and Philip Mohr (2005), "The Role of Item Extremity in the Emergence of Keying-Related Factors: An Exploration with the Life Orientation Test," Psychological Methods, 10 (1), 120-31.


