Generalizing About the Persuasive Effects of Message Variations: The Case of Gain-Framed and Loss-Framed Appeals

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1. Introduction

One recurring interest in rhetorical studies is the identification of useful general principles of effective message design—identifying what makes for more or less persuasive appeals. The most systematic way of gathering evidence on such questions is to conduct an experiment, in which (to take the simplest form) participants are exposed to one of two versions of a message, where the versions are identical except for the one particular feature of interest. For example, one might compare the persuasiveness of a message in which the advocate's overall conclusion is stated explicitly and that of the same message with the conclusion omitted. There is now quite an extensive empirical literature on such matters, examining a great many different message variations.

This chapter focuses on one such variation, the contrast between what are called "gain-framed" and "loss-framed" persuasive appeals. A gain-framed message emphasizes the advantages of compliance with the communicator's recommended action or viewpoint; a loss-framed message emphasizes the disadvantages of noncompliance. For example, "if you take your high blood pressure medication, you'll probably get to play with your grandchildren" is a gain-framed appeal, whereas "if you don't take your high blood pressure medication, you might not get to play with your grandchildren" is a loss-framed appeal. The animating research question is: which kind of appeal is more persuasive (generally, or in specified circumstances)?

The effects of this message variation are interesting enough in their own right, but I want to discuss this research also because the story of gain-loss message framing research speaks to some larger issues concerning this kind of research—experimental research aimed at producing dependable generalizations about the persuasive effects of message variations. So what follows is a rough narrative of gain-loss persuasive message framing research, concluding with some larger lessons that can be extracted from this case study.

2. Gain-loss framing effects: initial results

The story begins over 20 years ago, in 1987, when one of the first studies of gain-loss message framing was published: Meyerowitz and Chaiken's article in the *Journal of Personality and Social Psychology*, a very well-regarded psychology journal. Meyerowitz and Chaiken compared the effectiveness of gain- and loss-framed messages that were aimed at encouraging women to

undertake breast self-examinations (for the early detection of breast cancer). They found a loss-framed appeal to be substantially more effective than a gain-framed appeal (Meyerowitz & Chaiken 1987).

This was a really striking result. After all, the underlying argument is exactly the same in the two messages; the same underlying substantive consideration is invoked in the two appeals. Even so, this simple change of frame—emphasizing the disadvantages of noncompliance rather than the advantages of compliance—produced a large difference in persuasiveness.

So the question that naturally arises is: Why? Why this difference in persuasiveness, given substantive similarity in the arguments? As it happens, a good explanation of these results was ready to hand, in the form of the psychological phenomenon commonly called "negativity bias." Negativity bias is the heightened impact of, and sensitivity to, negative information (as opposed to otherwise-equivalent positive information; for a review, see Cacioppo, Gardner, & Berntson 1997).

This "robust psychological phenomenon" (Cacioppo & Gardner 1999, p. 206) has a variety of manifestations. For example, gains and losses are psychologically asymmetrical such that persons are generally more sensitive to losses than to otherwise-equivalent gains; specifically, people are more likely to prefer a risky (vs. less-risky) decision option if the option is presented in a way that emphasizes avoiding possible losses rather than obtaining possible gains (the classic study is Tversky & Kahneman 1981; for a review, see Kuhberger, Schulte-Mecklenbeck, & Perner 1999). Negative information has a disproportionate impact on evaluations or decisions compared to otherwise-equivalent positive information (e.g., Hamilton & Zanna 1972; Lutz 1975; for reviews, see Kanouse 1984; Rozin & Royzman 2001; Skowronski & Carlston 1989). Negative stimuli are preferentially detected, that is, detected at lower levels of input or exposure than are positive stimuli (e.g., Dijksterhuis & Aarts 2003). Finally, negative events generally evoke stronger and more rapid reactions (of various sorts) than do positive events (for a review, see Taylor 1991); for instance, negative events evoke more cognitive work than do positive events (Peeters & Czapinski 1990).

Taken together, these findings indicate that negative information is more potent than positive information—which of course is a natural explanation for why a loss-framed message was more persuasive than a gain-framed message in Meyerowitz and Chaiken's study. And in fact, Meyerowitz and Chaiken (1987, pp. 501, 507) invoked negativity bias as a plausible explanation of their results:

> Theorizing associated with the negativity bias effect in person perception and decision-making research . . . suggests that losses may be weighted more heavily than gains . . . Thus it might be predicted that a pamphlet stressing the negative aspects of not doing BSE would have a greater persuasive impact than a pamphlet stressing the positive aspects of doing BSE.

Given the combination of Meyerowitz and Chaiken's finding and the accompanying negativity-bias explanation, the natural conclusion to draw is that loss-framed appeals are generally more persuasive than gain-framed appeals. And indeed that's a common-enough conclusion to see in the literature. For example: "Framing studies . . . have generally shown that . . . loss frames are generally superior to gain frames" (Consedine, Horton, Magai, & Kukafka 2007, p. 551). Or: "Typically, loss frames are more persuasive than gain frames (Meyerowitz & Chaiken, 1987)" (Johnson, Maio, & Smith-McLallen 2005, p. 640).

3. Synthesizing research results through meta-analysis

But is it really true that loss-framed appeals are generally more persuasive than gain-framed appeals? Many subsequent studies have been conducted concerning the relative persuasiveness of gain- and loss-framed appeals, and in recent years Jakob Jensen and I have been engaged in an ongoing project in which we synthesize the results of these studies.

The traditional way of summarizing such studies has been the "narrative" review, in which studies are sorted on the basis of whether the message variation of interest made a statistically significant difference or not (and in what direction the difference occurred), where the reviewer searches for features that distinguish the significant and nonsignificant studies (or for features that distinguish the significant studies with one direction of effect from those with the opposite effect). But this way of synthesizing research is unsatisfactory for various reasons, and especially because of the role that statistical significance plays. As is now more widely appreciated, statistical significance is something different from the *size* of the effect of interest. To take a simple case, the correlation between two variables (X and Y) might be statistically significant in one study and nonsignificant in another—even though the correlation was actually *larger* in the second (nonsignificant) study—because of differences in sample size (the number of participants) in the two studies.

In contrast to traditional narrative means of synthesis, meta-analysis focuses specifically on (what is called) the "effect size" in each study—the magnitude (size) of the effect or relationship of interest. Thus (crudely) a meta-analytic review involves three steps: (1) locating the studies of interest, (2) extracting the effect size (and related information, such as sample size) from each study, and (3) computing average effect sizes both across all the studies and within sub-categories of interest. Meta-analytic methods have replaced traditional narrative methods and indeed have become the standard for syntheses of this kind of research. (For useful general introductions to meta-analysis, see Borenstein, Hedges, Higgins, & Rothstein 2009; Cooper 2010; Cooper, Hedges, & Valentine 2009.)

So we have been engaged in ongoing meta-analytic work to synthesize the results of existing research on gain-loss message framing effects. We search quite widely, across a number of databases with a variety of search terms, trying find every relevant study we can: published articles, dissertations, conference papers, master's theses, and so on. Our interest, of course, is specifically in locating experimental studies comparing the persuasiveness of gain- and loss-framed messages.

For each such study, we convert its results into an effect size, which represents the size and direction of the difference in persuasiveness between the gain-framed appeal and the loss-framed appeal. Specifically, we use the correlation coefficient (*r*) as our effect size index. A correlation is a value that can range from positive 1 to negative 1. In this application, a correlation of zero indicates no difference in persuasiveness between the two appeals. A positive correlation (for a given study) indicates a persuasive advantage for the gain-framed appeal, a negative correlation indicates an advantage for the loss-framed appeal. The larger the absolute value of the correlation, the larger the difference in persuasiveness between the two appeals.

Details of our methods are available in our published work (O'Keefe & Jensen 2006, 2007, 2008, 2009), so here I want only to specify how the present results are related to those previously reported. The cases analyzed here represent the cases initially analyzed by O'Keefe and Jensen (2006), with the addition of the subsequent studies concerning disease prevention behaviors that were included in the analyses of O'Keefe and Jensen (2007) and the subsequent

studies concerning disease detection behaviors that were included in the analyses of O'Keefe and Jensen (2009).

4. Initial meta-analytic findings: are loss-framed appeals generally more persuasive?

Even though persuasion effects research has been going on for quite some time, it's still rare to find more than 10 or 15 studies of any given message variable. Persuasion research, like many areas of social-scientific research, doesn't see replication as often as one might like. But gain-loss persuasive message framing has attracted a lot of research attention: over 200 studies, with over 60,000 participants.

If loss-framed appeals are generally more persuasive than gain-framed appeals, one would expect to find, on average, a negative correlation. Based on the effects observed for other persuasive message variations, one would not expect to see mean correlations as large as, say, .30 (or -.30). About the biggest mean effects one sees are in the .15 to .20 range, and most mean effects are .10 or so—not large, but dependable (see O'Keefe 1999).

For the comparison of gain-framed and loss-framed appeals, the average effect size across all studies, expressed as a correlation, is actually only .01 (mean $r = .010$, $k = 219$, $N = 62{,}836$). And, unsurprisingly, that mean effect is not significantly different from zero (the 95% confidence interval limits are -.006 and .027, that is, the confidence interval contains zero)—which is to say we cannot even be confident that the actual population effect is something other than zero. In short, there is no overall difference in persuasiveness between gain-framed and loss-framed appeals.

When statistically nonsignificant results are obtained, it is often useful to ask whether there were enough data in hand to detect some genuine effect if it exists. This is expressed as a matter of "statistical power," that is, the chances of finding a statistically significant effect [assuming, in the present case, that the actual (population) effect size was .10 (or -.10)]. Our analysis had excellent statistical power (.99; Hedges & Pigott 2001), which means it is correspondingly unlikely that the population effect size is indeed that large.

So Meyerowitz and Chaiken's initial study produced a striking experimental result (loss-framed appeals more persuasive than gain-framed appeals) and had a good explanation (negativity bias)—but that explanation turned out to be misplaced. Loss-framed appeals are *not* generally more persuasive than gain-framed appeals.

5. Renewing the search for negativity bias effects

The conclusion that loss-framed appeals are not generally any more persuasive than gain-framed appeals is, of course, a disappointing one—not least because of how Meyerowitz and Chaiken's initial finding fitted so nicely into the larger picture of negativity bias. So perhaps it is the case that loss-framed appeals really *are* more persuasive than gain-framed appeals, but that somehow that effect is being masked in these studies. After all, negativity bias is genuine, a very well-evidenced psychological phenomenon. So perhaps there is some factor at work that is preventing negativity bias from manifesting itself in these studies.

A little reflection on the nature of gain-framed and loss-framed appeals suggests a natural candidate for such a factor, namely, the linguistic representation of the "kernel state" of the

consequence under discussion (O'Keefe & Jensen 2006). The kernel state is the basic, root state mentioned in the message's description of the consequence. A given framing form might mention either desirable or undesirable kernel states. For example, a gain-framed appeal might take the form "if you wear sunscreen, you'll increase your chances of having attractive skin" (where the kernel state, "attractive skin," is a desirable one) or the form "if you wear sunscreen, you'll reduce your risk of skin cancer" (where the kernel state, "skin cancer," is an undesirable one). Similarly, a loss-framed appeal might mention either desirable kernel states ("If you don't wear sunscreen, you'll reduce your chances of having attractive skin") or undesirable kernel states ("If you don't wear sunscreen, you'll increase your risk of skin cancer").

Notice, thus, that a gain-framed appeal might be phrased entirely in terms of undesirable kernel states ("skin cancer," "tumors," "premature death," etc.) that are avoided by compliance, and a loss-framed appeal might be phrased entirely in terms of desirable kernel states ("long life," "attractive skin," and so forth) that foregone by virtue of noncompliance. Plainly, variations in kernel states might interfere with the appearance of the expected negativity bias effects.

To remove such interference and permit negativity bias to emerge, a more focused comparison is required. The comparison of interest is that between a gain-framed appeal that has exclusively desirable kernel states and a loss-framed appeal that has exclusively undesirable kernel states. Such a comparison pits a thoroughly "positive" message (gain-framed with desirable kernel states) against a thoroughly "negative" message (loss-framed with undesirable kernel states). If negativity bias is at work here, this comparison should yield a substantial negative mean effect, representing the expected persuasive advantage for loss-framed appeals.

Twenty different studies (with 21,213 participants) have investigated such a comparison. The average effect size across these studies is -.01 (actually, -.005, that is, an effect that is nearly literally zero). This effect is not statistically significantly different from zero (the 95% confidence interval limits are -.048 and .039; the statistical power was .99).

So not only do loss-framed appeals not enjoy any general persuasive advantage over gain-framed appeals, they are not more persuasive even under conditions in which negativity-bias effects would be expected to be maximized.

6. Changing course: disease detection and disease prevention

Given the lack of any overall persuasive advantage for loss-framed appeals—and given that the average difference in persuasiveness is statistically indistinguishable from zero—it naturally becomes attractive to consider the possibility that gain-framed appeals are more persuasive than loss-framed appeals under some (specifiable) circumstances, and loss-framed appeals have a persuasive advantage under other circumstances. (Notice that this might account for there not being any average difference overall.)

A 1999 study by Detweiler, Bedell, Salovey, Pronin, and Rothman provides a convenient illustration of a study encouraging such a line of thinking. Detweiler et al. (1999) found that a gain-framed appeal was significantly more persuasive than a loss-framed appeal for encouraging people to use sunscreen (which prevents skin cancer). This study, in conjunction with several others, gave rise to the idea that, at least in the realm of health behavior, there might be a systematic difference in the relative persuasiveness of gain- and loss-framed messages depending on whether the advocated action is a disease *prevention* behavior (like sunscreen use, the one

Detweiler et al. studied) or a disease *detection* behavior (like breast self-examination, the one Meyerowitz and Chaiken studied). Here, for example, is a formulation of this idea:

> The literature on framing and health promotion has yielded an interesting pattern of findings . . . Loss-framed messages have been effective in promoting mammography, BSE, and HIV testing, all early-detection behaviors. Conversely, gain-framed messages have been effective in promoting the use of infant car restraints and sunscreen, both prevention behaviors. (Salovey & Wegener 2003, p. 57)

So the suggestion is that for prevention behaviors, gain-framed messages will be more persuasive, but for disease detection behaviors, loss-framed appeals will be more persuasive.

However interesting such a pattern of results might be, the natural question that arises is *why* such a difference should occur—that is, what would explain such a difference? The explanatory framework that is commonly offered derives from Kahneman and Tversky's prospect theory (1979)—and specifically from the finding that people are more likely to undertake risky behaviors when potential losses are salient but prefer risk-averse choices when gains are prominent (the classic study is Tversky & Kahneman 1981). As Rothman and Salovey (1997, p. 3) put it:

> Prospect theory proposes that people are more willing to accept risks when they evaluate options in terms of associated costs but act to avoid risks when the same options are described in terms of associated benefits.

In the context of health behaviors, the supposition is that disease detection behaviors are riskier than disease prevention behaviors, because undertaking a disease detection behavior might uncover an abnormality. Hence as applied to gain-loss message framing, the reasoning is that the perceived riskiness of detection behaviors will make loss-framed messages more persuasive, whereas prevention behaviors will be more effectively promoted by gain-framed messages.

> From a prospect theory point of view, the perceived risk (of finding an abnormality) could make loss-framed messages more persuasive in promoting the detection behaviors. However, . . . gain-framed messages might be more likely to facilitate performing prevention behaviors. (Salovey & Wegener 2003, pp. 57-58)

This is now the overwhelmingly most common way of describing gain-loss message framing persuasive effects: that there's a difference between prevention and detection behaviors in the relative persuasiveness of these appeal variations, with the explanation derived from prospect-theoretic reasoning. For example:

> A series of research studies converge on a single conclusion . . . Gain-framed messages are more effective at encouraging prevention behaviors, but loss-framed appeals are more effective at fostering detection behaviors. (Dillard & Marshall 2003, p. 504)

> There are a number of effects of message framing that have been consistently obtained. Detection behaviors generally are better promoted by loss-framed messages, but prevention behaviors seem better promoted by gain-framed messages. (Salovey & Wegener 2003, p. 70)

> Gain-framed messages are more effective in promoting prevention behaviors . . . However, loss-framed messages are more effective in influencing early detection behaviors. (Perloff 2003, p. 196)

> Research on changing general health behaviors shows that gain-framed messages are more effective when the advocated behavior is prevention-oriented. Prevention behaviors are viewed as low-risk behaviors . . . Loss-

> framed messages, on the other hand, appear to be more effective when the advocated behavior is detection-oriented. Detection behaviors . . are perceived as high-risk. (USDA 2007, p. 2)

And elements of this generalization have even entered the popular literature:

> Framing matters: people are more likely to engage in self-examinations for skin and breast cancer if they are told not about the reduced risk if they do so but about the increased risk if they fail to do so. (Thaler & Sunstein 2009, p. 159)

7. Further meta-analytic findings: disease prevention and disease detection

This is a terrific explanation—but is there really that difference between prevention and detection behaviors with respect to the relative persuasiveness of gain- and loss-framed appeals? There are now many more studies of prevention and detection messages than the handful that initially encouraged this generalization, so those accumulated studies can be analyzed to address this question.

Concerning disease detection behaviors: Across 55 studies (with 9,247 participants), there is no statistically significant difference in the persuasiveness of gain-framed and loss-framed appeals. The mean effect size is -.03 (-.029), with 95% confidence limits of -.066 and .008 (power = .99). So loss-framed appeals are not more persuasive than gain-framed appeals concerning disease detection behaviors.

Concerning disease prevention behaviors: There is a statistically significant difference such that gain-framed appeals are more persuasive than loss-framed appeals—but the difference is so small as to be trivial: Across 103 studies (N = 22,652), the mean effect size is .04 (.038), with 95% confidence interval limits of .012 and .064. Thus there is no substantively important difference in the persuasiveness of gain- and loss-framed messages concerning disease prevention behaviors.

And, just to round out the picture, there are no significant differences on other message topics. For other health-related behaviors (e.g., getting hearing aids), the mean effect (across 13 studies with 4,702 participants) is -.02 (-.021; 95% confidence interval limits of -.073 and .031; power = .99). For advertising of non-health-related consumer products and services (ads for laundry detergent, insurance, etc.), the mean effect (across 25 studies with 3,805 participants) is -.01 (-.013; 95% confidence interval limits of -.074 and .049; power = .99). For the remaining topics (a miscellaneous set including taxpayer compliance, recycling participation, and public policy questions), the mean effect (across 23 studies with 22,430 participants) is .03 (.029; 95% confidence interval limits of -.021 and .079; power = .99).

Thus not only is there no overall difference in persuasiveness between gain-framed and loss-framed messages—even under conditions in which the effects of negativity-bias processes should be maximized—but the studies to date do not underwrite the suggestion that loss-framed appeals will have a substantial advantage concerning disease detection behaviors and gain-framed appeals a similarly large advantage concerning disease prevention behaviors. In short, the expected differences in persuasiveness between gain- and loss-framed appeals do not obtain, despite the presence of attractive explanatory frameworks (negativity bias, prospect theory) that are ready to accommodate findings of such differences.

8. Larger lessons

I want to draw out three larger points here concerning how, as a research community, we should approach the task of generalizing about persuasive effects from research evidence of this sort. These are phrased as advice to consumers of this research—but of course those who produce such research should heed these lessons as well.

First: Pay attention to the *size* of an effect, not just whether the effect is statistically significant. Researchers are commonly focused on the question of whether a given message variation makes a statistically significant difference to persuasiveness. That's a natural and understandable focus. After all, a statistically significant difference means that the difference is probably genuine, that is, not zero—and knowing that an effect is not zero is valuable. But—as illustrated by the finding concerning disease prevention behaviors—it is possible for an effect to be statistically significant and yet trivially small. That is, there are some effects that, even though they are not actually zero, are sufficiently small that they might as well be zero.

I don't mean to say that it's always easy to decide just how small is "so small it might as well be zero" (see, e.g., Abelson 1985). But when a researcher reports that (for example) the difference in persuasiveness of two messages was statistically significant, it will be useful to ask "How big was that difference, that is, what was the *size* of the effect?"

Second: Don't put too much faith in the results of any single study. The early study by Meyerowitz and Chaiken (1987) found a loss-framed appeal to be more persuasive than a gain-framed appeal. And, as we have seen, some commentators have invoked that finding as evidence for the claim that *generally* loss-framed appeals are more persuasive. But there is no such general difference between gain- and loss-framed appeals. So obviously Meyerowitz and Chaiken's early result was in some sense unrepresentative, and hasty generalization from that finding was inappropriate.

Another way of expressing this second point is: Ask for replications. The results of any single study are all very nice, but the results of any one study cannot speak to questions of generalization in the way that is wanted. Messages are like most other things: Generalizations about a category require examining more than one instance of the category. A study that compares one gain-framed appeal against one loss-loss-framed appeal may yield very useful information about the relative persuasiveness of those two particular messages, but it cannot provide good evidence for claims about any *general* differences in persuasiveness between gain-framed and loss-framed messages.

Notably, studies of the persuasive effects of message variations quite commonly display considerable variation in effects from one study to the next (see O'Keefe 1999). The plain implication is that the results of any one study are not necessarily an indication of the overall pattern of results across studies. That is to say, there is good empirical evidence that in this research domain, the results from any single study cannot be depended on to be representative of the picture that will emerge once a number of replications have been performed.

Third: Be wary of the combination of limited evidence and a good explanation. That is, be especially alert when presented with the combination of (a) a small number of statistically significant effects (or just one such effect) and (b) a good explanatory story.

Consider that early study by Meyerowitz and Chaiken, which found a significant advantage for loss-framed appeals. There was a compelling explanation for that result, in the form of negativity bias. This combination, I think, encouraged people to draw those broad conclusions about the greater persuasiveness of loss-framed messages.

Or consider the small number of studies that seemed to fit a pattern in which loss-framed appeals were more persuasive for disease detection behaviors (such as breast self-examination, the behavior studied by Meyerowitz and Chaiken), whereas gain-framed appeals were more persuasive for disease prevention behaviors (such as sunscreen use). The combination of these few studies and a prospect-theory explanation is apparently almost irresistible; that's the story one commonly sees told nowadays about message framing effects—even though it's not true. So: Don't be seduced by limited evidence, no matter how good the explanation seems to be. In fact, don't be seduced by limited evidence *especially when* accompanied by a good explanation.

I am happy to acknowledge that resisting this temptation will be difficult. Given some research finding—and especially some unusual or striking finding—our natural inclination is to ask "what's the explanation?" But bear in mind the previous point: Don't put too much faith in the results of any single study. Another way of putting that might be: No single study yields something to be explained (i.e., some genuine phenomenon). With a number of successful replications in hand, we might be confident in concluding that the phenomenon is genuine (and so would be confident in considering possible explanations)—but without more extensive evidence, we cannot be sure there is anything *to* explain. Briefly put, the motto should be: No explanans without an explanandum. When faced with a singular finding, don't ask "What's the explanation?" Ask "Where are the replications?"

References

Abelson, R. P. (1985). A variance explanation paradox: When a little is a lot. *Psychological Bulletin, 97*, 129-133.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Chichester, West Sussex, UK: Wiley.

Cacioppo, J. T., & Gardner, W. L. (1999). Emotion. *Annual Review of Psychology, 50*, 191-214.

Cacioppo, J. T., Gardner, W. L., & Berntson, G. G. (1997). Beyond bipolar conceptualizations and measures: The case of attitudes and evaluative space. *Personality and Social Psychology Review, 1*, 3-25.

Consedine, N. S., Horton, D., Magai, C., & Kukafka, R. (2007). Breast screening in response to gain, loss, and empowerment framed messages among diverse, low-income women. *Journal of Health Care for the Poor and Underserved, 18*, 550-566.

Cooper, H. (2010). *Research synthesis and meta-analysis: A step-by-step approach* (4th ed.). Los Angeles: Sage.

Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.). (2009). *The handbook of research synthesis and meta-analysis* (2nd ed.). New York: Russell Sage Foundation.

Detweiler, J. B., Bedell, B. T., Salovey, P., Pronin, E., & Rothman, A. J. (1999). Message framing and sunscreen use: Gain-framed messages motivate beach-goers. *Health Psychology, 18*, 189-196.

Dijksterhuis, A., & Aarts, H. (2003). On wildebeests and humans: The preferential detection of negative stimuli. *Psychological Science, 14*, 14-18.

Dillard, J. P., & Marshall, L. J. (2003). Persuasion as a social skill. In J. O. Greene & B. R. Burleson (Eds.), *Handbook of communication and social interaction* skills (pp. 479-513). Mahwah, NJ: Lawrence Erlbaum.

Hamilton, D. L., & Zanna, M. P. (1972). Differential weighting of favorable and unfavorable attributes in impressions of personality. *Journal of Experimental Research in Personality, 6*, 204-212.

Hedges, L. V., & Pigott, T. D. (2001). The power of statistical tests in meta-analysis. *Psychological Methods, 6*, 203-217.

Johnson, B. T., Maio, G. R., & Smith-McLallen, A. (2005). Communication and attitude change: Causes, processes, and effects. In D. Albarracin, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 617-669). Mahwah, NJ: Lawrence Erlbaum.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*, 263-291.

Kanouse, D. E. (1984). Explaining negativity biases in evaluation and choice behavior: Theory and research. *Advances in Consumer Research, 11*, 703-708.

Kuhberger, A., Schulte-Mecklenbeck, M., & Perner, J. (1999). The effects of framing, reflection, probability, and payoff on risk preference in choice tasks. *Organizational Behavior and Human Decision Processes, 78*, 204-231.

Lutz, R. J. (1975). Changing brand attitudes through modification of cognitive structure. *Journal of Consumer Research, 1*(4), 49-59.

Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology, 52*, 500-510.

O'Keefe, D. J. (1999). Variability of persuasive message effects: Meta-analytic evidence and implications. *Document Design, 1*, 87-97.

O'Keefe, D. J., & Jensen, J. D. (2006). The advantages of compliance or the disadvantages of noncompliance? A meta-analytic review of the relative persuasive effectiveness of gain-framed and loss-framed messages. *Communication Yearbook, 30*, 1-43.

O'Keefe, D. J., & Jensen, J. D. (2007). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease prevention behaviors: A meta-analytic review. *Journal of Health Communication, 12*, 623-644.

O'Keefe, D. J., & Jensen, J. D. (2008). Do loss-framed persuasive messages engender greater message processing than do gain-framed messages? A meta-analytic review. *Communication Studies, 59*, 51-67.

O'Keefe, D. J., & Jensen, J. D. (2009). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease detection behaviors: A meta-analytic review. *Journal of Communication, 59*, 296-316.

Peeters, G., & Czapinski, J. (1990). Positive-negative asymmetry in evaluations: The distinction between affective and informational negativity effects. In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (Vol. 1, pp. 33-60). Chichester, UK: John Wiley.

Perloff, R. M. (2003). *The dynamics of persuasion* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum.

Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin, 121*, 3-19.

Rozin, P., & Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review, 5*, 296-320.

Salovey, P., & Wegener, D. T. (2003). Communicating about health: Message framing, persuasion, and health behavior. In J. Suls & K. Wallston (Eds.), *Social psychology foundations of health and illness* (pp. 54-81). Oxford, UK: Blackwell.

Skowronski, J. J., & Carlston, D. E. (1989). Negativity and extremity biases in impression formation: A review of explanations. *Psychological Bulletin, 105*, 131-142.

Taylor, S. E. (1991). Asymmetrical effects of positive and negative events: The mobilization-minimization hypothesis. *Psychological Bulletin, 110*, 67-85.

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness* (rev. ed.). London: Penguin.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*, 453-458.

U. S. Department of Agriculture (USDA). (2007). Nutrition education research brief: Message framing, use of interactive technology to tailor messages, and intervention intensity. Alexandria, VA: U. S. Department of Agriculture, Food and Nutrition Service.