Contextual Influences on Message Persuasion: The Effect of Empty Space

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ABSTRACT

The empty space that surrounds a text message can affect the message's persuasiveness. Seven studies provide converging evidence in both field and laboratory settings that people find a message less persuasive, and are less likely to act on its implications, when it is surrounded by empty space than when it is not. These effects are mediated by perceptions of message strength. That is, message recipients infer that a message conveys a less strong opinion when empty space surrounds it and are consequently less likely to accept its implications. This effect does not occur when the space surrounding the message is generated randomly by a computer or when the message is attributed to a low credibility source. When a message is counterattitudinal, surrounding it by empty space decreases the disposition to counterargue its implications and increases acceptance of the position advocated. When recipients are under cognitive load, however, they use the space surrounding the message as a heuristic basis for judgment and are less persuaded when the message is surrounded by empty space. This research adds not only to persuasion literature and current advertising practices, but also to an understanding of different interpretations of empty space.

Keyword: empty (white) space, persuasion, conversational inference, source characteristics

Visual features of a message can influence the way that people construe its implications. This can occur even when the features have little if anything to do with the message content. For example, the font size, color and placement of a warning label can all affect a message's impact (Adams and Edworthy, 1995; Argo and Main 2004; Bernard et al. 2002; Bettman, Payne, and Staelin 1986; Torres, Sierra, and Heiser 2007). The nonverbal features that accompany a verbal message can sometimes influence the ease of comprehending it (Novemsky et al. 2007; Reber, Winkielman, and Schwarz 1998; Shen, Jiang, and Adaval 2010; Song and Schwarz 2008) and of integrating its implications (Adaval, Isbell, and Wyer 2007; Adaval and Wyer 1998; Wyer, Adaval, and Colcombe 2002). However, the present research identified a quite different factor that can affect responses to a verbal message. Rather than focusing on features that accompany a message, we were concerned with the *absence* of these features. Specifically, we investigated the way that a message's impact is affected by the amount of unused, empty space that happens to surround it.

Embedding a product's picture in empty ("white") space can increase perceptions of its prestige and quality (Pracejus, Olsen, and O'Guinn 2006; see also Homer 1995; Jacobs 1972; Jacobs and Poillon 1992; Kirmani 1990). It is unclear however, how the space that surrounds a *verbal* message is likely to influence people's reactions to it. Many messages make recommendations or advocate opinions to which a consideration of prestige is irrelevant. In such cases, the empty space surrounding these messages is likely to have quite different effects than those identified in previous research.

In fact, we found that surrounding a verbal message by empty space can decrease recipients' perception of the strength of the position it conveys. Although this effect might intuitively be attributed to differences in attention (Pieters and Wedel 2004; Pieters, Wedel, and

Batra 2010), this is not the case. Rather, it results from a process of inference making that is independent of the extent to which recipients deliberate on the message content. Seven studies confirm our speculations.

THEORETICAL BACKGROUND

Effects of Empty Space on Responses to Pictures

Research in several areas suggests that the perception of a stimulus and the consequent reactions to it can depend on the context in which it is presented (Bahnsen 1928; Koffka 1935; Rubin 1958). Contextual factors can influence the salience of a stimulus and the attention that is paid to it (Shen and Urminsky 2013). For example, a yellow dot is more likely to "pop out" when it is surrounded by black dots than when it is surrounded by grey ones. Likewise, a circle is perceived to be smaller when the circles surrounding it are large (known as Ebbinghaus illusion; Weintraub 1979). The empty space that surrounds a stimulus could have a similar effect. Thus, the picture of a product might be more likely to stand out when it is surrounded by empty space than when it is not (Brandt 1942; Strong 1926).

Empty space has been widely used in advertising and interior design to convey elegance and prestige (Book and Schick 1997; Jewler and Drewnmany 2000) and has historical roots (Pracejus et al. 2006). However, only a few empirical studies have investigated the effect of empty space in a consumer context (Pracejus et al. 2006; Pracejus, O'Guinn and Olsen 2013; Jacobs 1972; Jacobs and Poillon 1992). Pracejus and colleagues (2006), for example, found that surrounding the picture of a product by empty space increases perceptions of the product's

prestige value, thereby increasing evaluations of the product. However, these perceptions are

often culturally bound (Pracejus et al. 2013). Moreover, they may not generalize to product

domains in which prestige is irrelevant (e.g., groceries; Jacobs and Poillon 1992). To this extent,

Pracejus et al.'s findings are unlikely to generalize to verbal statements, which have no prestige

value in their own right.

Effects of Empty Space on Responses to a Verbal Message

Different processing strategies can be activated across contexts by information presented

in a format or a context that is conducive to their application (Adval and Wyer 1998; see Wyer

Hung, and Jiang 2008 for a review). Advertisers often present pictures together with verbal

material to portray perceptions of quality. In such cases, the verbal material is likely to be

recoded visually and integrated into mental images that create a holistic impression of the

product or an episode model of the events surrounding its use (Hung and Wyer 2008; Wyer et al.

2008). In the situations we investigated, however, the verbal messages to which individuals were

exposed were unlikely to elicit visual images; they were short statements that advocated either a

particular opinion or a plan of action, and recipients did not necessarily form a mental image in

order to understand the implications. Rather, they construed the implications of each piece of

information separately and integrated these implications analytically to arrive at a judgment

(Anderson 1981; Fishbein and Ajzen 1975). This integration involves piecemeal computations to

which pictures are often irrelevant and even detrimental because they may interfere with the

computational procedures. Given the different strategies in processing visual and verbal

information, the factors that influence its effect on reactions to a visual stimulus are likely to

differ from the factors that underlie the effect of empty space on responses to a verbal message. The latter factors, however, have not previously been identified.

In this research, the format of the message was the same in all conditions. However, the message was surrounded by a border that varied in its distance from the message itself, thereby conveying either a lot of empty space between the border and the text or very little (see figure 1 for an example). In conceptualizing these effects, we considered three factors that seemed likely to come into play: attention, metacognitive responses, and inferences about the strength of the opinion advocated by the message. All three factors converge on the prediction that a message is likely to have less impact on judgments when it is surrounded by empty space than when it is not. However, they have different implications for the conditions in which this occurs.

(Insert figure 1 about here)

Attention and Deliberation. Humans' cognitive resources are constrained and cannot give equal attention to all incoming sensory inputs (Kruschke 2011). Rather, they deliberate on only a subset of features that capture their attention (Hoffman and Singh 1997). This attention and deliberation, in turn, can influence the accessibility of these features in memory (Srull and Wyer 1989) and thus can affect the likelihood that the features are recalled and used as a basis for judgment in later situations.

As noted earlier, surrounding a picture by empty space may isolate it and increase the attention that is paid to it (Olsen, Pracejus, and O'Guinn 2012; Strong 1926). However, empty space may have the opposite effect on attention to a verbal statement. Pieters and Wedel (2004) found that people pay *more* attention to advertisements that devote a large amount of space to

text and leave little space unused. Their findings suggest that the empty space surrounding a verbal message could draw people's attention away from the message and decrease the resources they devote to processing it, thereby decreasing the message's impact.

Perceptual Feelings and Metacognition. Empty space could also influence a message's persuasiveness through its impact on recipients' metacognitive experiences. Feelings of pleasantness, reading difficulty and effort can provide information that people draw on in forming judgments and making decisions (Schwarz 2004). For example, a statement seems more important and likely to be true when it is printed in a color or font that is easy to read (Lee and Labroo 2004; Reber and Schwarz 1999) or when thoughts associated with it are highly accessible (Schwarz, Bless, and Bohner 1991; Tversky and Kahneman 1973; Wänke, Schwarz, and Bless 1995). Other stimulus features (e.g., figure-ground contrast) can also affect judgments through their impact on perceptual fluency (Reber and Schwarz 2001; see Reber, Schwarz, and Winkielman 2004 for a review). The effect of empty space on perceptual fluency is not completely clear. However, if the empty space surrounding a message makes the message less perceptually salient, recipients might be less likely to perceive the message as valid and so it might have less impact.

There are constraints on the generality of this conclusion. If recipients find that a communication surrounded by empty space is more pleasing, they may be more receptive to its implications. In contrast, a lack of empty space could give rise to a perception of visual complexity (Pieters, Wedel, and Zhang 2007; Pieters et al. 2010), making it seem cluttered and difficult to read. This could elicit an unfavorable affective reaction (Song and Schwarz 2008) that overrides the effects we predict.

Inference Making in Communication. The third factor that might possibly underlie the impact of empty space on responses to a message is quite different. Communications in a social context are normally conveyed for a purpose. Recipients of the communication likely assume that this is the case and construe not only the literal implications of the message but also the meaning that the communicator intends to convey (Grice 1975; Higgins 1981; Hilton 1995; Kardes, Posavac, and Cronley 2004; Wyer and Gruenfeld 1995). This meaning can sometimes be inferred from features of the message content or the manner in which it is delivered (facial expressions, tone of voice, etc.). However, recipients of a written communication must often rely on other, seemingly unrelated cues to understand the message's pragmatic implications. For example, graphic designers often use gestalt principles to create visual emphasis (Wileman 1993). Written communications use boldface or italics to convey emphasis. The amount of space that surrounds a message might have an effect as well.

We speculated that recipients might infer the communicator's intention to convey emphasis from the amount of unused space that surrounds the message text. That is, a communicator who intends to convey a strong opinion is likely to use all of the space available to elaborate his or her position, whereas a communicator who is less confident in his or her opinion, or less committed to its validity, may leave space unused. Although direct support for this speculation is limited, a series of studies by Petty and Cacioppo (1984) indicated that participants used the number of arguments presented as a heuristic basis for judgment. Consequently, the influence of the message increased with the number of arguments contained in it independently of the arguments' quality. In the present context, this could suggest that when a communication does not fill up the space available, recipients might infer that the communicator

is either unmotivated or unable to fill up the space with material supporting the position advocated and might therefore be less persuaded by it. Thus, although the space in which a message is embedded might not necessarily indicate what the communicator actually believes, in the absence of other cues, recipients might use it as a heuristic basis for inferring the strength of the communicator's commitment to its implications. That is, they may ascribe less importance to the message when it is surrounded by empty space and may be less persuaded by the message in this condition. Although this assumption is somewhat speculative, a pilot study provided some evidence for its validity and our results are consistent with its implications, as will be seen.

This analysis should be qualified in at least two respects, however. First, recipients are only likely to infer that the space surrounding the message reflects of the strength of the communicator's opinion if they believe that the communicator's use of the space was under his or her control. If they infer that the amount of space surrounding a message occurred fortuitously, they are unlikely to use it as a basis for inferring the strength of the message. Moreover, if the message comes from a noncredible source, recipients may reject its implications regardless of their perceptions of its strength. In these cases, therefore, the space surrounding the message should have little impact on responses to it. Therefore:

H1: Recipients are less likely to accept the opinion that is advocated in a verbal message if the message is surrounded by empty space than if it is not. This effect is mediated by the effect of empty space on perceptions of message arguments and the strength of the position it advocates.

H2: The effect of the empty space that surrounds a message on its impact will be diminished when either (a) the amount of space surrounding it occurred by chance

and was not intended by the communicator, or (b) the source of the message is

perceived to have low credibility.

Note that the other factors that might potentially underlie the impact of empty space on message

effectiveness would not easily account for these contingencies. Thus, support for hypotheses 1

and 2 would distinguish between the implications of these factors.

Second, the preceding discussion implicitly assumes that participants are either

indifferent or positively disposed to the position advocated in the message and, therefore, if they

perceive this position to be strong, are inclined to accept its implications. In this case, empty

space is likely to decrease the message's persuasiveness, as Hypothesis 1 implies. In some cases,

however, recipients might disagree with the position advocated on a priori grounds. In this case,

predictions of the effect of empty space on acceptance of the message are less straightforward.

That is, it depends on whether recipients are disposed to counterargue the message's implications

or accept these implications at face value. The nature of this dependence is elaborated in the next

section.

Heuristic versus Deliberative Processes

To the extent that the space surrounding a message influences recipients' perception of

the strength of the communicator's opinion, its influence on recipients' acceptance of this

opinion could be mediated by either of two processes (Reimer, Mata, and Stoecklin 2004). On

one hand, recipients might use the space surrounding the message as a heuristic basis for

judgment, and be less likely to accept the position advocated if they perceive that position to be

weak than if they perceive it to be strong. On the other hand, they may elaborate implications of

the message and base their opinion on the results of this elaboration. However, they may engage in less elaboration when they perceive the position advocated to be relatively weak.

When participants are inclined to agree with the position advocated in a message, their cognitive responses to it are likely to be consistent with this position. In this case, the acceptance of the message at face value and the cognitive responses to it have a similar implication, and so empty space should decrease the message's impact regardless of whether these cognitive responses occur. When a message is counterattitudinal, however, and recipients are disposed to counterargue, different considerations arise. Although participants may be able to counterargue a message's implications, they may be less motivated to do so when the position advocated seems weak and the source is not committed to it. To this extent, they may counterargue less when a message is surrounded by empty space and so they may be more likely to accept it than they would otherwise. However, suppose recipients engage in heuristic processing and base their acceptance on the strength of position advocated. Then, they should be *less* inclined to accept the position when the message is surrounded by empty space (and is interpreted as less extreme) than when it is not. That is:

> **H3:** If recipients disagree a priori with the position advocated in a message, empty space will increase their acceptance of the message they engage in counterarguing. However, it will decrease their acceptance of the message if they are unable or unmotivated to counterargue.

By manipulating the cognitive load that recipients experienced at the time they read the messages, we were able to isolate these processes.

Overview

Seven studies confirmed the effects of the empty space surrounding a verbal message and evaluated alternative hypotheses concerning the processes that underlie it. A preliminary study showed that the amount of empty space in online Internet communications affected reactions to the message. A second, laboratory study showed that when participants were given a message suggesting that they should engage in a certain behavior, surrounding the message by empty space decreased their compliance with this suggestion. The remaining studies evaluated the factors that mediated these effects. Specifically, study 3 showed that empty space can have an impact on the message's persuasiveness independently of the attention that recipients pay to the message at the time it is presented. Study 4 generalized the effects to advertising effectiveness, and showed that message impact is influenced by the *relative* amount of empty space that surrounds the text rather than by the overall image size. Two additional experiments indicated that the effects are eliminated when either the amount of space surrounding the message is generated randomly by a computer (study 5) or the message is conveyed by a low-credibility source (study 6). Finally, study 7 provided evidence that the implications of empty space can either be used as a heuristic basis for judgments or affect the amount of cognitive elaboration of the message's implications, depending on whether recipients are under cognitive load. In combination, the studies provided converging evidence that the effect of empty space on message impact is robust and that its effect is underlain by an inference-making process for understanding the pragmatic implications of a communication.

STUDY 1

A field study examined whether the space surrounding a statement that was posted on an online social platform can influence respondents' liking for the statement and the likelihood of responding to it. Note that when visual elements are held constant, the subjective size of an image is likely to vary with the amount of space surrounding it (Kirmani 1990). Thus, the amount of empty space might be confounded with the size of the image and thus with the amount of attention paid to it (Wolfe et al. 1990). To investigate the interplay of image size and empty space, therefore, we considered both the relative amount of space surrounding a message and the absolute amount.

Method

We collected images of the statements posted on a Facebook page over a one-month period from November 19 to December 18, 2013. The page, named *Saying Images*, had over 70,000 subscribers at the time we collected data. (To ensure that sufficient time was allowed to stabilize responses to the images, data were not recorded until two months later.) This procedure resulted in a sample of 115 images.

We downloaded a screenshot of each message image for use in recording the amount of space (image size and text space), audience responses (the total number of likes, shares and comments), and the presence of nontext elements (a picture of a cartoon character and celebrities, nature scene background, etc.). We extracted three indicators of effectiveness: the numbers of likes, shares and comments. We also recorded the posting date of the statements for use as a covariate.

As all statement images were rectangular in shape, we measured the picture dimensions (i.e. the width and the height of the image) in pixels with the Microsoft Office Picture Manager. Then, we multiplied the dimensions to compute the overall area. This resulted in image sizes ranging from 280 × 200 pixels to 580 × 600 pixels. Statements, however, were irregular in shape. To estimate text space (i.e., the total area on an image that was occupied by text), we grouped the statements into text block(s) and aggregated the area of all text blocks on the image. If the text was packed without much redundant space in between, we considered the text to constitute a single block. If the text was clustered partly in the top-left corner and partly in the bottom-right corner, for example, two blocks were assumed.

Results and Discussion

The absolute amount of empty space was inferred from the difference between the overall area and the text area. The relative amount of empty space surrounding the text was inferred from the proportion of the total area that was empty. Because the relative amount of empty space was a function of both image size and its absolute amount and thus introduced multicollinearity concerns, we evaluated the effects of empty space on each measure of message impact using stepwise regression, with a .50 entry level and a .10 level required to remain in the model. The posting date and the presence of nontext elements were entered first, followed by the relative and absolute measures of empty space and then the overall image size.

Each outcome (the number of likes, the number of shares and the number of comments) was evaluated separately. In each case, only the relative measure remained significant, suggesting that it was a better predictor than the absolute amount and image size. That is,

individuals' liking for the statements decreased as the relative amount of empty space increased (β = -.22, $t(111)$ = -2.24, p = .027). Similarly, individuals shared the statement images to a lesser extent when there was empty space (β = -.338, $t(111)$ = -3.45, p = .001) and gave fewer comments when empty space was appreciable (β = -.23, $t(111)$ = -2.30, p = .023). In each case, the effect remained significant after we controlled for the image size and other variables that were included in the stepwise model (ts(110) $\geq$ -2.10, p < .05). These findings suggest that the relative proportion of empty space was the principle determinant of message impact. (Findings obtained in study 4 confirm this conclusion.)

STUDY 2

The results of study 1 were consistent with our conceptualization that the impact of a statement decreases when it is surrounded by empty space. Study 2 confirmed this conclusion.

Method

One hundred twenty-six Hong Kong undergraduate students participated for credit. They first performed several marketing studies that were completely unrelated to our investigation. At the end of the experimental session, however, the experimenter announced that copies of a paper related to the studies they had performed were on a table next to the exit and that they could take a copy as they left the experiment if they were interested. A pasteboard stand on the table contained the note – "PICK ME! And mark down your participant number or sign the record" (See figure 2). The text, font type and size of the note were the same in all conditions, and were

positioned at the center of the pasteboard. The size of the pasteboard, however, was either A4 size (210 × 297 millimeters) in the *empty space* conditions or A5 size (148 × 210 millimeters) in the *limited space* conditions. The number of participants who picked up a paper in each condition was recorded.

(Insert figure 2 about here)

Results and Discussion

Logistic regression analyses indicated that participants were less likely to take the reference paper in the empty space condition than in the limited space condition (37.7% vs. 59.6%, respectively, B = .409, Wald (1) = 5.94, *p* = .015). Thus, they complied less with the message's implication when the message was surrounded by substantial empty space.

STUDY 3

Our preliminary studies indicated that surrounding a message by empty space decreases liking for it and compliance with the behavior it advocates. Study 3 evaluated an alternative account of these findings. That is, people might pay less attention to a message when it is surrounded by substantial empty space. If this is so, however, their ability to recall the message should be lower in these conditions.

Method

Ninety-four US residents (36 male; M_{age} = 34.67, SD_{age} = 12.65) were recruited on Mechanical Turk for a monetary incentive. They first completed a survey entitled Quotes-of-the-Year and, on this pretense, evaluated 10 statements selected from social platforms such as Twitter and Facebook. The statements, which varied in length from 3 to 11 words, covered a variety of topics such as romance (e.g. "try to reason about love and you will lose your reason"), happiness (e.g., "life is too short for tears"), and personal values (e.g., "follow your heart"). Each statement was identical in font type, font size, text position, spacing between lines, paragraphing, and background graphics. In the *limited space* condition, each quote was presented in a box, the size of which ranged from 420 × 315 pixels to 660 × 165 pixels. The border surrounding the quote contained no additional space. In the *empty space* condition, however, the statement was contained in a box the size of which ranged from 960 × 720 pixels to 960 × 240 pixels. In this case, substantial empty space surrounded the text.

Participants received all 10 quotes in each condition. After reading each quote, they reported the extent to which they liked the quote and the extent to which they thought it was important along scales from 1 (not at all) to 7 (very much). Responses to these items were averaged to provide a single measure of message persuasiveness (α = .88). In addition, the time spent evaluating each quote was recorded and the total time spent evaluating the quotes was used as an index of message deliberation. Finally, after reporting their age and gender, participants were given the first few words of each quote as a cue and asked to recall it as accurately as possible.

Results and Discussion

Participants evaluated the statements less favorably in the empty space condition than in the limited space condition (3.94 vs. 4.41, respectively; $F(1, 92) = 4.37$, $p = .039$). However, participants did not differ in the time they spent on evaluating the statements (145.6 seconds vs. 136.7 seconds, respectively, $F < 1$, ns). Moreover, participants recalled more statements in the empty space condition than in the limited space condition (7.50 vs. 6.23, respectively, $F(1, 92) = 5.72$, $p = .019$). The finding that participants evaluated the quotes less favorably under conditions in which they recalled more of their content might seem inconsistent with evidence that better recall leads to more favorable evaluations (Petty and Cacioppo 1996). Furthermore, bootstrapping analyses (model 4, Hayes 2013) indicated that message recall did not significantly mediate the effect of empty space on message persuasiveness (based on 5,000 samples, 95%CI: from -.0219 to 2.102).

Note that participants' ability to recall the message could reflect not only their attention to the message but also the cognitive elaboration they devote to its implications. As Petty and Cacioppo (1986) noted, however, the effect of a message on attitudes can be totally unrelated to the recall of the message content. Rather, it depends on the type of cognitive responses that are made to the message. These responses could consist either of bolstering or counterarguing the message's implications. If empty space increases bolstering, it could enhance message persuasiveness but if it increases counterarguing, the opposite effect could occur. Thus, without knowing the nature of these cognitive responses, it can sometimes be hard to predict the effect of empty space on the impact of a message. In the present study, in which participants were unlikely to have had strong a priori attitudes toward the statements they judged, bolstering may

have predominated. In study 7, we consider more fully the effect of empty space on cognitive responses to a message.

(Insert table 1 about here)

STUDY 4

Study 1 suggested that the critical determinant of reactions to messages is the relative amount of empty space surrounding the message and not the absolute amount of space surrounding it. However, we sought to confirm this conclusion. To do so, we printed the stimuli on cardboard and independently varied the amount of space (limited vs. empty) and the overall size of the ad (large vs. small). If image size matters, it should have a direct impact on message persuasiveness.

We also examined whether empty space could affect advertising effectiveness through its impact on perceptions of the product's image. As noted earlier, advertising research suggest that the empty space surrounding a product's picture can increase perceptions of quality, creativity, and trustworthiness (Pracejus et al. 2006). Although we expected that the empty space surrounding a *verbal* message would not have comparable effects, we wished to confirm this expectation.

Method

One hundred fifty-five Hong Kong undergraduate students (42 male; M_{age} = 19.8, SD_{age} = 1.55) participated for pay of HK$40. They were randomly assigned to conditions of a 2 (space: limited vs. empty) × 2 (ad size: large vs. small) between-subjects design. Participants were asked to evaluate a printed ad for *Snickers* candy bars (printed on a cardboard) that was used in a worldwide campaign containing the message: "Things can go wrong easily if you are hungry; EAT SNICKERS and get rejuvenated." The message was surrounded by either limited space or empty space. However, the overall size of the ad varied. Thus, in the large ads, the message size was 137 × 156 millimeters and the ad size was either the same (in the limited space conditions) or 197 × 223 millimeters (in the empty space conditions). In the small ads, the message size was 96 × 109 millimeters and the overall ad size was either the same or was 137 × 156 millimeters. (Thus, the overall ad size was the same in the large size, limited space condition and the small size, empty space condition.)

Participants were shown one of the four ads as part of an ostensible online survey. They first rated the extent to which they would want to (a) eat and (b) buy Snickers, along scales from 1 (not at all) to 7 (very much). Then, they evaluated the ad in terms of its interestingness, creativity, trustworthiness, impressiveness, and funniness along similar scales. Responses to these items were averaged to provide an indication of the favorableness of the image of Snickers that the ad conveyed (α = .93). Participants then reported the extent to which the ad " looked good," and the extent to which text was (a) too difficult to read, (b) too small to read, and (c) too hard to focus on (α = .77).

Results and Discussion

Advertising Effectiveness. Product evaluations were analyzed as a function of space conditions and ad size. Participants liked the product significantly less in the empty space conditions ($M = 2.41$) than in the limited space conditions ($M = 3.00$); $F(1, 151) = 7.08$, $p = .009$), suggesting that advertising effectiveness decreased as the space surrounding the text increased. Results further showed that this effect was independent of ad size ($p > .15$), consistent with the implications of study 1.

Image Perceptions. Empty space, image size and their interaction had no significant impact on the image that was formed of the product ($ps > .20$). Participants perceived ads of different sizes to be equally creative, funny, interesting, and impressive (4.42 vs. 4.48 under the limited and empty space conditions, all $Fs < 1$).

Perceptual Experiences. Analyses of the aesthetic appeal of the ad and reading difficulty yielded no significant effects of empty space or ad size ($p > .15$). Even if the overall size of the ad was reduced and the font became smaller in scale, participants did not experience greater difficulty in reading and focusing on the text.

This study confirmed that the effects on message persuasion were driven by empty space but not by other visual features such as image size or the contrast between the image and its background. Moreover, the effects of empty space influenced the ad's effectiveness even without activating the desirable qualities associated with the product being advertised. Our findings for this study are summarized in table 2.

(Insert table 2 about here)

STUDY 5

The preceding studies provide little evidence that the effect of empty space is mediated by its impact on attention or subjective feelings. The next three studies investigated further implications of an inference-based account of this effect. According to this account, recipients of a verbal message seek to understand its pragmatic implications, thereby inferring the strength of the opinion that the communicator intends to advocate from the cues that are available (i.e., the empty space surrounding the message text). To this extent, the effect of empty space on persuasion should be mediated by its impact on the perceptions of message strength.

Recipients may spontaneously infer the strength of a message from the space that surrounds it. However, this inference may not influence their responses to the message unless they perceive that the amount of space surrounding the message was intentional. That is, if they do not perceive that the space reflects the communicator's motivation to convey a strong message, the space may not influence their construal of the message's implications. For example, the effect of empty space on message impact should not be evident if the amount of space surrounding the message occurred by chance, or when the source of the message is not credible and his or her opinions should not be taken seriously. Studies 5 and 6 examined these possibilities.

Study 5 validated the assumption that the amount of space surrounding a persuasive message would not influence recipients' opinions if they perceive that it occurred by chance and was not under the communicator's control. That is, empty space should not influence the

persuasiveness of the message if the configuration of space and message was generated randomly by a computer.

Method

Two hundred sixty-six US residents (148 male; M_{age} = 35.12, SD_{age} = 12.75) were recruited from Mechanical Turk with monetary incentive. They were assigned to cells of a 2 (space conditions: empty space vs. limited space) × 2 (source: computer [random] vs. person) between-subjects design.

We told the participants that the study comprised two unrelated tasks. In the first task, they evaluated two popular quotes from the Internet that emphasized the importance of personal warmth: "Hold on to whatever keeps you warm inside" and "A kind word can warm three winter months." Each quote was presented in either a box with little empty space or a box with substantial empty space, as in other studies. Unlike in other studies, a headline was added at the top of the page. In *random source* conditions, the headline stated that "the message and the configuration of the image (e.g., font, color, or other visuals) do not reflect the personal attitude or intention of the author." In *person source* conditions, it read that "the message and the configuration of the image (e.g., font, color, or other visuals) are the result of the author's free choice." In each case, participants rated the persuasiveness of each statement along a three-item scale ("to what extent do you like the quote," "to what extent do you think the quote is important," and to what extent do you agree with the quote;" α = .90), from 1 (not at all) to 7 (very much). They also reported their perceptions of message strength on "how strongly did the quote convey its opinion." Moreover, the time they took to make their evaluation was recorded.

Then, to determine the impact of the message on participants' personal beliefs, we asked

them to complete an ostensibly unrelated survey that concerned how people manage their

romantic relationships. On this pretense, participants were given a list of 10 attributes and

reported the importance of each along a scale from 1 (not at all) to 7 (very much). The attributes

included five warmth-related qualities (sincerity, understanding, friendly, trust, and having

complementary personalities; Williams and Bargh 2008) as well as qualities that concern status

and wealth, physical attractiveness, and so on. Responses to the warm-related items were

averaged (α = .55). Finally, they reported their marital status and other demographic information.

Results and Discussion

Perceptions of Message Strength and Evaluation Time. Analyses of perceived message

strength yielded a marginally significant interaction of space and source ($F(1, 262)$ = 3.53, p

= .062). When the message was generated intentionally by the communicator, participants

perceived it to convey a nonsignificantly weaker opinion when empty space surrounded it than

when it did not (4.29 vs. 4.66, respectively; $F(1, 262)$ = 2.77, p = .097). When the message was

computer-generated, however, the difference was nonsignificantly reversed (4.59 vs. 4.38,

respectively; F< 1). Moreover, there was no effect on the amount of evaluation time (F< 1),

consistent with the results of previous experiments.

Message Impact. Analyses of participants' judgements of choosing a warm partner

yielded a significant interaction of space and source conditions ($F(1, 262)$ = 6.70, p = .010).

Effects of a similar pattern were also evident in analyses of their message persuasiveness ratings

(F(1, 262) = 4.98, p = .026). We therefore averaged these variables to provide a single measure

of message impact (α = .79). Analyses of this measure yielded a significant interaction of space

and source of the form expected (F(1, 262) = 8.06, p = .005). When participants thought that

someone had intentionally generated the message, they were less persuaded by its implications

when it was surrounded by empty space than when it was not (5.23 vs. 5.64, respectively; F(1,

262) = 10.13, p = .002). When they were told that a computer had randomly generated the

message, however, this difference was not apparent (5.39 vs. 5.28, respectively F < 1). Note also

that no effects on warmth-unrelated judgments were reliable (ps > .20).

Mediation Analyses. Bootstrapping analyses (model 8, Hayes 2013) indicated that the

interactive effect of empty space and source condition on message impact was mediated by

participants' perceptions of message strength (95%CI: from .0088 to .5351, excluding 0; based

on 5,000 resamples). As predicted, the perceptions of message strength mediated the effect of

empty space when participants were told that the configuration of the display was intentional

(95%CI: from .0041 to .3651), but not when they were told that the configuration was randomly

generated (95%CI: from -.2884 to .1085). Our findings for this study are summarized in table 3.

(Insert table 3 about here)

STUDY 6

Study 5 indicated that participants were not influenced by the amount of space

surrounding a message when they believed that it occurred by chance and had no implications

for the source's intentions to communicate. Similar effects should occur if the source of the message were not credible. If participants perceive that a message comes from a low-credibility source, they might not be persuaded even if the communicator advocates a strong opinion. In other words, participants' perceptions of message strength are likely to depend on the space that surrounds it, but their acceptance of the message's implications might not be. Study 6 examined this possibility.

Method

One hundred eighty-nine US residents (81 male; $M_{age} = 37.49$, $SD_{age} = 13.05$) were recruited from Mechanical Turk and assigned to cells of a 2 (space: empty vs. limited) × 2 (source: low vs. high credibility) between-subjects design. We selected a communication that has been used successfully in previous research on source credibility (Pratkanis et al. 1988; Tormala, Briñol and Petty 2006, 2007). Participants were told that we were interested in how consumers evaluate household products and that we were collecting different opinions about using phosphate laundry detergents. In the *high-credibility* conditions, the message was ostensibly taken from a pamphlet from an established consumer advocacy group that investigates misleading practices with the express purpose of helping consumers make sound decisions. In the *low-credibility* conditions, the message allegedly came from a pamphlet prepared by a nationwide soap and detergent manufacturer that sold phosphate detergents. Thus, the source of the message had a vested interest in persuading people to use its products. On the next page, participants in both conditions read a message entitled *The Benefits of Phosphate Detergents* (see the appendix for the complete message) that was surrounded by either empty space or little space.

After reading the message, participants reported their attitude toward the use of phosphate laundry detergents along four scales from 1 (very bad/unfavorable/harmful/negative) to 7 (very good/favorable/beneficial/positive), and reported their agreement with the message for three items ("I perceived the message as being carefully thought out," "I perceived the message as convincing," and "I thought the message fairly evaluated the evidence"; Wood, Kallgren, and Priesler 1985) along a scale from 1 (not at all) to 7 (very much). They also described their perceptions of message strength along three scales from 1 (weak/uncertain/not confident) to 7 (strong/certain/confident), and the source with respect to five items (trustworthy, likable, knowledgeable, being expert, and credible) along a scale from 1 (not at all) to 7 (very much). Then they reported the aesthetic quality of the communication along two scales from 1 (not at all pretty/looks bad) to 7 (very pretty/looks good). Finally, they reported the perceived font size and the difficulty of reading the message, and indicated the extent to which they elaborated the message content ("how much attention did you pay to the message," "how much effort did you put into reading the message," and "how deeply did you think about the information of the message"; Tormala and Petty 2002), along scales from 1 (not at all) to 7 (very much). Responses to each set of items were averaged (in all cases, $\alpha > .84$).

Results

Manipulation Check. Participants perceived the source as more credible in the high-credibility conditions ($M = 5.03$) than in the low-credibility conditions ($M = 4.64$; $F(1, 185) = 4.49$, $p = .035$). However, the interaction of source credibility and space conditions was marginally significant ($F(1, 185) = 3.37$, $p = .068$). Specifically, empty space non-significantly

increased the perceptions of the source's credibility in the low-credibility conditions (4.82 vs. 4.40, in empty vs. limited space conditions, respectively; $F(1, 185) = 2.38, p > .10$). In the high-credibility conditions, however, the effect of empty space was nonsignificant in the opposite direction (4.88 vs. 5.17, respectively; $F(1, 185) = 1.12, p > .20$).

Perceptions of Message Strength. As expected, participants perceived the message to be conveyed less strongly when it was surrounded by empty space than when it was not (5.27 vs. 5.71, respectively; $F(1, 185) = 6.07, p = .015$), and this difference did not depend on whether the source was credible (5.30 vs. 5.83, respectively; $F(1, 185) = 4.52, p = .035$) or not (5.42 vs. 5.68, respectively; $F(1, 185) = 1.16, p > .20$). The interaction of source credibility and space conditions was not significant ($F < 1$).

Message Impact. Analyses of participants' attitudes toward using phosphate detergents and their judgments of the message's persuasiveness yielded a similar pattern of effects. We thus combined these variables to provide a single index of message impact ($\alpha = .94$). Analyses of this index indicated that participants reported the message's impact to be nonsignificantly greater when the source was credible ($M = 5.37$) than when it was not ($M = 5.02$; $F(1, 185) = 3.16, p = .077$). However, the interaction of source and space conditions was significant ($F(1, 185) = 6.08, p = .015$) and similar to that observed in study 5. In the high-credibility conditions, the impact of the message was less when the message was surrounded by empty space than when it was not (5.06 vs. 5.64, respectively; $F(1, 185) = 4.55, p = .034$). In the low-credibility conditions, however, the amount of space surrounding the message did not significantly affect message impact (5.19 vs. 4.82, respectively, $F(1, 185) = 1.16, p = .283$).

Self-Reported Elaborations. The effects of source credibility and space conditions on participants' reports of their elaboration of the message were similar to their effects on attitudes. Participants elaborated more in the high-credibility conditions ($M = 6.23$) than in the low-credibility conditions ($M = 5.94$; $F(1, 185) = 4.69$, $p = .032$). However, the interaction of source credibility and space conditions was significant ($F(1, 185) = 5.07$, $p = .026$), indicating that although empty space led to greater elaboration than limited space in the high-credibility conditions (6.46 vs. 6.03, respectively; $F(1, 185) = 5.17$, $p = .024$), this difference was not evident in the low-credibility conditions (5.87 vs. 6.04, respectively; $F < 1$).

Mediation Analyses. Bootstrapping analyses (model 15; Hayes 2013) based on 5,000 resamples confirmed that the mediating effect of perceived message strength on the effect of empty space on attitudes depended on source credibility (95%CI: from .0117 to .4049, excluding 0). That is, participants' perceptions of message strength mediated the effect of empty space on message impact when source credibility was high (95%CI: from .0456 to .8844), but not when it was low (95%CI: from -.1474 to .5078). Thus, although space conditions had similar effects on participants' perceptions of message strength in both source credibility conditions, these perceptions had an effect on participants' attitudes only when the source was credible.

Perceptual Experiences. Source credibility and space conditions had no significant effects on perceptions of either aesthetic quality ($Fs < 1$) or reading difficulty ($Fs < 1$). Our findings for this study are summarized in table 4.

(Insert table 4 about here)

Discussion

Studies 5 and 6 provided converging evidence for the inference-based account of the effects of empty space, showing that these effects depend on perceptions of the relevance of the inferences drawn from empty space to the judgments that people are asked to make. When the context of the message was generated randomly by a computer (study 5), the space surrounding the message had no impact on perceptions of message strength and, as a result, had no influence on the message's persuasiveness. In study 6, the space surrounding the message decreased perceptions of message strength regardless of the credibility of the source. However, it affected recipients' acceptance of the message only when the source's opinion was credible and the strength of this message was relevant. When the source was not credible, participants' opinions were not influenced by the message regardless of their perception of the strength of the position it conveyed.

Note that participants' report of their cognitive elaboration in the high-credibility conditions increased as empty space increased. This is consistent with the evidence in study 3 that participants had better recall of the message when it was surrounded by empty space. It further suggests that empty space can alter recipients' cognitive responses to the message. Study 7 confirmed this possibility.

STUDY 7

In principle, the empty space that surrounds a message could not only serve as a heuristic cue but also affect the systematic processing of the message content. If recipients of a message use the amount of empty space as a heuristic basis for judgment, it should affect the impact of a message independently of the amount of cognitive deliberation that recipients might be able to perform in response to it. This should be particularly true when recipients are neither motivated nor able to expend time and effort in evaluating the message's implications. For example, it might be evident when they are under cognitive load and their resources are depleted.

In some cases, however, people are motivated and able to think about the implications of a message. In this case, they might either elaborate the positive implications of the message or try to refute its validity (i.e., to counterargue), depending on whether they agree or disagree with the position advocated or disagree with (Petty and Cacioppo 1986). The magnitude of these cognitive responses could also depend on the strength of the position advocated. That is, recipients of a counterattitudinal message may feel less threatened by it when the communicator does not seem confident of the position being advocated than when she or he appears to be strongly committed to the position. Therefore, they may counterargue less in the former condition than in the latter.

Study 7 examined the implications of this possibility and, in doing so, distinguished between the effects of empty space on heuristic and deliberative processing. Unlike in other studies, participants received a message advocating a position with which they disagreed and thus were disposed to counterargue. The message was either surrounded by empty space or not. We expected that participants would counterargue the message but would be less inclined to do so when the message was surrounded by empty space than when it was not. To this extent, they should believe more strongly in the position advocated in the former condition than in the latter.

In some conditions, however, participants were put under cognitive load while they read the message. In this case, they were unable to counterargue the message's implications and thus were likely to engage in heuristic processing. In this case, they should be less persuaded by the message when it was surrounded by empty space. In short, we expected that the empty space surrounding the message would have opposite effects on participants' acceptance of the position advocated, depending on whether they were under cognitive load or not.

Method

One hundred three Hong Kong undergraduate students (33 male; $M_{age} = 20.60$, $SD_{age} = 1.50$) participated for pay of HK\$20. They were randomly assigned to cells of a 2 (space: empty vs. limited) × 2 (cognitive load: low vs. high) between-subjects design. Although this study was similar to study 6, the communication concerned the use of nuclear power to replace fossil fuel (Haugtvedt and Wegener 1994). Participants in this study possessed unfavorable attitudes toward this position because of growing concerns about potential leakage from nuclear facilities near Hong Kong and a recent accident that had occurred in Fukushima, Japan. (A pretest using 43 undergraduate students from the same population indicated that agreement with the position along a scale from 1 (strongly disagree) to 7 (strongly agree) was significantly below the scale mean ($M = 3.35$; $t(42) = -2.55$, $p < -.015$.)

Participants were told they would complete several independents tasks in the session, the first of which was concerned with human memory and induced differences in cognitive load. In the high-load conditions, participants were asked to memorize eight letters and numbers (i.e. "R 3 6 E 4 C R H"). In the low-load conditions, they were asked to memorize two letters or

numbers (i.e. "R 3"). They were given 20 seconds to memorize the sequence and were told that they would be asked to recall it as accurately as possible at the end of the session.

Then, in an ostensibly unrelated study, we told participants that a group of researchers were interested in understanding people's reactions to different views on nuclear power and, on this pretense, gave them a message that favored the use of nuclear power to replace fossil fuel. The message text was surrounded either by empty space or not, as in other studies. Then participants reported their attitude toward the message position and the message's persuasiveness along the scales used in study 6.

Participants were then asked to list the thoughts that came to mind at the time they read the message and to categorize each thought as opposing, neutral, or supporting the position taken in the message (Harmon and Coney 1982; Petty and Cacioppo 1977; Sternthal, Dholakia, and Leavitt 1978). Finally, they recalled the sequence they had been asked to memorize.

Results

We expected that when participants were under high cognitive load, they would not think carefully about the message's implications and would use the space surrounding the message as a heuristic basis for inferring its persuasiveness and thus as a basis for their attitude toward the position advocated. To this extent, they should report a less favorable attitude toward the position advocated under the empty space conditions than under the limited space conditions. In the absence of cognitive load, however, participants were expected to counterargue the position advocated. However, they were expected to counterargue less in the empty space conditions (when they perceive the position advocated to be less strong) than in the limited space conditions

and so they should be more persuaded in the former conditions. Our results confirmed these expectations.

Cognitive Responses. The proportion of supportive thoughts listed in each condition and the proportion of opposing thoughts listed were computed for each participant and used as indices of bolstering and counterarguing, respectively. Analyses of bolstering as a function of experimental variables yielded no significant effects (ps >.10), as shown in table 5. However, analyses of counterarguing indicated that participants generated nonsignificantly fewer thoughts that opposed the message position in the high-load conditions than in the low-load conditions (.269 vs. .363 respectively; $F(1, 99) = 3.01$, $p = .086$). Moreover, the interaction of cognitive load and space conditions was significant ($F(1, 99) = 10.03$, $p = .002$). Specifically, participants in the low-load conditions generated significantly fewer opposing thoughts when the message was surrounded by empty space than when it was not (.248 vs. .486, respectively; $F(1, 99) = 8.56$, $p = .004$). In the high-load conditions, however, this difference was not significant in the opposite direction (.333 vs. .197, respectively; $F(1, 99) = 2.52$, $p = .116$).

Message Impact. Analyses of participants' attitude towards the use of nuclear power and their ratings of message persuasiveness yielded similar effects of the form expected. We again combined these measures into a single index of message impact ($\alpha = .88$). As predicted, the interactive effect of space conditions and cognitive load on the combined measure was significant ($F(1, 99) = 9.46$, $p = .003$). When participants were under high load, they were less likely to accept the position advocated when the message was surrounded by empty space ($M = 3.81$) than when it was not ($M = 4.40$; $F(1, 99) = 3.81$, $p = .054$). When they were under low load,

however, they were more likely to accept the position in the former condition than in the latter (4.26 vs. 3.55, respectively; $F(1, 99) = 5.81$, $p = .018$).

Bootstrapping analyses (model 8, Hayes 2013; based on 5000 resamples) indicated that the tendency to counterargue mediated the interactive effects of space conditions and cognitive load on the attitude towards the position advocated in the message (95%CI: from .1916 to 1.1114, excluding 0). The tendency to counterargue mediated the effect of empty space when cognitive load was low (95%CI: from -.7519 to -.1155), but not when it was high (95%CI: from -.0251 to .5367). Furthermore, the tendency to bolster could not mediate the effects of empty space (95%CI: from -.1747 to .1534). Our findings for this study are summarized in table 5.

(Insert table 5 about here)

Discussion

Study 7 provided evidence that the inferences drawn from empty space can both serve as a heuristic cue and affect systematic processing of the message content. Under high cognitive load, participants' attitude toward the position advocated was influenced directly by the inferences they drew from empty space independently of the message content. Thus, they reported a less favorable attitude toward the message position when empty space surrounded the text. Under low load, however, participants engaged in counterarguing, but they counterargued less when the message was surrounded by empty space. Consequently, they were more persuaded by the message in this condition.

The difference between the effects of empty space on the impact of a counterattitudinal message and the effects we observed in our earlier studies are noteworthy. In our earlier studies, participants typically had no strong a priori opinion about the topic to which the messages pertained and consequently were unlikely to counterargue their implications. In this case, surrounding the message with empty space decreased its impact, as we observed in the high-load conditions of the present experiment. When a message is counterattitudinal, however, recipients of the message may be motivated to refute it and this may be particularly true when they perceive the implications of the message to be strong. In this case, therefore, surrounding the message with empty space increases its impact, in contrast to its effects when participants do not have a strong a priori opinion toward the position being advocated.

GENERAL DISCUSSION

Summary and Implications

Advertising research has typically found that consumers infer several attributes of a product (quality, creativity, prestige, etc.) from the space that surrounds a picture of it (Homer 1995; Jacobs 1972; Pracejus et al. 2006). People can also draw inferences from the amount of space that surrounds a verbal message. As our research indicates, however, the nature of these inferences is quite different.

Both theory and past research indicate that people's reactions to a verbal communication are influenced not only by its literal meaning but also by their perception of the meaning that communicator intends to convey (Grice 1975; Higgins 1981; Sperber and Wilson 1986; Wyer

and Gruenfeld 1995). This meaning can be inferred from characteristics of both the message itself and the context in which it is presented. In face-to-face conversations, for example, communicators' intentions are often inferred from their facial expression or tone of voice. Likewise, the pragmatic implications of a written communication can also be inferred from contextual factors. The amount of physical space that surrounds the communication may be one of these factors. Surprisingly, the effects of this factor have not before been considered.

Our research provides several examples of this influence in both laboratory and real-life settings. Study 1 showed that the messages circulated on Facebook stimulated fewer responses when they were surrounded by empty space. Study 2 showed that a recommendation to take a free pamphlet led to less compliance when empty space surrounded it. Studies 3 and 4 indicated that the effects of empty space could not be explained in terms of differences in attention or perceptual fluency and metacognitive experience.

The last three studies provided compelling evidence of the processes underlying the effects of empty space and the conditions in which these processes occur. Study 5 showed that when the space surrounding a message is generated randomly by a computer, people perceive it to have no implications for the strength of the message and thus it has no impact on the message's influence. In study 6, the space surrounding a message affected perceptions of its strength regardless of the credibility of its source. However, it influenced recipients' attitudes only when the source was credible, and therefore the strength of the position advocated was a relevant consideration in forming these attitudes.

Finally, study 7 provided evidence that when the position advocated in a message is counterattitudinal, recipients are motivated to counterargue but are less inclined to do so when the message is surrounded by empty space and they perceive the position advocated to be less

strong. Consequently, they are more likely to accept the position advocated when the message is surrounded by empty space than when it is not. On the other hand, inducing cognitive load prevents recipients from engaging in this cognitive activity and leads them to use the space surrounding the message as a heuristic. In this case, they are less persuaded by the message when empty space surrounds it and they perceive its implications to be less extreme.

Our interpretation of these results assumes that individuals use the amount of empty space surrounding a message as an indication that the communicator is either unmotivated or unable to provide strong arguments in support of the position advocated. This assumption is consistent with Petty and Cacioppo's (1984) findings that individuals who are not involved in a message use the number of arguments in support of a position as a basis for inferring its validity independently of the quality of the arguments. We confirmed this assumption in an independent study. A total of 55 MTurkers (24 males; $M_{age} = 37.1$, $SD_{age} = 12.9$) took part in the study for pay of $.20. They were told that the researchers were interested in the way people write persuasive arguments and, on this pretense, were asked to respond to the same message about nuclear energy used in study 7. Half of the participants were given the message surrounded by empty space (empty space condition) and the other half were given the message *not* surrounded by space (limited space condition). Then all participants were asked to indicate the extent to which they perceived the communicator as having tried hard to provide persuasive arguments for the position advocated (two items; $r = .66$). Specifically, participants in the empty space condition reported that the communicator tried less hard to provide arguments in the empty space condition ($M = 3.11$, $SD = 1.35$) than in the limited space condition ($M = 3.93$, $SD = 1.59$; $F(1, 53) = 4.21$, $p = .045$). These results confirm the assumption that individuals inferred the communicator's

intention to make arguments for the position advocated from the space surrounding the message text.

Furthermore, study 7 distinguished between the heuristic effects of empty space and its effects on more deliberative information processing. Individuals are likely to engage in heuristic processing not only if they are unable to do so, as in study 7, but also if they are unmotivated to expend this effort. To this extent, the different effects of empty space on responses to a counterattitudinal message may depend on recipients' need for cognition (Petty and Cacioppo 1986) as well as other situational and individual difference factors that are likely to influence the motivation to refute a message's implications. For example, participants are often fairly indifferent to the implications of an advertisement and are unmotivated to think extensively about these implications. In this case, empty space may decrease the ad's impact. In contrast, appeals to engage in behavior that recipients are inclined to resist (e.g., donating money to an unpopular cause) may elicit less counterarguing when the messages are surrounded by empty space and may therefore be *more* effective in these conditions. Political advertising might also be worth considering in this context. For example, the statements that favor the candidate one prefers might be more effective if they are surrounded by limited space whereas statements that favor the opponent, which are likely to stimulate counterarguing, might be more effective if they are surrounded by empty space.

An inherent ambiguity arises in evaluating these possibilities. In our discussion, we have typically focused on the effectiveness of empty space, implicitly suggesting that limited space is the default. However, the effects of empty and limited space are obviously relative, and in the absence of a control condition, it is unclear whether empty space decreases perceptions of a message's strength, limited space increases it, or both. Because all written communications are

transmitted in *some* context, the nature of such a control condition is unclear. However, the ambiguity should be kept in mind.

Limitations and Future Research

This research provides an intriguing demonstration of how *visual* cues can affect the impact of a *verbal* message. These effects generalize over several different types of communications (quote images, advertisement, and pamphlets) as well as persuasive messages (conveying a specific opinion or a plan of action). Note that in most of our studies (except the online setting in study 1 and the high-load conditions in study 7), participants received messages in isolation of any other materials and were asked to devote resources to the target message. In advertising contexts, however, messages are often surrounded by a large amount of other irrelevant verbal or visual material and thus need to compete for attention. Although our results might not generalize to these situations, they have implications for a large number of situations in which consumers encounter messages on billboards, full-page magazine ads and public announcements. Thus, we did not consider our procedures to be a serious limitation on the applicability of our findings. Further research is nonetheless necessary to ensure that our results generalize to such cluttered settings.

Although the effects of empty space we identified cannot be explained in terms of differences in the attention paid to the messages presented, we do not contend that attention plays no role in the effects of empty space on message impact (Pieters and Wedel 2004; Pieters et al. 2010). For example, empty space increased recipients' recall of a message in study 3 albeit it decreased the message's persuasiveness. As noted above, participants were explicitly asked to

comprehend the message in our research. This may have called their attention to the content and prevented the detection of additional effects that might have occurred. When people do not focus their attention on a particular message or specific content, empty space might permit the material to stand out from the clutter and thus may increase attention to it (Strong 1926). It might also reduce visual complexity and capture attention to the target content (Pieters et al. 2010). Pieters and Wedel (2004) nonetheless found that people sometimes pay more attention to advertisements that devote a large amount of space to text and leave little space unused. Concerning these mixed findings, further investigations of the conditions in which attention comes into play and in which empty space affects attention differently are certainly warranted.

Lastly, the results of study 4 confirmed that the critical determinant of reactions to messages is the *relative* amount of empty space surrounding the message and not the absolute amount of space surrounding it. However, we manipulated empty space within a comfortable range such that the stimuli were likely to be similar in the metacognitive experiences they elicited (aesthetic pleasure, reading difficulty, etc.). When the space surrounding a message exceeds these extremes, additional considerations are likely to arise. Perceptions of extremely limited space might activate general concepts associated with physical constraint and have effects similar to those other situational factors that constrain one's feelings of physical freedom (Levav and Zhu 2009; Xu, Shen, and Wyer 2012). Excessive amounts of empty space might have other effects. These considerations raise more general questions concerning the conditions that give rise to different interpretations of empty space.

DATA COLLECTION INFORMATION

The first author conducted all seven studies and the pretest of study 7 between December 2013 and July 2016 in Hong Kong (undergraduate students of the Chinese University of Hong Kong) and in the United States (Amazon MTurkers). The pilot study reported in the General Discussion was conducted in January 2017 on Mechanical Turk. All studies were collected by the first author or under her supervision (with the support of research assistants from the Chinese University of Hong Kong). Data were analyzed by the first author, but were discussed on multiple occasions jointly by all authors based on the first author's field notes, artifacts and summary.

APPENDIX

A Summary of the Messages Used in Studies

Study 5:   (a) Hold on to whatever keeps you warm inside.

(b) A kind word can warm three winter months.

Study 6:   The Benefits of Phosphate Detergents #1: "For ordinary household use, it is now widely accepted that phosphate detergents are the cleanest and safest type of detergent on the market. In fact, non-phosphate detergents typically contain EDTA, a chemical additive associated with harmful environmental consequences even in small amounts. Thus, it is wisest to use phosphate detergents for household laundry."

Study 7:   Nuclear energy should replace fossil fuel (i.e., the major source of greenhouse gases) to ease global warming.

REFERENCES

Adams, Austin S. and Judy Edworthy (1995), "Quantifying and Predicting the Effects of Basic Text Display Variables on the Perceived Urgency of Warning Labels: Tradeoffs Involving Font Size, Border Weight, and Color," *Ergonomics*, 38 (11), 2221-37.

Adaval, Rashmi, and Robert S. Wyer (1998), "The Role of Narratives in Consumer Information Processing," *Journal of Consumer Psychology*, 7(3), 207-45.

Adaval, Rashmi, Linda M. Isbell, and Robert S. Wyer (2007), "The impact of pictures on narrative-and list-based impression formation: A process interference model," *Journal of Experimental Social Psychology*, 43(3), 352-64.

Anderson, Norman H. (1981). *Foundations of information integration theory*. New York: Academic Press.

Argo, Jennifer J. and Kelley J. Main (2004), "Meta-Analyses of the Effectiveness of Warning Labels," Journal of Public Policy and Marketing, 23(2), 193-208.

Bahnsen, Paul (1928). *Ein Untersuchung über Symmetrie und Asymmetrie bei visuellen Wahrnehmungen*. Lippert.

Bernard, Michael, Bonnie Lida, Shannon Riley, Telia Hackler, and Karen Janzen (2002), "A Comparison of Popular Online Fonts: Which Size and Type is Best?" *Usability News*, 4(1), available at: http://usabilitynews.org/

Bettman, James R., John W. Payne, and Richard Staelin (1986), "Cognitive considerations in designing effective labels for presenting risk information," *Journal of Public Policy and Marketing*, 5, 1-28.

Book, Albert C. and C. Dennis Schick (1997). Foundations *of Copy and Layout,* 3rd ed. Lincolnwood, IL: National Textbook.

Brandt, Herman F. (1942), "An Evaluation of the Attensity of Isolation by Means of Ocular Photography," *American Journal of Psychology*, 55(2), 230-39.

Fishbein, Martin and Icek Ajzen (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Grice, H. Paul (1975), "Logic and conversation," In Peter Cole and Jerry L. Morgan (Eds), *Syntax and Semantics III: Speech Acts* (pp. 41–58), Academic Press, New York, NY.

Harmon, Robert R., and Kenneth A. Coney. (1982), "The persuasive effects of source credibility in buy and lease situations," *Journal of Marketing Research*, 19(2), 255-60.

Hayes, Andrew F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.

Haugtvedt, Curtis P., and Duane T. Wegener (1994), "Message order effects in persuasion: An attitude strength perspective," *Journal of Consumer Research*, 21(1), 205-18.

Higgins, E. Tory (1981), "The "communication game": Implications for social cognition and persuasion," In E. T. Higgins, C. P. Herman, M. P. Zanna (Eds), *Social Cognition: The Ontario Symposium*, Vol. 1, 343-92.

Hilton, Denis J. (1995), "The Social Context of Reasoning: Conversational Inference and Rational Judgment," *Psychological Bulletin*, 118(2), 248-71.

Hoffman, Donald D., and Manish Singh (1997), "Salience of visual parts," *Cognition*, 63, 29–78.

Homer, Pamela M. (1995), "Ad size as an indicator of perceived advertising costs and effort: The effects on memory and perceptions," *Journal of Advertising*, 24(4), 1–12.

Hung, Iris W. and Robert S. Wyer (2008), "The Role of Implicit Theories in the Impact of

 Problem-Solving Print Advertisements," *Journal of Consumer Psychology*, 18, 223−35.

Jacobs, Laurence (1972), *Advertising and Promotion for Retailing: Text and Cases*, Glenview,

 IL: Scott, Foresman.

Jacobs, Laurence and Christopher L. Poillon (1992), "White Space in Newspaper Grocery

 Advertising: Some Findings," *Journal of Current Issues and Research in Advertising*, 14

 (2), 69-75.

Jewler, A. Jerome and Bonnie L. Drewmany (2000). *Creative Strategy in Marketing,* 7th ed.

 Belmont, CA: Wadsworth.

Kardes, Frank R., Steven S. Posavac, and Maria L. Cronley (2004), "Consumer inference: A

 review of processes, bases, and judgment contexts," *Journal of Consumer

 Psychology*, 14(3), 230–56.

Kirmani, Amna (1990), "The Effect of Perceived Advertising Costs on Brand Perceptions,"

 Journal of Consumer Research, 17, 160–71.

Koffka, Kurt (1935). *Principles of Gestalt Psychology*. New York: Harcourt Brace.

Kruschke, John K. (2011), "Models of attentional learning," In E. M. Pothos and A. J. Wills

 (eds.), *Formal Approaches in Categorization*, pp. 120–152. Cambridge University Press.

Lee, Angela Y., and Aparna A. Labroo (2004), "The Effect of Conceptual and Perceptual

 Fluency on Brand Evaluation," *Journal of Marketing Research*, 41(2), 151–65.

Levav, Jonathan, and Rui Zhu (2009), "Seeking Freedom through Variety," *Journal of Consumer

 Research*, 36(4), 600–10.

Novemsky, Nathan, Ravi Dhar, Norbert Schwarz, and Itamar Simonson (2007), "Preference

 Fluency in Choice," *Journal of Marketing Research*, 44(3), 347–56.

Olsen, G. Douglas, John W. Pracejus, and Thomas C. O'Guinn (2012), "Print advertising: White space," *Journal of Business Research*, 65(6), 855–60.

Petty, Richard E., and John T. Cacioppo (1977), "Forewarning, Cognitive Responding, and Resistance to Persuasion," *Journal of Personality and Social Psychology*, 35(9), 645–55.

Petty, Richard E., and John T. Cacioppo (1984), "The Effects of Involvement on Responses to Argument Quality: Central and Peripheral Routes to Persuasion." *Journal of Personality and Social Psychology*, *46*. 69–81.

Petty, Richard E., and John T. Cacioppo (1986), "The Elaboration Likelihood Model of Persuasion?" in *Advances in Experimental Social Psychology*, Vol. 19, ed. L. Berkowitz, New York: Academic Press, 123–205.

Petty, Richard E., and John T. Cacioppo (1996), *Attitudes and persuasion: Classic and contemporary approaches,* Westview Press, Boulder, Colorado.

Pieters, Rik and Michel Wedel (2004), "Attention Capture and Transfer in Advertising: Brand, Pictorial, and Text-Size Effects," *Journal of Marketing*, 68 (April), 36–50.

Pieters, Rik, Michel Wedel, and Rajeev Batra (2010), "The stopping power of advertising: Measures and effects of visual complexity," *Journal of* Marketing, 74(5), 48–60.

Pieters, Rik, Michel Wedel, and Jie Zhang (2007), "Optimal Feature Advertising Design Under Competitive Clutter," *Management Science*, 53 (11), 1815–28.

Pracejus, John W., G. Douglas Olsen, and Thomas C. O'Guinn (2006), "How Nothing Became Something: White Space, Rhetoric, History, and Meaning," *Journal of Consumer Research*, 33(1), 82–90.

Pracejus, John W., Thomas C. O'Guinn, and G. Douglas Olsen (2013), "When white space is more than "burning money": Economic signaling meets visual commercial rhetoric," *International Journal of Research in Marketing*, 30(3), 211–18.

Pratkanis, Anthony R., Anthony G. Greenwald, Michael R. Leippe, and Michael H. Baumgardner (1988), "In search of reliable persuasion effects: III. The sleeper effect is dead: Long live the sleeper effect," *Journal of personality and social psychology*,54(2), 203–18.

Reber, Rolf, and Norbert Schwarz (1999), "Effects of perceptual fluency on judgments of truth," *Consciousness and cognition*, 8(3), 338–42.

Reber, Rolf, and Norbert Schwarz (2001), "The hot fringes of consciousness: Perceptual fluency and affect," *Consciousness and Emotion*, 2, 223–31.

Reber, Rolf, Norbert Schwarz, and Piotr Winkielman (2004), "Processing Fluency and Aesthetic Pleasure: Is Beauty in the Perceiver's Processing Experience?" *Personality and Social Psychology Review*, 8(4), 364–82.

Reber, Rolf, Piotr Winkielman, and Norbert Schwarz (1998), "Effects of perceptual fluency on affective judgments," *Psychological Science*, 9, 45–48.

Reimer, Torsten, Rui Mata, and Markus Stoecklin (2004), "The use of heuristics in persuasion: Deriving cues on source expertise from argument quality," *Current Research in Social Psychology*, 10(6), 69–84.

Rubin, Edgar (1958), "Figure and ground," *Readings in perception*, 194-203.

Schwarz, Norbert (2004), "Meta-cognitive experiences in consumer judgment and decision making," *Journal of Consumer Psychology,* 14(4), 332–48.

Schwarz, Norbert, Herbert Bless, and Gerd Bohner (1991), "Mood and persuasion: Affective states influence the processing of persuasive communications," *Advances in experimental social psychology*, 24, 161–99.

Shen, Hao, Yuwei Jiang, and Rashmi Adaval (2010), "Contrast and assimilation effects of processing fluency," *Journal of Consumer Research*, 36(5), 876–89.

Shen, Luxi, and Oleg Urminsky (2013), "Making Sense of Nonsense: The Visual Salience of Units Determines Sensitivity to Magnitude," *Psychological science* 24 (3), 297–304.

Song, Hyunjin, and Norbert Schwarz (2008), "If it's hard to read, it's hard to do processing fluency affects effort prediction and motivation," *Psychological Science* 19(10), 986–88.

Sperber, Dan, and Deirdre Wilson (1986/1995), *Relevance: Communication and Cognition*, 2nd edition, London: Blackwell.

Srull, Thomas K., and Robert S. Wyer (1989), "Person memory and judgment," *Psychological review*, 96(1), 58–83.

Sternthal, Brian, Ruby Dholakia, and Clark Leavitt (1978), "The Persuasive Effects of Source Credibility: Tests of Cognitive Response," *Journal of Consumer Research*, 4(4), 252–60.

Strong, Edward K., Jr (1926), "Value of white space in advertising," *Journal of applied psychology*, 10(1), 107–16.

Torres, Ivonne M., Jeremy J. Sierra, and Robert S. Heiser (2007), "The effects of warning-label placement in print ads: A social contract perspective," *Journal of Advertising*, 36(2), 49–62.

Tormala, Zakary L., Pablo Briñol, and Richard E. Petty (2006), "When credibility attacks: The reverse impact of source credibility on persuasion," *Journal of Experimental Social Psychology,* 42, 684–91.

Tormala, Zakary L., Pablo Briñol, and Richard E. Petty (2007), "Multiple Roles for Source Credibility under High Elaboration: It's All in the Timing," *Social Cognition,* 25(4), 536–52.

Tormala, Zakary L., and Richard E. Petty (2004), "Resistance to persuasion and attitude certainty: The moderating role of elaboration," *Personality and Social Psychology Bulletin*, 30(11), 1446–57.

Tversky, Amos, and Daniel Kahneman (1973), "Availability: A heuristic for judging frequency and probability," *Cognitive psychology*, 5(2), 207–32.

Wänke, Michaela, Norbert Schwarz, and Herbert Bless (1995), "The availability heuristic revisited: Experienced ease of retrieval in mundane frequency estimates," *Acta Psychologica*, 89(1), 83–90.

Weintraub, Daniel J. (1979), "Ebbinghaus illusion: context, contour, and age influence the judged size of a circle amidst circles," *Journal of Experimental Psychology: Human Perception and Performance*, 5(2), 353–64.

Wileman, R. E. (1993). *Visual communicating*. Educational Technology.

Williams, Lawrence E., and John A. Bargh (2008), "Experiencing physical warmth promotes interpersonal warmth," *Science*, *322*(5901), 606–7.

Wolfe, Jeremy M., Karen P. Yu, Marian I. Stewart, Amy D. Shorter, Stacia R. Friedman-Hill, and Kyle R. Cave (1990), "Limitations on the parallel guidance of visual search: Color x color and orientation x orientation conjunctions," *Journal of Experimental Psychology: Human Perception and Performance,* 16(4), 879–92.

Wood, Wendy, Carl A. Kallgren, and Rebecca M. Preisler (1985), "Access to attitude-relevant information in memory as a determinant of persuasion: The role of message attributes," *Journal of Experimental Social Psychology*, 21(1), 73–85.

Wyer, Robert S., Rashmi Adaval, and Stanley J. Colcombe (2002), "Narrative-based representations of social knowledge: Their construction and use in comprehension, memory, and judgment," *Advances in experimental social psychology*, 34, 131–97.

Wyer, Robert S., and Deborah H. Gruenfeld (1995), "Information processing in interpersonal communication," *The cognitive bases of interpersonal communication*, 7–47.

Wyer, Robert S., Iris W. Hung, and Yuwei Jiang (2008), "Visual and verbal processing strategies in comprehension and judgment," *Journal of Consumer Psychology*, 18, 244-257.

Xu, Jing, Hao Shen, and Robert S. Wyer (2012), "Does the distance between us matter? Influences of physical proximity to others on consumer choice," *Journal of Consumer Psychology*, 22(3), 418–23.

TABLE 1

Summary of Findings for Study 2 and 3

Study	Dependent variables	Empty space	Limited space
Study 2 (N = 126)	Instruction compliance	37.7%	59.6%
	Persuasiveness	3.94 (1.14)	4.41 (1.03)
Study 3 (N = 94)	Processing time (in seconds)	145.6 (102.23)	136.7 (55.74)
	Recall of the statements	7.50 (2.34)	6.23 (2.80)

TABLE 2

Summary of Findings for Study 4 (N = 155)

Dependent variables	Ad Size	Empty space	Limited space
Advertising effectiveness	Large	2.67 [a,b] (1.36)	2.95 [a] (1.49)
	Small	2.12 [b] (1.07)	3.06 [a] (1.51)
Image perceptions	Large	4.60 [a] (1.34)	4.42 [a] (1.52)
	Small	4.34 [a] (1.66)	4.43 [a] (1.67)
Aesthetic pleasure	Large	4.27 [a] (1.72)	3.95 [a] (1.64)
	Small	3.61 [a] (1.87)	3.80 [a] (1.75)
Reading difficulty	Large	2.12 [a] (.97)	2.22 [a] (1.34)
	Small	2.32 [a] (1.20)	2.08 [a] (.91)

Note. Cells in each row with unlike superscripts differ at $p \leq .05$.

TABLE 3

Summary of Findings for Study 5 (N = 266)

Dependent variables	Source Characterisitics	Empty space	Limited space
Perceptions of message strength	Intentional	4.29 [a] (1.17)	4.66 [a] (1.27)
	Random	4.59 [a] (1.44)	4.37 [a] (1.18)
Processing time (in seconds)	Intentional	27.9 [a] (11.5)	27.7 [a] (14.2)
	Random	28.0 [a] (11.5)	28.0 [a] (13.9)
Message impact	Intentional	5.23 [a] (.73)	5.64 [b] (.69)
	Random	5.39 [a] (.79)	5.28 [a] (.74)

Note. Cells in each row with unlike superscripts differ at $p \leq .05$.

TABLE 4

Summary of Findings for Study 6 (N = 189)

Dependent variables	Source Credibility	Empty space	Limited space
Source credibility	Low Credible	4.82 [a,b] (1.25)	4.40 [b] (1.52)
	High Credible	4.88 [a,b] (1.26)	5.17 [a] (1.25)
Perceptions of message strength	Low Credible	5.42 [a] (1.34)	5.68 [a,b] (1.28)
	High Credible	5.30 [a] (1.25)	5.83 [b] (1.04)
Message impact	Low Credible	5.19 [a] (1.22)	4.82 [a] (1.61)
	High Credible	5.06 [a] (1.48)	5.64 [b] (.99)
Cognitive elaboration	Low Credible	5.87 [b] (.99)	6.04 [b] (1.04)
	High Credible	6.46 [a] (.63)	6.03 [b] (.96)

Note. Cells in each row with unlike superscripts differ at $p \leq .05$.

TABLE 5

Summary of Findings for Study 7 (N = 103)

Dependent variables	Cognitive Load	Empty space	Limited space
Tendency to bolster	Low load	.420 [a,b] (.32)	.314 [b] (.32)
	High load	.403 [a] (.30)	.499 [a] (.36)
Tendency to counterargue	Low load	.248 [a] (.26)	.486 [b] (.33)
	High load	.333 [a] (.34)	.197 [a] (.25)
Message impact	Low load	4.26 [a] (1.13)	3.55 [b] (1.20)
	High load	3.81 [a] (1.07)	4.40 [c] (.79)

Note. Cells in each row with unlike superscripts differ at $p \leq .05$.

FIGURE 1

EXAMPLES OF SPACE MANIPULATION (STIMULI USED IN STUDY 7)

Empty space condition   Limited space condition

**Nuclear Energy Should
Replace Fossil Fuel
(i.e. the Major Source of
Green House Gases)
to Ease Global Warming.**

**Nuclear Energy Should
Replace Fossil Fuel
(i.e. the Major Source of
Green House Gases)
to Ease Global Warming.**

FIGURE 2

SAMPLES OF THE PASTEBOARD STAND USED IN STUDY 2