Is a Picture Worth a Thousand Words? the Moderators of Graphical Display and Statistical Formats of Product Efficacy on Framing-Message Effectiveness Relationship

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IS A PICTURE WORTH A THOUSAND WORDS? INFLUENCES OF GRAPHIC ILLUSTRATION ON FRAMED ADVERTISEMENTS Chun-Tuan ChangNational University of KaohsiungStatistical framing of product efficacy and graphic illustration were examined to explain the conditions under which messages could be more effective in a healthcare product advertisement. Using different health contexts (skin care and traveling) and statistical formats (percentage and frequency), two experiments investigate how consumers respond to positively and negatively framed messages with different forms but equivalent information about product efficacy. Framing effects were enhanced by graphical aids when statistics were presented in a percentage or a frequency with a small number size. The moderating role of graphs on framing effectiveness was eliminated when statistics were presented in frequency with a large number size.

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Is a Picture Worth a Thousand Words?
Influence of Graphic Illustration on Framed Advertisements
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ABSTRACT
Statistical framing of product efficacy and graphic illustration were examined to explain the conditions under which messages would be more effective in a healthcare product advertisement. Using different health contexts (skin care and traveling) and statistical formats (percentage and frequency), two experiments investigate how consumers respond to positively and negatively framed messages with different forms but equivalent information about product efficacy. Framing effects were enhanced by graphic aids when statistics were presented in a percentage or a frequency with a small number size. The moderating role of graphic illustration on framing effectiveness was eliminated when statistics were presented in frequency with a large number size.

INTRODUCTION
Consumers in modern society are frequently required to make healthcare decisions that involve grave potential risk. Discussing risks and benefits of treatment or healthcare options has become an increasingly important part of healthcare communication. For a long time, consumer researchers and public health campaigners try to figure out if there are specific optimal ways for information presentation that can be adopted to maximize the effectiveness of message for well-informed communication and what kinds of manipulations of risk and benefit information may increase message persuasiveness because of people’s subjective interpretation of information (Kahneman, Slovic and Tversky, 1982; Fischhoff, Bostrom and Quadrel, 1993; Naus et al., 2002; Lowe and Ferguson, 2003; Gurmankin, Baron and Armstrong, 2004).

An individual’s judgments and decisions are influenced greatly by how information is presented or framed (for a review paper, see Levin, Schneider and Gaeth, 1998). A 50% chance of survival (positive frame) is logically equivalent to a 50% chance of mortality (negative frame). However, each statement influences differently on the attitudes formed, and decisions made by the message reader (Moxey et al., 2003). Positive labeling of probability leads to an encoding of the information that tends to evoke favorable associations in memory while negative framing of the same probability tends to cause unfavorable associations (Levin and Gaeth, 1988). This phenomenon has shown to extend on medical and healthcare scenarios (Edwards et al., 2001) and diversified consumer purchase contexts (e.g., Levin and Gaeth, 1988).

The objective of present study was to investigate moderators of information formats of product efficacy on framing effectiveness in advertising contexts. Using appropriate message frames could increase the persuasiveness of messages to consumers, thereby increasing sales (Martin and Marshall, 1999). Understanding of framing effects may provide direct applications in creative and effective execution of advertising copy and layout (Arora, 2000). This research tested the idea that consumer responses to a new product advertisement could be influenced by message framing and presentations of graphs and statistics, and determined whether different graphic illustrations and different statistical presentations described in a message modified framing effects. The question centered in this research was: “could different statistical formats about product efficacy and graphic displays influence consumers’ evaluations and attitudes?”

A healthcare context is emphasized in this research because of the market value and the importance for public policy and communication. The healthcare market has changed irrevocably in the last two decades with the emergence of ‘healthcare consumers’ who, rather than being passive, have taken a more active role in their own healthcare (Moorman and Matulich, 1993). Health expenditures have outpaced the growth of the economy in 2002 (Department of Health, 2003). Over-the-counter (OTC) pharmaceuticals and consumables had the highest growth rate in 2002 primarily because of new product introductions expanding the market. Consumers demand more information, more choices and more involvement in decision-making (Moorman and Matulich, 1993). An important marketing issue arising here is how to present information to best educate consumers about healthcare and convince them to purchase related healthcare products or services.

THEORETICAL BACKGROUND AND HYPOTHESES
Statistical Formats of Product Efficacy and Framing Effects
Across various contexts of consumer healthcare decisions, researchers suggest that attribute framing influences subjects’ perceived willingness to accept a particular treatment (Levin et al., 1998). Levin et al. (1998) labeled it as attribute framing because only a single attribute within any given context is the subject of the framing manipulation and suggested that it represents the simplest case of framing, making it especially useful for gaining a basic understanding of how descriptive valence influences information processing. Positively framed messages stimulate more positive response than negatively framed ones to risk-avoidant options such as immunization (Donovan and Jalleh, 2000), condom usage (Linville, Fisher and Fischhoff, 1993), and adaptation of surgical procedures (McNeil et al., 1982; Wilson, Kaplan and Schneiderman, 1987; Marteau, 1989; Jacoby et al., 1993; Llewellyn-Thomas, McGreal and Thiel, 1995; O’Connor, Pennie and Dales, 1996; Krishnamurthy et al., 2001). Those risk-averse options may alleviate health problems and lead to longer life. A positively framed option generates positive associations and thus seems more attractive than a negatively framed option. People are more likely to approve of the choice when survival or success rates are emphasized than when the mortality or failure rates are emphasized.

Previous studies demonstrate that risk formats may influence consumers’ attitudes and healthcare decisions (Stone, Yates and Parker, 1997; Feldman-Stewart et al., 2000; Evans et al., 2000). Halpern, Blackman and Salzman (1989) investigated the influences of various presentations of oral contraceptive risk information on perceived safety. They found that estimates of the probability of risky events were affected by multiple sources of error and interpretation of different forms but equivalent statistical information. A majority of previous framing studies manipulated attribute framing through percentage presentation (e.g., Levin and Gaeth, 1988; Jalleh, 1992; Linville et al., 1993; Donovan and Jalleh, 2000; Sanford et al., 2002). The persuasive effects from the use of the positive or negative framing remain unclear in different statistical formats (i.e., frequency).

Frequency is defined as the number of times a given case, value, or event occurs relevant to the whole sample (e.g., 7 in 10 or 700 out of 1,000). Frequency may also be stated as a ratio of numbers of individuals occurring in a specific class to a total sample under a survey. Siegrist (1997) showed that risk information via a
frequency format (e.g., 600 out of 1,000 people will die) leads to more risk-averse behavior than that via a percentage (incidence rate) form (e.g., 60% of people will die). Schapira, Nattinger and McHorney (2001) further indicated that frequency formats have several advantages over probability because of its attributes of ease of interpretation, simplicity and the ability to provide a human contextual quality in statistical information. Similarly, Gigerenzer (2002) and Hoffrage and Gigerenzer (1998) indicated that people find using information presented in frequency easier than using information in percentage format, and make less biased judgments of risk when using information in frequency format.

Frequency can be presented in different number sizes (i.e., with different denominators). People respond differently to equivalent forms of relative frequency information presented in superficially different ways. McFarland and Miller (1994) administered a test on social perceptiveness ability and found that the manipulation of group size changed participants’ self-assessment of the ability to accurately interpret social situations. Participants were provided with fictitious feedback either that their performance was ranked in the 30th percentile or that they ranked 300th among 1,000 people. In interpreting information that represents relative frequencies, people tend to be more sensitive and responsive to frequencies in a large number size (e.g., 300 out of 1,000) than those in a small number size (e.g., 3 out of 10). These judgmental tendencies show that the number size of frequency serves as an anchoring point that determines subsequent decisions. The concept of “base-rate neglect” is often used to explain the cognitive judgmental tendency described above that people underutilize relative information about population statistics and instead overutilize other salient information such as the number size of frequency (Kahneman and Tversky, 1973). Yamagishi (1997) analyzed the rankings of 11 common causes of death given by the people and compared it to the actual number of deaths. They found that people were more likely to rank causes of death that occurred more frequently.

It is expected that statistical formats would affect the way people interpret information and influence message persuasion. When a frequency format is presented in a positively framed message, frequency with a larger number size should arouse more attention and will be judged as more favorable than that with a smaller one, which leads to higher effectiveness. Alternatively, in a negatively framed message, frequency presented in a higher magnitude of number should make potential harmful consequences more serious which could lead to less favorable attitudes towards the promoted alternative and thus decrease the message effectiveness.

The hypotheses are specifically presented as follows:

**H1:** Different statistical formats would moderate the relationship between framing and message effectiveness.

**H2a:** Frequency framed positively with a larger number size would be more effective than that with a smaller number size.

**H2b:** Frequency framed negatively with a larger number size would be less effective than that with a smaller number size.

The **Moderator of Graphic Illustration on Framing Effectiveness**

The other communication format factor investigated in the present study has widespread appeal among marketing practitioners and is related to vividness effects. Vividness effects occur when material is exhibited in the form of picture (Block and Keller, 1997). Researchers across disciplines agree that visual representation in appropriate graphs could contribute to information comprehension, problem solving, and effective communication (Pinker, 1982; Tufte, 1983; Kosslyn, 1989; Schapira et al., 2001; Edwards, Elwyn, and Mulley, 2002). There is an increasing trend in communicating health risks to employ a visual representation of risk, rather than just a bald statement of the relevant statistics (Edwards et al., 2002). After all, ‘a picture is worth a thousand words.’ Researchers proposed that the presentation of risk information in a graphic form could be an effective means of increasing risk-avoidant behavior (Keeney and von Winterfeldt, 1986). Stone et al. (1997) empirically demonstrated the efficacy of such recommendation by showing that graphic techniques of demonstrating risk information could be more effective than simply providing numerical information highlighting the risk reduction accorded by a safer product.

Some specific graphic types are suggested to assist consumer processing of quantitative information and increase the effectiveness of risk communication (Edwards et al., 2002; Schapira et al., 2001). Schapira et al. (2001) suggested that human figures add contextual implication to the numeric information presented and increase personal salience because of depiction of human beings in the graph. Frequency with human figures was easy to identify with, was understandable, and conveyed a meaningful message. Similarly, crowded figures (e.g., showing how many of 100 people are affected) were found useful in Edwards et al. (2002). In contrast, bar graphs are perceived as more analytical, more difficult to understand, and less influential. Feldman-Stewart et al. (2002) conducted a study to determine which formats for displaying quantities such as probabilities of treatment risks and benefits are perceived more accurately and easily by patients. The results showed that vertical bars, horizontal bars, numbers, and systematic ovals were equally well perceived for making a choice, whereas random ovals caused slower and less accurate performances. Stone et al. (2003) further adopted pie charts to demonstrate risk information, suggesting that it represents the percentage information accurately. Based on these findings, appropriate graphs and charts could enhance vividness effects and facilitate persuasion in comparison to the typical, exclusively verbal presentation of information. When a healthcare marketer communicates with a consumer about product efficacy, visual presentation of graphic display in the information would increase the effectiveness of message delivery.

**H3:** Graphic illustration would strengthen framing effects.

**Interrelationship among Framing, Statistical Formats of Efficacy and Graphic Illustration**

When both statistical formats of statistics and graphic aid are incorporated in a framed message, a three-way interaction effect is expected to occur since both information presentations could affect the people’s evaluations. As discussed above, frequency with a large number size and an appropriate graph would boost framing effectiveness. Therefore, when both variables are considered, a synergy might occur and increase message persuasion. Nevertheless, earlier empirical results with a qualitative approach (i.e., focus group interviews) indicated that frequency in a graph with lower denominations have positive attributes of simplicity, directness, and ease of interpretation (Schapira et al., 2001). Graphs with large number sizes are perceived as depicting risk of lower magnitude.
Focusing on the denominator, participants noted that more figures presented with success (probability of successful rate) when the larger number size are used (i.e., 100 or 1000 compared to 10) (Schapira et al., 2001). People have a general intuition that larger samples lead to more accurate estimates of population means. It seems possible that when frequency is framed with a larger denominator in a graph, the larger denominator might dilute the salience of graphs on framing effectiveness. Therefore, the contradicting strengths of effects from graphic display and frequency with different denominators need to be further explored.

**STUDY 1**

Experiment 1 examined the moderating role of graphic illustration on framing effects by following the traditional manipulation of attribute framing which presents statistics in percentage. A 2 (message framing: positive vs. negative) X 2 (graphic display: without chart vs. with chart) factorial design was employed. Pie charts were chosen as the visual representation based on an earlier pilot study with a convenient sample. Skin care was selected as test product category and a new product named as PerfectSlim was selected with efficacy at 80%.

Prior to the experiment, the treatment booklets were randomized. Participants were assigned to one of the four experimental conditions above. The study was conducted at the ground floor of a large department store where cosmetics and accessories were sold. Female customers were selected as the sample. The sample consisted of 213 females; age ranged from 17–68 years with the mean age 35.8. Participants were approached and asked to participate in a survey for consumer research. Participants were instructed to follow the instructions on the booklet, read a scenario of a new skincare product, and respond to the questions that followed. Participants read a three-part booklet containing a survey on skincare routines and skincare product history (a pre-manipulation questionnaire), description of the new skincare product, and a survey on product evaluations (a post-manipulation questionnaire). When they finished, booklets were collected. The experiment lasted about 10 minutes.

**Message Manipulations (Independent Variables)**

The first paragraph was consistent across 4 experimental conditions and was stated as follows: “At night the body is relaxing and needs less energy, and sugars are more easily stored. An innovation PERFECTSLIM has been specially formulated for an evening application to stimulate the body’s natural drainage and reduce the appearance of cellulite, through the massage application technique. Body contours are refined and the stomach looks smoother. Scientific tests have proven the high effectiveness of the PERFECTSLIM formula.” Meeting the criterion that the framing involves an attribute of the framed object and avoid ceiling effect of extreme values (e.g., 90%) (Levin et al., 1998), the description of the new skincare treatment was presented in a positive (negative) frame with percentage was that “Reported reduction of the appearance cellulite: 80% agree” (“Reported reduction of the appearance cellulite: 20% disagree”) (Figure 1).

**Pre-manipulation Measures**

1. **Perceived health status and health consciousness.** Participants evaluated their skin health and weight control separately in two questions on a 4-point scale (poor, fair, good and excellent). The questions regarding health consciousness were adopted from the Health Consciousness Scale (Gould, 1990) and were modified into four questions targeting skincare measured on five-point scales (“does not describe you at all” (0), “describes you a little” (1), “describes you about fifty-fifty” (2), “describes you fairly well” (3), and “describes you very well” (4)).

2. **Individual perceptions of skincare issues.** Participants were asked to identify skincare problems they were worried about and worrying degree of each acknowledged problem in 7-point semantic scales.

3. **Previous experience of skincare products.** Participants answered the questions whether they ever purchased or used ten skincare products (e.g., sun protection, softening toner, and anti-cellulite, anti-acne and oil control) and how much they usually spent on them every month to provide a basic understanding of purchase history and to represent one’s involvement.

4. **Background demographics.** Questions assessed participants’ age, occupation, income, and tendency towards new products.

**Post-manipulation Measures**

1. **Opinions of the information presentation.** Five specific questions assessed participants’ evaluation on the presented message. Respondents were asked “What do you think of the information above as a way of describing this new product?” to see whether the information made it easier to understand the product, whether the information was meaningful, confusing, informative, and whether it added nothing on 7-point scales. After reverse coding for some questions, a composite score was created by calculating the numerical average of the five scales.

2. **Manipulation check on framing.** One question assessed the difference of the information framing. Participants had to state whether the advertisement they had seen reported how test women felt about the new product (either agreed with product efficacy or not).

3. **Behavioral intention.** The likelihood of buying, using the advertised product and recommending it to family or friends were measured on a three-item 7-point semantic differential scale consisting of likely/unlikely. It was an indicator of message effectiveness.

**Results**

High Cronbach’s alphas (opinions of information presentation=0.88, and behavioral intention=0.93) indicated that the scales used in this study were reliable. The result of chi-square test for framing manipulation was significant (p<.05). Participants in the negatively framed conditions judged messages as emphasizing the chance satisfactory results of the product would fail to provide, whereas those in the positively framed conditions judged the messages as emphasizing the satisfactory results of the product would provide. The framing manipulation was successful.

An analysis of covariance (ANCOVA) controlling for purchase experience of skincare products was performed (please see Figure 2 for detailed results). The results are consistent with previous findings that positive framing is more effective than negative framing in presenting probability with $F (1, 212)=33.78, p<.01$. Presenting information in a positive or negative way resulted in differences in the position of the anchoring point, and thus determined people code the alternative as entailing a loss or a gain, which led to different levels of behavioral intention. A significant interaction effect between framing and graphic illustration was found on participants’ behavioral intention with $F (1, 212)=41.14, p<.01$. The results supported H3 that graphic display could enhance framing effects.
STUDY 2

Study 2 was designed with the objectives of considering multiple types of framed statistics to test the robustness of the moderating effect of graphic illustration in the relation between framing and persuasion found in Study 1. A traveling context was chosen to increase the external validity and generalizability of this research. The experiment tested the relative effectiveness of positively and negatively framed messages to promote a product in different statistical formats of efficacy probability in a 2 (message framing: positive vs. negative) X 3 (statistical format of medicine efficacy: percentage vs. frequency with a large denominator vs. frequency with a small denominator) X 2 (graphic display: without graph vs. with graph) between-subjects design. Each participant responded to one hypothetical medical alternative with a level of efficacy set at 75%.

Scenario of a New Medical Alternative

A new medicine for travel health was chosen. Health and well-being have been considered as one of the major risk factors in tourism and perceived risk in health was found to be the most important risk factor in travel experience (Lepp and Gibson, 2003). It is widely acknowledged that adverse health effects may significantly tarnish tourists’ experience of a holiday and destination (Lawton and Page, 1997). Taking preventive preparations by purchasing related healthcare products become one effective risk-reduction strategy tourists may adopt. The context of traveling could facilitate an understanding of consumer attitudes towards healthcare decisions. Melatonin was selected to be tested product in this study. Replacing sleeping pills, melatonin is a new hormone replacement therapy for combating jet lag without serious hazards or side effects of drugs. Although it was approved by FDA in the

FIGURE 1
Negative frame in percentage presentation with graphic display (pie chart)

PERFECTSLIM may fail to provide satisfactory results for 20% of test women on reduction of the appearance cellulite.

FIGURE 2
Influences of Graphic Display and Probability Format of Product Efficacy on Framed Ads
Pre-manipulation Measures

1. Perceived health status and health consciousness. Participants evaluated their general and travel health separately in two questions on a 4-point scale. Questions regarding health consciousness used in Study 1 were modified into four questions targeting travel care.

2. Individual perceptions of health risk. Derived from previous studies (Rosenstock et al., 1988; Slovic et al., 1989), six items assessed participants’ travel health attitudes by measuring perceived susceptibility, perceived severity and routine medicine-taking. Before further data analysis, some questions needed to be reversed-coded to ensure uniformity in coding.

3. Previous experience of traveling healthcare products. Participants answered the questions whether they ever purchased or used seven travel healthcare product categories (e.g., sun protection, travel sickness, and pain relief) to provide a basic understanding of purchase history.

4. Background demographics and travel history. A series of questions assessed participants’ age, gender, birthplace, number of trips during the past 12 months, number of international trips by plane, and number of regions they visited before.

Post-manipulation Measures

1. Opinions of the information presentation. The same questions adopted in Study 1 were used.

2. Manipulation check on framing. One question assessed the difference of the information framing. Participants had to state whether the leaflet they had read emphasized better results of melatonin would bring or not.

3. Manipulation check on presentations of medicine efficacy. Participants identified the statistical format of medical efficacy (with chart or not, with what kind of chart, frequency or percentage).

4. Behavioral intention. In addition to the three questions used in Study 1, the likelihood of discussing the alternative with physicians on a 7-point semantic differential scale consisting of likely/unlikely was incorporated into the intention scale.

Results

An initial set of analyses was conducted to determine whether any of the demographic or pre-manipulation variables moderated behavioral intentions. The variables of health consciousness and individual perceptions towards health risks were determined to be controlled variables in the further analyses. The reliability of the scales was also checked and the following Cronbach’s alphas were obtained: individual perceptions of health risk=0.75, opinions of information presentation=0.83, and behavioral intention=0.91. The result of chi-square test of framing manipulation was significant, confirming that participants in the negatively framed conditions judged the messages as emphasizing the chance the satisfactory results of the medicine would fail to provide, whereas those in the positively framed conditions judged the messages as emphasizing the satisfactory results of the medicine would provide. Similar procedures with significant chi-square tests were found to confirm the success of manipulations of statistical format presentations and graphic illustration.
An overall analysis of covariance (ANCOVA) controlling for health consciousness and individual perceptions towards health risks was performed. A significant three-way interaction of framing, statistical formats of medical efficacy, and graphic display was found on participants’ behavioral intention with $F(2, 445)=31.49, p<.01$. Treatment means are summarized in Table 1.

Post-hoc tests with Bonferroni adjustment were conducted to test the rest of proposed hypotheses. When efficacy was presented in different statistical formats, a significant difference between positive and negative framing was observed ($F(2, 445)=7.29, p<.05$). These results lend support for the main effect of statistical framing (H1) that information of medicine efficacy presented differently would influence framing effectiveness (Figure 4). Furthermore, a significant interaction effect between frequency and its number size was also found ($F(1, 445)=7.21, p<.05$). When statistical information of medical efficacy was presented in a larger number size, framing effects were enhanced (difference of framing effects in statistics with a larger number size=5.21-3.34=1.87 vs.

**FIGURE 3**
Examples in Graphic Illustrations of Different Statistical Formats and Framing

Positive frame in a large denominator with graphic display (human figures)

*Melatonin may provide satisfactory results for 225 out of 300 people with your health condition:*

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Means of All Experimental Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without graphic illustration</td>
</tr>
<tr>
<td>Positive frame, percentage (75%)</td>
<td>4.61</td>
</tr>
<tr>
<td>Negative frame, percentage (25%)</td>
<td>3.97</td>
</tr>
<tr>
<td>Positive frame, frequency in a small number size (3 out of 4)</td>
<td>4.01</td>
</tr>
<tr>
<td>Negative frame, frequency in a small number size (1 out of 4)</td>
<td>4.33</td>
</tr>
<tr>
<td>Positive frame, frequency in a large number size (225 out of 300)</td>
<td>5.21</td>
</tr>
<tr>
<td>Negative frame, frequency in a large number size (75 out of 300)</td>
<td>3.34</td>
</tr>
</tbody>
</table>

*p <.05; ** p <.01
difference of framing effects in statistics with a smaller number size=4. 33-4.01=0.32). Statistics framed positively and presented in a larger number size was more persuasive (M=5.21) than that with a smaller one (M=4.01). Conversely, statistics framed negatively and presented in a larger number size became less persuasive (M=3.34) than that with a smaller one (M=4.33). The results were consistent with predictions of H2a and H2b.

Graphic illustration was found to facilitate framing effects (F (1, 445)=5.91, p<.05), supporting H3. One interesting finding reveals that framing effects were enhanced by graphic display only when statistics were presented in percentage or in relative frequency with a small number size and no significant graphic effects were found with statistics presented in relative frequency with a large number size. The interaction between framing and graphic display became insignificant when the number size of the frequency was large (Figure 5). Participants appeared to focus on the increased number of figures in the larger denominator with larger numerator, regardless of graphs. Only main effect of framing was found significant. This finding is similar with prior work demonstrating a response range effect on subjective risk assessments (Yamagishi, 1997). Yamagashi reported that risk estimates were grater when ascertained on an X out of 100 scale compared to an X out of 10,000 scale. What it was found here was that the relative frequency information with a larger denominator dominated the message effectiveness and diluted the effect of visual representation of graphic aid. Without the graphic display, participants replied on not only the framing effects but also the statistical formats. Relative frequency with a large number size was more influencial in decision making. With the aid of appropriate graphs, message effectiveness mainly depended on the way the statistics were framed (chance to provide satisfactory results vs. chance failed to provide satisfactory results). Visual representation of graphic aid could have more impacts on persuasion than the statistical formats (probability vs. frequency with different number sizes). Indeed, a picture could be worth a thousand words. The two studies above suggest potential biases in perceptions of a new product based on the way the efficacy information is framed, the aid of graphic display (i.e., highlighted human figures and pie charts), the size of the number size the statistics presented in, and the interactions among these three communication format variables.

GENERAL DISCUSSION AND IMPLICATIONS

This paper examines the importance of the context in which a new product is presented to individuals. Partially replicating the results of previous research, the results showed that framing an alternative positively led to higher persuasion than framing it negatively. In addition, two moderators of this process were introduced, i.e., statistical formats of efficacy information (percentage vs. frequency) and the visual representation of graphic display. In line with earlier research, statistical formats may influence healthcare decisions (Stone et al., 1997; Feldman-Stewart et al., 2000; Schapira et al., 2001). In addition, relative frequency information may increase favorableness in the judgment making. Presenting frequency information with a larger number size was found to increase message persuasion. The provision of a chart representing the outcome rate further increased the persuasiveness of health communication in the case of positive framing but reduced that in the case of negative framing. Framing effects were enhanced by graphic aid only when statistics were presented in percentage or in relative frequency with a small number size. When statistics were presented in frequency with a large number size, only the main effect of framing remained significant. The increased number of figures might dilute the vividness effects of graphs.

Future research should test the generalizability of the three format factors with different level of product efficacy (less than 50% or very high efficacy such as 99.9%). Sheridan et al. (2003) suggest that framing affects could still be found when the balance of potential harms and benefits is a close call (50%). Additional studies on health communications should test the effectiveness of those factors in quasi-experiments or field tests across various products. The present study limited in the conditions of high congruence between statistical formats and graphic illustration.
(i.e., probability presented in pie charts, and frequency presented in highlighted human figures). A full factorial design considering low congruence circumstances (i.e., using bar charts to present frequency or using crowded charts to illustrate percentage information) should be examined in future. Only one dimension of product efficacy (potential gain) was investigated. One proposal for future research is to incorporate risk information (potential loss of side effects) with these framing factors. It is important to understand under what conditions the messages would be effective and when and why statistical format and visual representation of graphic display are likely to facilitate or inhibit message framing and the effectiveness of the copy strategies. Researchers should also explore how those framing variables could influence consumers’ understanding, belief, trust, or confidence in the information received (Gurmankin et al., 2004). Assessment of numeracy or prior exposure to risk concepts should be incorporated in future research as a possible moderator on framing effectiveness.

The meaningful communication of product efficacy information has an important role in the practice of marketing. This is especially so when a patient chooses to take an active role in a healthcare decision where risks and benefits must be considered (Schapira et al., 2001). First, information must be presented clearly. Care is required to avoid an overload of information. The visual presentation of graphic information has been explored. This study provides new insights into information formats when interpreting numeric efficacy information presented in different formats and graphic displays used in advertising communication. A picture could be worth a thousand words when appropriate statistical formats are chosen. In addition to the purpose of persuasion, statistical formats should be chosen to optimize consumer understanding and ability to use the information effectively. For general public, we would be able to look beyond the scene regarding advertising campaigning’ framed messages. After all, it makes little mathematical difference how information is expressed. It does, however, make a psychological difference.

**REFERENCES**


