

A Field Study of How Different Numerical Information Formats Influence Charity Support

Gary L. Brase

ABSTRACT. Psychological research indicates that the perceived importance of numerical information is affected by the format of that information. Specifically, low base rates expressed as frequencies on very large scales (e.g., 6 million Britons) are more influential than the same information in other numerical formats (e.g., a 0.1 probability). Thus, although the above examples are mathematically the same, people's reactions to them vary. The current research attempted to extend these lab findings in an applied, field situation of soliciting support for charities. The pattern of results was similar to past lab research, although the differences between format types were smaller.

KEYWORDS. Frequencies, persuasion, judgments under uncertainty

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A FIELD STUDY OF HOW DIFFERENT NUMERICAL INFORMATION FORMATS INFLUENCE CHARITY SUPPORT

Although the primary purpose of charitable organizations is to help people, one of the necessarily associated activities is the solicitation of monetary and other support in order to achieve that purpose. More generally, the fields of advertising and marketing are concerned with similar issues of soliciting positive responses to a chosen topic. The psychological study of persuasion is therefore of vital interest to those who run and maintain charities; how does one persuade people to donate their time and money? (Or more generally, how does any organization induce greater commitments of time and money?) While the majority of research in persuasion and marketing has focused on behavioral tactics and methods of deploying information in attempts to persuade or otherwise elicit positive responses (e.g., Cialdini 2001; Petty, Wegener, and Fabrigar 1997), little attention has been given to the ways in which the information contained in the messages themselves should be designed in order to be persuasive.

This article will begin with a clarification and overview of this situation regarding the relative lack of research on message contents, as opposed to message delivery, in both psychology and marketing. I then will describe a field study that applies some recent ideas and findings from judgment and decision making research. Finally, I will discuss some of the implications of these study results for marketing and advertising more generally, as well as limitations to keep in mind regarding this research.

Literature review

Psychological research on persuasion has largely focussed on the *number* of arguments presented in persuasion attempts and sometimes the quality of those arguments (i.e., weak or strong arguments; see, e.g., Petty and Cacioppo 1984, 1986). Although these certainly are influential factors, they are independent from considerations about how the statements themselves are actually posed. The formats of statement contents are typically not considered as a factor in their evaluation as arguments (although see Rothman and Salovey 1997 on

framing effects). Similarly, research on advertising and marketing has traditionally focussed more on methodology, as compared to content. So, for instance, there are findings on the effectiveness of various techniques to increase survey response rates (university sponsorship, pre-notification letters, return postage inclusion, postcard follow-ups, etc.). All of these are influential factors (Fox, Crask, and Kim, 1988), and all of them are focussed on how the message is delivered rather than what the message is. These studies of general methodology (in both psychology and marketing) are useful because they are easily generalized across specific situations, whereas the specific message is assumed to change according to the user's needs in different contexts (e.g., soliciting donations, selling insurance, or surveying political attitudes). Certain aspects of actual message content, however, are also fairly consistent across situations. In particular, many messages involve numerical content (e.g., three out of four dentists, 99 and 66/100th pure, 9 billion served, etc.). Although specific numbers change across messages, choices of numerical format is a message detail that can be decided by whoever is sending the message.

The persuasive impact of statistical information, as presented in different types of formats, has been touched on by only a few studies (Brown and Newman 1982; Halpern, Blackman, and Salzman 1989). Recent research on human judgment and decision-making abilities, however, hold important implications for how different statistical formats are perceived and used in cognitive processes (e.g., Brase 2002a, 2002b; Brase, Cosmides, and Tooby 1998; Gigerenzer and Hoffrage 1995; Hoffrage, Lindsey, Hertwig, and Gigerenzer 2000). This research has proposed that the human mind was designed by evolutionary history to most effectively acquire and use information in the format of natural frequencies, that is, information about the frequencies of objects, events, and locations as they are encountered and recognized in the world (e.g., nested sets of counts such as “28 out of the past 90 occurrences”). Such information is not only ecologically valid in terms of source, but has advantages over other formats in terms of flexibility and computational ease (Gigerenzer and Hoffrage 1995). Single-event probabilities (e.g., 0.04) are often used as a numerical format at the other end of these dimensions: Not encountered in (evolutionarily) naturalistic environments, normalized to an artificial reference class (between 0 and 1), not as flexible in usage, and not computationally as easy to use (at least for many

functional objectives studied). Naturally sampled frequencies, on the other hand, are relatively easier to understand, easier to work with, and often create stronger reactions (Brase, et al. 1998; Brase 2002a). These properties suggest that such frequencies can help generate better understanding of messages.

Other research in the field of judgments under uncertainty has documented that when people are asked to make decisions about a family or small-group sized populations (under 100 people) the traditionally observed framing effects of decision malleability disappear (also called a risky shift; Tversky and Kahneman 1981; Wang 1996a, 1996b; Wang and Johnson 1995). The explanation for this pattern of sudden consistency (i.e., not changing responses due to framing) stems from the rationale that these smaller population sizes are on scales of magnitude with which humans have directly and recurrently dealt over their evolutionary history. What is important for the present purposes is that this view suggests absolute frequency information about very large reference classes (e.g., the U.S. population) is not perceived veridically, but rather in a manner somewhat similar to the changes in difference thresholds in sensory perception (Cohen and Ward 1989). Brase (2002a) found that very large reference classes can lead to systematic distortions in the persuasive impact on both attitudes and potential behaviors (i.e., social influence). Specifically, proportionally small groups expressed as an absolute frequency of a large reference class (that is, low-base rate events such as 2.8 million, which is 1% of the U.S. population) had more influence on decisions than the same information in different formats (1%, .01, 1/100) and were seen as representing more significant issues. At the same time, proportionally large populations expressed as an absolute frequency of a large reference class (e.g., 277 million, which is 99% of the U.S. population), had less influence on decisions than the same information in different formats (99%, .99, 99/100) and were seen as representing less significant issues. Both this and the aforementioned research by Wang and colleagues have all been based on hypothetical situations in laboratory settings. The basic logic of the research by Brase (2002a), however, can be applied within field studies.

Advertising and marketing research is much richer in terms of field research, but has not incorporated the more recent studies on numerical perception. Much like early statistical reasoning studies,

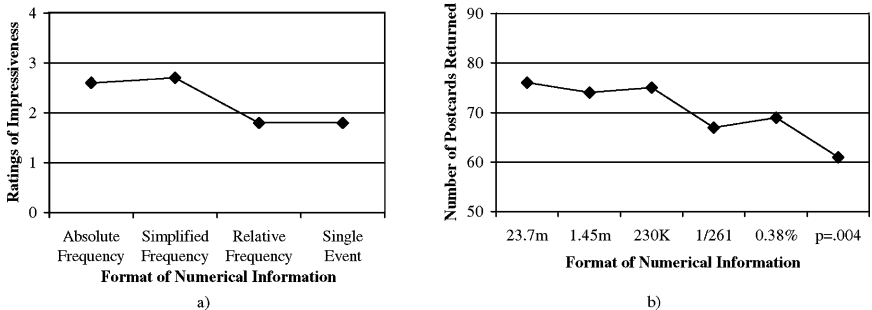
such research tends to depict people as both ill-equipped to work with detailed quantitative information (e.g., Cohen, 1996) and also easily influenced by slight changes in how quantitative information is presented (e.g., Schindler and Kirby, 1997).

A field study of numerical formats

The objective of the present study was to extend the psychology laboratory findings on the effects of numerical formats (absolute frequencies, relative frequencies [i.e., percentages], simplified frequencies, and single-event probabilities) in an applied, field setting more relevant to advertising and marketing issues. This parallels aspects of earlier laboratory research (Brase 2002a); the present study can be compared to the “low base-rate events” condition in Brase (2002a), the results of which are shown in figure 1a. Two patterns were predicted:

H1: Absolute frequencies will elicit more responses than other formats (simplified frequencies, percentages, and single-event probabilities, all of which are normalized to standardized reference classes). This result will be particularly notable in comparison with single-event probabilities;

FIGURE 1. Ratings for the Persuasiveness Of Different Numerical Formats in a Laboratory Measure (1a) Using A 5 Point Scale for Rating Impressiveness of a Statistical Message (Adapted From Brase 2002a), Compared to the Numbers of Postcards Returned, According to the Format of the Numerical Message Contained on the Postcard (This Study, 1b).



H2: Absolute frequencies on increasingly larger scales (from the U.K. population, to the E.U. population, to the world population) will not affect responses.

METHOD

The methodology of this study was a modified version of the “lost letter” paradigm that has been used to study helping behavior (e.g., Levine, Martinez, Brase, and Sorenson 1994). Postcards were developed that had a piece of statistical information about a disorder (cancer), and asked the recipient to return the postcard to an address associated with a relevant charity (The Cancer Prevention Research Trust). The postcards informed recipients that they had been sent as part of a study, and that returning the postcard provided an indication of support for the charity. Returning a postcard was meaningful in terms of paying costs on behalf of the charity, as it required paying postage (Levine, et al. 1994). Of interest was the number of postcards returned with each of the different types of statistical information on them. This provides an unobtrusive and objective measure of actual behaviors, sampling from the true general population. Of course, postage is not a large cost, but it is acceptably unobtrusive for research purposes and at the very least reflects an weighted assessment of the perceived importance of the topic.

Participants

Six thousand potential participants were sent postcards asking them to return the bottom portion of the postcard as a show of support for a charity. The names and addresses of participants were taken from the electoral rolls in Northeast England.

Materials and Procedure

All the postcards were professionally produced, using the design and production facilities of the local university (see appendix). Each postcard was on A5 card stock paper (148mm x 210mm), with a center perforation, and printed using two colors (red and black). The top front portion of the postcard contained an item of statistical

information (in a red box, using white text) placed above the following message:

As part of a research project on campaign effectiveness, we are asking you to return this postcard as an indicator of support for cancer prevention research. All you have to do is tear off the attached pink card, put a stamp on it and pop it in the post. There will be no further obligation, and returning this card will not result in subsequent posting.

The charity's logo was printed in the bottom right corner of this section. An equal number (1,000) of six different postcards with different statistical information messages were sent out (see appendix). The reverse of the top portion of the postcard contained the recipient's address. The bottom front portion of the postcard contained the address for a Post Office Box in the name of the Cancer Prevention Research Trust, and a space designated for affixing a stamp. The bottom back portion of the postcard contained the message "I support cancer prevention research" and a graphic of a box with a check mark in it. All the postcards were mailed using a professional mailing service.

No manipulations were employed, aside from changes in numerical format, to increase response rates—no targeting mailing, no payments, no pre-notification, no follow up postcards, and so on. It is therefore expected that the response rate overall will be both uninfluenced by other factors and relatively low.

RESULTS

A total of 422 postcards were returned and counted as valid responses. Between 3–7 postcards in each condition were returned for incorrect addresses (average return rate of 0.04%), and between 6–10 postcards in each condition were returned by the postal service even though they had no stamps (average return rate of 0.08%). Both the incorrectly addressed and incorrectly posted cards were excluded from the results. The average response rate across conditions was 7.3%, which is a reasonable response

rate given that there were no incentives for responding, no cover letters, and postage was not paid for the reply (Fox, Crask, and Kim, 1988).

The results (figure 1b, right-hand side) show that absolute frequency message postcards were the most often returned (7.4–7.6%) and single-event probability postcards were the least often returned (6.1%), which is what was predicted, although it is not a statistically significant difference (difference of proportions test: $z = 1.24$, $p = .11$, effect size (η^2) = .06). Comparing the return rate for absolute frequency messages (U.K. reference class) directly to the return rate for single-event probability messages, there was an 18.7% increase in responses. The larger-scale absolute frequency message postcards (E.U. and worldwide population reference classes) were returned at the same rate as the smaller (i.e., U.K. population) absolute frequency message, as predicted (7.4%, 7.6%, and 7.5% respectively).

DISCUSSION

The results of this study found the same pattern of relative responses to different numerical formats as previously found under laboratory conditions (Brase 2002a), but the differences between numerical formats were not as large. Absolute frequencies were more effective (in motivating responses) than percentages or single event probabilities. Furthermore, and as expected, the shift to increasingly large reference classes had no effect on return rates. The smaller effect in the field, as compared to under laboratory conditions, is not particularly surprising – one purpose of doing studies in the lab is to minimize noise from possible extraneous variables. It may be that the relatively rich context of a real-life situation partially mediated the effects of different numerical formats. This explanation would imply that different numerical formats will have more differentiated effects in situations that contain fewer additional contextual variables in connection with the message (e.g., email messages, text messages, and possibly telephone calls). In terms of future research, it also indicates that necessary sample sizes based on power analyses of lab results may underestimate sample sizes actually needed for clear field research results.

Marketing Implications

The response rate obtained in this study (7.3%, on average) is in line with other results, taking into account that there were no methodology manipulations to increase response rates (i.e., no prenotification letters, no follow up postcards, no postage paid for return, and no financial incentives). The increase in response rates due to the use of absolute frequencies (a 18.7% relative increase, but in overall terms adding 1.5% points) was modest in comparison to other effects. For example, the addition of a pre-notification letter has a typical effect of adding 7.7% to a response rate, stamped return postage adds 6.2%, and a postcard follow up adds 3.5% (Fox, Crask, and Kim, 1988). On the other hand, changes in the numerical format of a message – unlike these other techniques— has no cost associated with it.

Interestingly, media such as email messages are areas in which even small increases in response rates (such as found here for numerical format manipulations) can have huge implications. Modern bulk distribution emails –“spam”—typically yield only about a .01% response rate. Spam is still a profitable activity because it can be (and is) sent to millions of people at negligible cost. Just .01% of 1 million is 10,000 customers. An 18% relative increase in response rates from spam – based on an easily implemented change of wording – would represent a very significant improvement (from the perspective of the marketers utilizing spam).

Limitations and Further Issues

It also may be that the charity context used in this study, “cancer prevention and research,” was a difficult test for detecting the effects of different numerical formats. Nearly everyone has a positive attitude towards cancer prevention and research, and it may have been the case that many respondents did not thoughtfully consider the numerical message, but rather responded automatically based on an already established conviction that they supported this cause (even in the absence of high involvement with the issue; Van Kenhove and De Wulf 2002). If this was the case, it could obscure any effects of different numerical formats in the messages. Indeed, one response was received from the 6000 sent that was not in the form of the postcard, but instead a letter which indicated it was perverse that

anyone would *not* support cancer research and prevention (by not returning the actual postcard, ironically, it was not possible to code this response). This interpretation would be consistent with a dual process model of persuasion (Chaiken and Trope 1999; Petty and Cacioppo 1984, 1986; Smith and DeCoster 2000), which would explain the more anemic present results as due to relatively superficial thought processes rather than thoughtful consideration of the numerical information.

By this interpretation, issues about which a person had mixed attitudes (thus promoting more thoughtful consideration) or even about which a person had negative or no attitudes would be more likely to show effects of numerical format. This could include issues that are more broadly defined, thereby avoiding narrow, automatic approval (or disapproval). For example, Catholic Charities, USA has such a broad mandate that it may be difficult for people to categorically recognize everything it does as personally agreeable.

The implications of these results for charities (and other marketers of information) are two-fold under this interpretation. First, when the topic under consideration is one about which people generally have a positive attitude and already support (such as cancer prevention), the presentation format of supporting numerical information has only a small effect. In such situations, the beliefs people already have are entrenched and it is probably more productive to focus on providing clear and easy mechanisms for providing charitable support. On the other hand, it may still be the case that the presentation format of supporting numerical information has a substantially greater effect in situations where people have only weakly held beliefs about the topic under consideration, where the topic is relatively controversial (i.e., there is no general consensus about supporting or not supporting work within the topic), or where there is little surrounding context to the persuasive message. Further research to more firmly assess the effects of numerical information formats in areas with the above characteristics (e.g., drug usage, sexual activity, and stem cell research) could lead to results showing stronger effects.

In addition to the above suggestions, there are also several other potential directions for further research. Methodological manipulations to increase response rates (e.g., pre-notification letters, follow up postcards, etc.) can be used in conjunction with numerical format

manipulations to assess if the effects of different numerical formats hold up across levels of responsiveness. Numerical format manipulations can also be combined with other message designing ideas taken from psychological research (e.g., Eveland and Crutchfield 2004), to obtain additive, and possibly interactive, effects. Finally, there is also still a question of real, direct effects on donations—can the effects of numerical formats on ratings, and now on postcard return rates, be experimentally translated into increases in actual charitable donations?

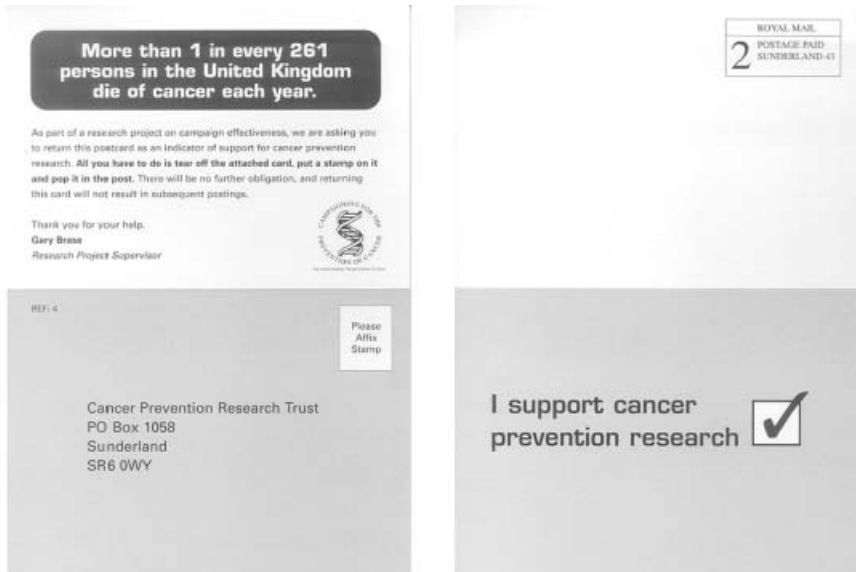
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APPENDIX

Sample of Postcard Stimuli Used (Simplified Frequencies) and Messages Shown in Each Condition.



Relative frequency message: More than 0.38% of persons in the United Kingdom die of cancer each year.

Single-event probability message: A person has a .004 probability of dying of cancer this year.

Simplified frequency message: More than 1 in every 261 persons in the United Kingdom die of cancer each year.

Absolute frequency message (U.K.): More than 230,000 persons in the United Kingdom die of cancer each year.

Absolute frequency message (E.U.): More than 1,452,000 persons in the European Union die of cancer each year. [n.b. 1,452,833 out of 379 million]

Absolute frequency message (World): More than 23,766,000 persons worldwide die of cancer each year. [n.b. 23,766,667 out of 6.2 billion]