Examining the Effect of Gain/Loss Framing and Video/Text Mediums on Comprehension

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Executive Summary

Since 2010, UBC has been committed to reaching key milestones in sustainability. One branch of this initiative is informing campus managers about sustainable food-ware, including containers, cups and cutlery, and encouraging them to procure food-ware that are sustainable or recyclable. Previously, UBC shared a document of sustainable food-ware to inform campus managers to purchase sustainable options, however little compliance has been observed, thus a new video format will be used to observe comprehension differences between the two mediums.

Preliminary research suggests a video format may enhance comprehension therefore the study will test the two different mediums attached to a loss or gain framed message in order to observe the impact on comprehension. Background research suggests that a loss-frame paired with a video would increase comprehension. The survey created outlined 4 conditions and a loss-framed video is hypothesized to demonstrate the greatest effect size. No statistical difference was observed between the 4 conditions, which may be due to the small sample size and incorrect population. The hypothesis was not proven, however, all video conditions tended to perform better than text. In particular, the loss-framed video obtained the best comprehension score out of all 4, which prompts opportunities for further research.

Key Words: Waste, Food-ware, Procurement, Framing, Video, Text, Sustainability
INTRODUCTION

Over the recent years, there has been an increase in public awareness on the unsustainable nature of single use food-ware containers, as these are frequently disposed of in landfills or end up in incinerators. Not only do these deplete non-renewable resources, they also introduce chemicals into the air, water and soils which contribute to climate change. In order to mitigate the impacts of these single-use food-ware transactions, universities and governments have developed programs to promote recyclable, compostable and reusable options, accelerate sustainable practices and to minimize carbon footprint. The Environmental Protection Agency reports that since 1980, the United States recycling rates have been steadily increasing, with the last recorded value of 32.1% of all recyclable products recycled in 2018.

At the University of British Columbia (UBC), these concerns and the importance of sustainability within the university’s culture have led to the creation of the Zero Waste Action Plan, an initiative that aims to move UBC towards a greener future. Under the department of Campus and Community Planning, the goal of the Zero Waste Action Plan is to propel UBC towards a future where all unwanted products and materials can be reused or recycled in order to decrease waste disposal every year. Food outlet managers on the UBC campus receive a “Zero Waste Food Ware Strategy” PDF that includes guidelines that aids them through the correct single use items procurement decisions, in order to meet target sustainability goals. However, interpretation of these guidelines has not led to significant changes in sustainable food-ware procurement choices, which has led the client to produce a 5-minute educational video communicating sustainable food ware options. This prompts the question, is a video format more effective in communicating and enabling the understanding of appropriate food-ware procurement decisions compared to a written document format?

Previous studies have sought to address whether a video medium of communication is a more effective manner to transmit and teach information as opposed to a written format. Merk et al. (2011) observed the effectiveness of learning complex content via interactive videos versus illustrated textbooks and discovered that videos were comparable or even superior to a traditional text form of teaching information. Furthermore, video modules have demonstrated to be a more effective form of learning in clinical settings compared to text-based ones, where the results for video conditions scored higher in both primary tests conducted after reviewing the information and in follow up tests 1 month later (Buch et al., 2014). Videos have even more effectiveness in increasing and changing people's perception of scientific agreement (Kerr & Wilson, 2018). Throughout these studies, it is suggested that the effective nature of the videos may be due to the additional features offered such as the extraction of key details and the interactive nature of being able to stop the video to grasp and important information. As Marx et al. (2007) suggests, communication methods that maximize experiential processes such as using narratives often displayed in video formats can enhance beliefs and behaviors. In concordance, these may be more engaging, enhancing central processing of messages which increase attention and comprehension (Kerr & Wilson, 2018). It is proposed that the findings of these studies may be generalized to our proposed research question. Similar to these studies, both the video and text mediums provided by the client convey the same type of information. However, the video format highlights key information in a more distinct way, which may lead video conditions to be more effective at communicating the correct food-ware procurement decisions.
Furthermore, research suggests that framing effects can influence decision-making. For example, emphasizing environmental, economic and moral dimensions in framed messages has demonstrated a positive effect on individuals’ engagement with climate change (Li & Su, 2018). The prospect theory focuses on how people make decisions between alternatives that involve risk: perceived losses or perceived gains. Although there are mixed results about which type of framing is more effective, most recent research shows that negative framing in environmental contexts tends to be more effective in communicating the effects of climate change (Kahneman & Tversky, 2013; Karpinska-Krakowiak et al., 2020; Grazzini, 2018). Specifically, loss-framed messaging seems to have a greater influence in decision making than gain-framed messaging because people have more sensitivity towards messages that suggest a negative impact on the environment. (Grazzini, 2018; Cheng et al., 2011).

The opportunity available is the limited research on the correlation between gain-loss framing and video versus written formats. Thus, this study will address this gap and answer the following: How does loss-gain framing influence comprehension of UBC’s Zero Waste Guidelines between communication mediums? It is hypothesized that a loss-framed video will increase comprehension of the UBC’s zero waste guidelines in comparison to a gain-framed video, loss/gain-framed text version displaying the same information.

METHODS

Participants and Demographics
By means of G-Power, utilizing an 0.05 alpha value and a 0.8 power, the power analysis required a minimum 128 participants for a significant interaction. In total, 118 individuals began the survey, but 72 participants did not complete the survey which indicates a large dropout rate of 61%. After excluding participants who did not complete the survey, the sample size obtained was 46 participants ($n = 46$) among which 53% were male, 44% were female and 2% of participants did not choose to identify. The average age of participants was 21 years of age and they were all affiliated to UBC.

Measures
Based on the concerns voiced by the client, in conjunction with the factual reasoning of the food-ware procurement decisions in the materials provided; the dependent variable of comprehension was operationally defined as knowledge retention. The quantitative representation of this variable was the participant’s scores calculated from the 3 survey questions. These 3 multiple choice questions covered the types of cups, cutleries and containers that were directly addressed in the video and written guidelines. The data collected on Qualtrics was converted to a numerical score based on the sum of correct and incorrect answers chosen per question. The score was achieved by assigning a value of (-1) to each incorrect answer, and a value of (+1) to each correct answer. Thus, a high, positive participant score would be interpreted as an indicator of a more comprehensive understanding of UBC’s zero waste guidelines through its assigned condition.

Conditions
To observe the effect of loss/gain framing in the comprehension in different communication mediums of UBC’s zero waste guidelines to UBC students. The study was a between-subjects design as each participant was randomly assigned to only one condition. All of
which consisted of the participants reading a framed message about the information (See Appendix A) they will be presented with and prompting them to imagine themselves as UBC cafe manager. Both mediums were provided by UBC Campus and Community Planning and covered the same information (See Appendix C and D). The 4 conditions are as follows: gain framed message followed by the text, loss framed message followed by the text, gain-framed message followed by video and loss-framed message followed by the video. After watching the video or reading the guidelines, all participants answered the same survey question regarding the food-ware procurement decisions and some basic demographic questions (See Appendix B).

Procedure

A Qualtrics survey was distributed online across different social media channels, through the authors UBC classes, via UBC Facebook groups with the aim of recruiting as many UBC campus frequenters. The data collection ran for 4 weeks in total, and there was no additional incentive to motivate people to participate in the study. There were 16 participants in the gain-frame text condition, 10 participants in the loss-frame text, 9 in the gain-frame video, and 11 in the loss-frame video condition. The participants viewed the consent form, and after agreeing to participate in the study, they were randomly assigned to one of the four conditions mentioned before. A mandatory waiting time was deployed in every condition to ensure that participants completely read the document or watched the video before they could advance any further. Afterwards, 3 food-ware procurement related questions were provided and followed up with demographic questions. Overall, the survey required an approximate of 5 minutes to complete, and the video and PDF were embedded in the survey, thus participants were not redirected to other websites. Responses to the survey was very low, as the sample size was only 46 when the required minimum for a significant finding was 128 participants.

RESULTS

Overall, the results were inconclusive and did not support the hypothesis that the loss-frame video condition would have the greatest effect size out of the 4 conditions. With these many conditions, it was necessary to have a minimum sample size of 128 participants. Although 118 participants initiated the survey, the majority of them did not complete the survey. The total obtained sample size (n = 46) across 4 conditions consisted of gain-frame text (n=16), loss-frame text (n = 10), gain-frame video (n = 9) and loss-frame video (n = 11).

A 2-way ANOVA between-subjects analysis was conducted for the 4 conditions. Table 1 shows the results for the containers question. The video conditions had higher means overall: video-gain (M=0.444, SD=0.410) and video-loss (M=0.500, SD=0.418) compared to text-gain (M=0.203, SD=0.526) and text-loss (M=0.250, SD=0.354). Table 2 shows the results for the cups question. The video conditions had higher means overall: video-gain (M=0.489, SD=0.337) and video-loss (M=0.442, SD=0.439) compared to text-gain (M=0.337, SD=0.518) and text-loss (M=0.400, SD=0.525). Table 3 shows the results for the containers question. The video conditions had higher means overall: video-gain (M=0.704, SD=0.261) and video-loss (M=0.758, SD=0.368) compared to text-gain (M=0.479, SD=0.516) and text-loss (M=0.700, SD=0.292). Overall, these results signal that video messages may perform better than text.

To further explore the data, the sum of averages was calculated for each of the 4 conditions (See Table 4). Out of all the conditions, loss-video messages had the greatest mean (M=1.7)
compared to gain-video ($M=1.6$), text-loss ($M=1.4$) and text-gain ($M=1.0$). In addition, a 3-way ANOVA was performed to see if there were any interactions between the type of questions. Compared to cups and containers, the cutlery question showed a significant interaction as this question had the greatest overall mean (See Graph 1). This suggests that the type of wording of the question may matter.

In conclusion, the results were unable to support the hypothesis as none of the calculations showed significance due to the small sample size. However, there is some evidence leaning towards the hypothesis that suggests loss-gain framing can influence video or text comprehension, which may be revealed with more data points.

**DISCUSSION**

Several challenges and limitations affected the results, including a high drop-off rate of 61% and an incorrect target audience. A major limitation was the length of the survey itself. More specifically, there were two key areas that severely impacted participant engagement. First, there was a mandatory waiting period to view the text or video before the participant can enter the survey. This was set in place to give participants enough time to view the material and understand the zero waste guidelines more thoroughly. Participants who may not have clearly read the instructions might have been confused by the inability to advance in the survey thus, it could have motivated them to exit the survey before it could be formally completed. If the study were conducted again a suggested improvement would be to look into effectively balancing the time allocated for participants to view relevant information and to visibly show a timer countdown of the time remaining.

Another challenge of the study was keeping participants engaged as the zero-waste strategy was targeted for a different audience. The zero-waste strategy is intended for UBC food outlet managers and not the student population, which means that the content of both text and video mediums should be modified to accommodate a student participant pool. However, keep in mind that these adjustments do not inherently change who the guidelines are intended for and what the purpose of this zero-waste strategy aims to achieve. One suggestion may be to understand what the document aims to inform the audience, and to be aware of how different audiences may receive the document and what their goals of understanding the material is intended for.

One insight that was observed is the cutlery question obtaining much higher scores compared to the cup and container questions. Upon further review, a possible explanation for this difference is the wording of the question itself and the options available for participants to choose from. The overuse of the word ‘cutleries’ appeared to easily steer participants to select the correct responses, since the correct answers contained cutleries whereas the incorrect did not. Word choice must be more carefully considered to avoid similar outcomes as the data taken from this specific question seems to have been affected by that limitation. The material used for sustainable cutlery is also easier to guess correctly as it was easy to deduce which materials are reusable, compared to types of materials for cups and containers.

Future replications of this study can also specifically look into other populations where it may be possible to generalize findings to a much larger sample since a focus on food outlet managers is too small in terms of scope. Researching and applying loss-gain framing to other forms
of communication mediums could also provide more insight to its influence in conveying information and testing its comprehension across participants will be necessary as well.

**RECOMMENDATIONS**

Even though these findings were not significant, there are some areas of improvement based on the data from Qualtrics and participant’s feedback. From 113 total participants, 69 did not complete the survey, which means that they started completing the survey but didn’t answer all the questions. Based on this observation, the recommendation to the client is to shorten the guidelines in the document and video format. There is evidence that supports that flashcards enhance knowledge retention (Santos-Ferreira et al., 2020), thus we suggest presenting the guidelines in a flashcard style with pictures of the containers that comply with the guidelines. The flashcards could be sent out digitally to the managers as needed.

Additionally, some participants provided feedback and mentioned that they felt that the survey was a memorization task that was measuring retention. Thus, if the guidelines felt like a memorization task, the suggestion is that UBC provides a checklist tool to managers, so they can easily mark the items that they have or will purchase once they become part of the UBC network. In a study by Verweij & Kashiwagi (2016), it was found that introducing an easy-to-use procurement checklist for buyers and vendors significantly improves the correct procurement decisions and correct labelling. Having a checklist would decrease the required memorization cognitive load and will make it easier for managers to purchase and track the items.

Similarly, it’s important to explore the underlying motivations that managers may have to follow the guidelines. There could be other reasons to explain why managers are not following the guidelines, as opposed to simply not understanding them. Providing an incentive on behalf of UBC might be an effective way to increase adherence with the guidelines, as it would be mutually beneficial and potentially motivating. Research on motivations for the ‘Greening’ of industry shows that some of the key motivations from CEOs to follow greener guidelines is the environmental awareness and the economic benefit (Townsend, 1998). Further research is required to assess the motivations for UBC managers specifically and how UBC could provide economic benefits to increase compliance with the guidelines. With regards to the framing effects, more research should be done to assess gender differences, as there is compelling evidence that women are more likely to be influenced than men when exposed to negative framing (Fujimoto & Park, 2010).
REFERENCES


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Appendix A.

The loss or gain framing before a video or text document of zero waste foodware options

Imagine you are a UBC cafe manager who needs to make procurement decisions (e.g., purchasing food packaging containers for the summer) and you are responsible to make sustainable purchasing decisions for UBC’s zero waste goals.

A. You will be watching a 4 minute video on UBC’s zero waste food ware strategy. Please watch carefully.
B. You will be reading a document on UBC’s zero waste food ware strategy for 4 minutes. Please read carefully.

Gain:
UBC has invested at least $20 million dollars on Sustainability programs on campus. If these guidelines are followed properly it would save million in costs for waste management and help promote more healthy environmental effects.

Loss:
UBC has invested at least $20 million dollars on Sustainability programs on campus. If these guidelines are not followed it decreases the environmental effectiveness of UBC’s solid waste management and makes the whole effort worthless.

Appendix B
Questions:

1. What kind of cups should you buy for your cafe? (select all that apply)
Yes items:
   1. recyclable plastic cups type 1
   2. recyclable plastic cups type 2
   3. recyclable plastic cups type 5
No items:
   4. plastic cups type 3
   5. plastic cups type 6
   6. plastic cups type 7
   7. compostable cups
   8. foam cups

2. What kind of cutleries should you buy for your cafe? (select all that apply)
Yes items:
   1. Wood based cutleries
   2. Bamboo based cutleries
   3. Plant fibre based cutleries
No items:
4. Recyclable plastics
5. Compostable plastics
6. PLA plastics

3. What kind of containers should you buy for your cafe? (select all that apply)
Yes items:
1. Plain containers
2. Uncoated containers
3. Certified compostable containers
4. Reusable containers

No items:
5. Compostable plastic containers
6. Biodegradable plastic containers,
7. Conventional plastic containers
8. Styrofoam containers

What is your age?

a. 12-17 years old.
b. 18-24 years old.
c. 25-34 years old.
d. 35-44 years old.
e. 45-54 years old.
f. 55-64 years old.
g. 65-74 years old.

What is your gender identity?

a. Woman
b. Man
c. Transgender
d. Non-binary/non-conforming
What is your ethnicity?

a. Caucasian
b. African American
c. Latino or Hispanic
d. Asian
e. Native American
f. Other: ______
g. Prefer not to respond
Appendix C.
PDF Images of “Food Service Ware Procurement Guideline” used in the survey text conditions
Appendix D.
Screenshot of “Zero Waste Food Ware” video used in the survey video conditions.

Appendix E.
Table 1.
Descriptive statistics for containers.
### Descriptives - Containers

<table>
<thead>
<tr>
<th>text/video</th>
<th>gain/loss</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Gain</td>
<td>0.203</td>
<td>0.526</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>0.250</td>
<td>0.354</td>
<td>10</td>
</tr>
<tr>
<td>Video</td>
<td>Gain</td>
<td>0.444</td>
<td>0.410</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>0.500</td>
<td>0.418</td>
<td>11</td>
</tr>
</tbody>
</table>

**Table 2.**
Descriptive statistics for cups.

### Descriptives - Cups

<table>
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<th>SD</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>Text</td>
<td>Gain</td>
<td>0.337</td>
<td>0.518</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>0.400</td>
<td>0.525</td>
<td>10</td>
</tr>
<tr>
<td>Video</td>
<td>Gain</td>
<td>0.489</td>
<td>0.337</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>0.442</td>
<td>0.439</td>
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</table>

**Table 3.**
Descriptive statistics for cutleries.

### Descriptives - Cutleries

<table>
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<th>text/video</th>
<th>gain/loss</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Gain</td>
<td>0.479</td>
<td>0.516</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>0.700</td>
<td>0.292</td>
<td>10</td>
</tr>
<tr>
<td>Video</td>
<td>Gain</td>
<td>0.704</td>
<td>0.261</td>
<td>9</td>
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<td></td>
<td>Loss</td>
<td>0.758</td>
<td>0.368</td>
<td>11</td>
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</table>

**Table 4.**
Sum of overall mean for each condition
<table>
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<tr>
<th>Conditions</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text Gain</td>
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</tr>
<tr>
<td>Text loss</td>
<td>1.4</td>
</tr>
<tr>
<td>Video Gain</td>
<td>1.6</td>
</tr>
<tr>
<td>Video Loss</td>
<td>1.7</td>
</tr>
</tbody>
</table>

**Graph 1.**  
*Descriptive plot for cutlerys.*

**Graph 2.**  
*Descriptive plot for cups.*
Graph 3.
Descriptive plot for containers.

**Descriptives plots**

**Relationship with Client:**
Overall, it was a pleasure to work with our client, as they provided guidance and support from the beginning of our research. The request from our client was very specific, thus we were unable to
conduct our ideal research, which was one of the challenges that we faced as we had to change our research question after submitting our proposal. Additionally, we were unable to get the managers (who were our target) to participate in our study, which limited our findings.

**Team Work:**
Throughout the term we worked as a team by meeting multiple times per week and working collaboratively to meet the deadlines. In general terms, we all worked on everything and contributed equally to our final presentation and final report. For the proposal and the presentation, we all met and worked in conjunction to put it together. For the final report, Manuela was in charge of Qualtrics, as she was managing the survey’s responses. Peijia focused on Jasp and helped a lot with statistical analysis. Brian, Amir and Valeria supported Manuela and Peijia where needed. Everyone worked collaboratively on the presentation, recommendations and discussion in order to ensure seamless group work. We think our teamwork was excellent, as we were all committed to do our best in this research project. We didn’t have any challenges working as a team and we are glad that we worked together this term.