
Fishing for Sustainability: The Effects of Indirect and Direct Persuasion

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Abstract

Websites and technologies that promote sustainable behavior often employ direct persuasion by being open about persuasive intent. We examined the use of indirect persuasion, methods that do not make persuasive intent clear. We built two variants of a recipe website designed to induce changes in users: one using direct persuasion and the other using indirect methods. We measured the effects of each site on users' attitudes and actions towards the environment. Preliminary results show that the direct style influenced actions while the indirect style influenced attitudes. We discuss the implications of this dissociation for research and applications.

Keywords

Persuasive technology, Consumer attitudes, Consumer actions, Sustainability, Information design.

ACM Classification Keywords

H5.2. User Interfaces. User-Centered Design.

Introduction

Although many people believe that environmental problems are serious, there is gap between general attitudes and personal actions towards sustainable living [4]. Persuasive technology is a set of design heuristics developed with the view that computing technology is a powerful method to shape individuals'

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behavior [2]. Persuasive technology might persuade people to engage in more sustainable behavior, but if people are not already convinced of the importance of sustainability, they may not choose to use persuasive technology. To solve many of the problems of sustainability, attitudes and actions must be changed and indirect persuasion may be a way to change the actions of people who wouldn't otherwise open themselves to direct persuasion.

Persuasion

There are many definitions of persuasion. We use Simons' definition [6]: "persuasion is human communication designed to influence the autonomous judgments and actions of others." Simons excludes group pressure and external incentives such as money. In this framework, *attitudes* are judgments about the goodness of a thing, whether it is desirable or undesirable. We focus on changes in attitudes and actions towards environmental sustainability.

However, people often resist persuasion. A meta-review [5] concluded that forewarnings about persuasive intentions in messages induce resistance because they threaten recipients' existing attitudes and identities. The theory of reactance [1] explains that persuasion sometimes does not work because persuasion threatens a person's sense of autonomy and freedom of action. For example, if individuals do not view themselves as environmental or view "environmental" as something unappealing (i.e. "I don't want to be a tree hugger."), overt language promoting environmental values will alienate those who do not have those values.

We define direct persuasion as persuasion that has clear and apparent intentions. In contrast, indirect

persuasion does not clearly expose its own position, confront or condemn users' existing attitudes, or adopt an identity typical of people who already agree with the message. Indirect persuasion should incur less resistance from users.

Hypothesis 1: Indirect persuasion will improve attitudes towards sustainability more than direct persuasion.

However, when indirect persuasion does not openly seek to persuade, it does not suggest specific actions for the user. Goal-setting theory maintains that simplifying a process and giving clear instructions increases compliance [3]. Direct persuasion provides clear direction, whether or not a person agrees.

Hypothesis 2: The actions taken by people who receive direct persuasion will be more sustainable than those taken by people who receive indirect persuasion.

Design

To test our hypotheses, we created a recipe website to persuade users to make more sustainable food choices when selecting recipes. Consistent sustainability metrics for a broad range of food ingredients are difficult to come by, while data on common seafood are published by groups such as the Environmental Defense Fund. Fish recipes often call for a particular class of fish where specific species (e.g. Atlantic vs. Pacific salmon) have different health and sustainability impacts.

When presenting a recipe with a seafood ingredient, the website shows multiple options for that ingredient along with the health and environmental ratings for those seafood options. For example, for a recipe with shrimp, "spot prawn" is listed as an "Eco Best" ingredient option

Aunt Julia's Paella			
Alternate Options - It looks like the fish in your recipe has a few alternatives that can be substituted in to make your dish more environmentally friendly! Take action and help save the environment!			
Common Name (more)	Health Issues (less)	Environmental Issues (less)	Sources (more)
Giant Tiger Prawn	 <p>Contaminant levels unknown. Avoid eating the same fish more than once a week, to minimize risk of mercury. (US FDA)</p>	 <p>Wild shrimp fisheries abroad have large amounts of bycatch, including endangered sea turtles. Outside the U.S., the construction of many shrimp farms has destroyed mangrove forests and other coastal wetlands.</p>	
Giant Freshwater		 <p>Wild shrimp fisheries abroad have large amounts of bycatch, including endangered sea turtles.</p>	

Aunt Julia's Paella	
Alternate Options - In case your grocery store does not carry the fish called for in this recipe or if you'd like to try some alternatives, click for some other options.	
Ingredients (for yield: 6 Servings)	
Chicken, cut up (Or 4 thighs)	1

figure 3. Presentation of alternatives information for EcoEats (top) and Tastee (bottom).

Finally, the presentation of recipe alternatives on the actual recipe page was different for both sites. Above the ingredient list, Tastee users were presented with a box explaining that the system knows of some alternatives to the fish in the recipe, in case the one in the recipe isn't available (Figure 3, bottom). Clicking on the link presents a summary table of the alternatives. On the EcoEats site this summary table appears automatically, and the text above the table says that using an alternative can be more environmentally friendly (Figure 3, top). In both conditions, users could

click on a column in the table to reveal the detailed information behind the summaries.

Pilot Study Design

We conducted a between-subjects pilot study using the two variants of our website. Eleven individuals participated in the study (7 male, 4 female; average age = 27.6 years) and were given \$20 for their time.

Task

Participants were told that they were evaluating a new web site for finding recipes online. They were asked to find two recipes with at least one seafood ingredient they would like to cook, cook one of the recipes, and return with a receipt of the seafood purchased.

Independent Variable

Participants were randomly assigned to one of two experimental conditions. Users in the direct persuasion condition used the EcoEats web site while users in the indirect persuasion condition used the Tastee web site.

Dependent Measures

Self-reported dependent measures were distributed across three surveys: pretest, site test, posttest. The Pretest survey was taken before the website recipe search task, the site test survey was taken after the website search task, and the posttest survey was taken after the participant had cooked the recipe.

ATTITUDES

To assess whether direct or indirect persuasion would be more effective at promoting sustainable attitudes, all three surveys asked the participant to rate the importance of nine factors when choosing seafood: cost, taste, heartiness, health benefits, environmental

friendliness, ease of preparation, convenience, quality/freshness, and novelty.

ACTIONS

To measure how sustainable participants' actions were, we recorded the actual recipes that the participants prepared. To quantitatively describe the recipes, we counted the number of seafood species alternates listed for each recipe within each of the 6 rating categories: Health Alert, Health Caution, Health Safe, Eco Worst, Eco Caution, and Eco Best.

Results

Hypothesis 1: Attitudes

Our first hypothesis stated that indirect persuasion (Tastee) would change attitudes toward sustainability. We calculated the change in environmental attitudes between the site test and posttest surveys (see Figure 4 for attitude ratings). We ran an ANOVA controlling for individual environmental ratings from the pretest to see if the change in attitudes differed significantly between conditions. The indirect condition increased the importance of environmental attitudes ($M = .59$, $SD = .24$) significantly more than the direct condition ($M = -.20$, $SD = .25$), $F(1, 8) = 4.8$, $p = .05$. These results support Hypothesis 1.

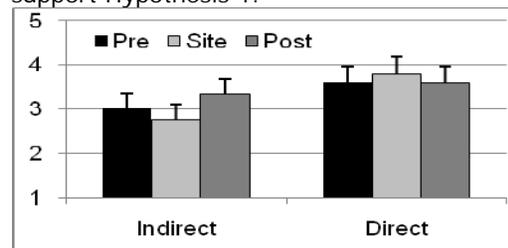


figure 4. Average environmental attitude ratings by condition across all three surveys.

Hypothesis 2: Actions

To analyze our second hypothesis that direct persuasion (EcoEats) leads to environmental actions more often than indirect persuasion (Tastee), we compared the average environmental and health ratings of cooked recipes between conditions. Tastee participants did not have a preference for recipes with higher ratings in one category or other. EcoEats participants cooked recipes that had significantly lower Eco Worst ($M = .95$, $SD = 1.15$) and Eco Concern ($M = .19$, $SD = 1.15$) than Eco Best ratings ($M = 4.70$, $SD = 1.15$), $p < .05$, providing support for Hypothesis 2.

Discussion

The analysis of participants' attitudes supports Hypothesis 1. Participant attitudes towards the environment improved in the indirect persuasion condition but did not significantly change in the direct persuasion condition. The analysis of participants' actions supports Hypothesis 2. Participants cooked more sustainable recipes in the direct persuasion condition than in the indirect persuasion condition.

The correlation coefficient between participants' change in environmental attitudes and the Eco Best ratings of their cooked recipe was not significant ($r = .13$, n.s.). Although intuitively, attitudes and actions would seem to be correlated, they were independent in this pilot study. If this result were to be replicated in a larger study, it would suggest that websites intended for persuasion will need to take different strategies for attitudes and for behavior. Doing so, however, might put the designer in the position of trying to use direct and indirect persuasion at the same time, a serious dilemma.

We were limited by the nature of the sustainability data on seafood. Different environmental groups use different seafood taxonomies and ratings for sustainability. We relied on only one set of environmental data ratings to reduce the variance within our dataset but it may have impacted the accuracy of the data. For example, certain species have plenty of alternate options data of all categories (i.e. good and bad for the environment). This means that the ratings do not necessarily reflect actual environmental safety but rather penalize options that have more data accompanying them. We are currently working on normalizing the ratings of the recipes in the database to implement in subsequent work.

We had initially wanted to measure the environmental rating of the actual cooked seafood, not just the ratings of the cooked recipe. However, when trying to find ratings for the actual fish cooked, inadequate food labeling made it impossible to reliably identify the exact species of fish. While this issue of food labeling is outside the scope of this research, we believe this situation is improving and will improve more rapidly as more consumers demand this information.

Future Work

We are currently expanding from our pilot study in several ways. Specifically, we are

- Exploring differences in site usage and affect between conditions,
- Refining measures of environmental attitude,
- Comparing the website to different persuasive technologies, such as mobile technologies, and
- Introducing additional variations in information display and persuasive methods.

The current research platform offers the opportunity to test such research questions in an effective and practical manner. This research helps differentiate changes in attitudes and actions with the eventual goal of changing both towards more sustainable lifestyles.

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References

- [1] Burgoon, M., Alvaro, E., Grandpre, J., Voulodakis, M., Dillard, J. P., & Pfau, M. (2002). In J. P. Dillard, & M. Pfau (Eds.), *The Persuasion Handbook*. Thousand Oaks, CA: Sage Publications.
- [2] Fogg, B.J. (2003). *Persuasive technology using computers to change what we think and do*. Amsterdam: Morgan Kaufmann.
- [3] Locke, Edwin A. (2001) "Motivation by Goal Setting," *Handbook of Organizational Behavior*, 2: 43-54.
- [4] O'Keefe, G. J., & Shepard, R. L. (2002). Environmental public information and action programs. In J. P. Dillard, & M. Pfau (Eds.), *The Persuasion Handbook*. Thousand Oaks, CA: Sage Publications.
- [5] Quinn, J. M., & Wood, W. (2004). Forewarnings of influence appeals. In E. S. Knowles, & J. A. Linn (Eds.), *Resistance and Persuasion*. New Jersey: Lawrence Erlbaum & Associates.
- [6] Simons, H. W. (2001). *Persuasion in society*. Thousand Oaks, CA: Sage Publications.