

Persuasion Strategies for Computers as Persuasive Technologies

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ABSTRACT

Similar to human persuaders in our society, persuasive computing technologies can influence people's attitudes and bring some constructive changes in many domains such as marketing, health, safety, environment and so on. Since the study of computers as persuasive technologies was introduced at CHI 97 as a new research area, more valuable studies have been done in this relatively unexplored area. Many persuasion strategies have been devised, applied and evaluated. In the paper, several strategies together with their applications are presented. These strategies are either proved or promising to be successful. Ethical issues of persuasion strategies are discussed as well. A set of ethical principles is summarized for future persuasive technology design.

Keywords

Captology, persuasive computers, persuasion strategy, e-commerce, comparison challenge, Internet advertising, recommender system, collaborative filtering, ethics.

1. INTRODUCTION

Similar to human persuaders in our society, persuasive computing technologies can influence people's attitudes and bring some constructive changes in many domains, such as commerce, health, education and so on. In the process, computers help us improve ourselves and our society. The study of computers as persuasive technologies was introduced at CHI 97 as a new research area [1]. The scientists have agreed to call this area "Captology" (Fig. 1), which is based on an acronym derived from "Computers As Persuasive Technologies".

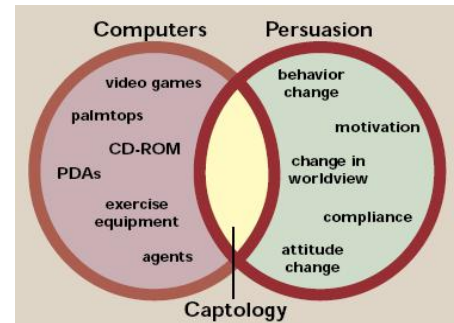


Fig. 1 What Is Captology (From [2])

Since that, more valuable studies have been done in this relatively unexplored area. Some key definitions and frameworks for understanding Captology have been proposed. Also, various persuasive technologies have been designed and developed in the forms of Web site, software, artifact, and mobile computing device. Some of them are very successful in evaluations.

This paper first presents an introduction to Captology and then focuses on the persuasion strategies for computers as persuasive technologies. Several strategies and their applications are described. Among them, some have been proved to be effective; others are promising to be successful but have not been evaluated. Finally, the ethical issues of persuasion strategies are discussed.

2. OVERVIEW OF PERSUASIVE COMPUTERS

2.1. The definition of persuasive computers

B.J.Fogg, an authority in Captology, has defined persuasive computers in his paper as "the computing systems, devices, or applications intentionally designed to change a person's attitudes or behavior in a predetermined way" [2].

Persuasion implies changing other's attitudes or behaviors in a planned way. So the definition emphasizes intentionality as a key point of persuasive computing technology. However, the computing systems,

devices, or applications themselves do not have the intention to persuade users in some way. It is their creators or developers who plant the intent in the machines [1]. For example, a CD-ROM that persuades kids to eat fruits and vegetables qualifies as a persuasive computing technology because it inherits a type of intent from its designers.

2.2. The domains persuasive computing was used in

Up to now, persuasive computing technologies have been used in at least 12 domains. Among them, four domains are the most significant. They are marketing, health, safety and environment [3].

Marketing is probably the most significant domain, in which the persuasive technologies are widely used to motivate customers to buy products and services. For example, In order to encourage a customer to buy more, some online supermarket recommends some products to the customer based on her interests [4]. With the growth of e-commerce on the Internet, marketing will continue to be the main domain of persuasive technologies for the foreseeable future [3].

In health domain, the persuasive technologies include persuading people to form a healthy habit and take preventive measures against illness. For example, a Web site is designed to persuade people to quit smoking. Health becomes a significant domain partly because most people consider that improving physical and mental well-being is a good thing to do.

The next most significant domain for persuasive technologies is safety. In this field, technologies are used to promote the safety and security or to prevent accident [3]. For example, a mobile device is designed to persuade drivers to reduce their speed. However, safety is often involved in collective behavior, and therefore can result in the debate about related ethical issues [5].

Environment is another significant domain for the application of persuasive computing. The technologies are used to persuade people to preserve or restore the natural environment. A good example is the “Scorecard.org” website, which is designed to motivate

environmentally friendly behavior [3]. Environment will become a more important domain since protecting environment is widely concerned and accepted as desirable and necessary.

3. PERSUASION STRATEGIES

B.J.Fogg proposed that Captology, as a relatively new research area, should adopt or borrow the existing persuasion theory from other fields such as psychology, communication, media and so on [1]. Since these subjects have a history of investigating different types of persuasion and their effects, Fogg think that the theories and methods of these subjects can transfer well into Captology.

Actually, in the existing persuasive computing technologies, the strategies used are far from new. Most of them are the basic theories or frameworks of other fields.

The rest of this section describes some persuasion strategies through examples. Some of them have proved to be successful; some are promising ideas but have not been evaluated.

3.1. Just-In-Time persuasion

The persuasion will become very effective if the persuasive messages are highly related and available at just the moment people make a decision.

This basic theory was applied by Stephen Intille and his colleagues [6]. They developed a PDA device used to persuade people to select the healthy and nutritious food instead of those high in saturated fat. According to the paper, “although the USDA and DHHS periodically release dietary guidelines for Americans, only 12% of Americans have “good” eating habits” [6]. There are two reasons they did not follow the dietaries:

1. The persuasive messages are too general to be used in a specific purchase.
2. The persuasive messages are not available at the time and place people selected food in the market.

Therefore, the PDA device was designed to solve these two problems. It can provide high-tailored information for the users at exactly the time they make their



decisions on which kind of food to choose. Its user interface is quite simple (Fig.2). There is a barcode scanner on the PDA. Users can use it to scan two items in sequence and then a related comparison will be displayed.

Fig. 2 Prototype (From [6])

Another good application of this strategy is comparison challenge Internet advertising, which is proposed by Jae Lee et al. [7]. It can be used by manufacturers to promote the sales of their products on the Internet by providing a related comparison for customers when they face lots of similar products and hesitate to make the decision on which one to choose.

In an e-commerce Web site, a new product with a very competitive performance and price is often overlooked by most customers if its brand is not well known. Based on comparison challenge, a “Compare Me” or “Compare XXX” (XXX is the newcomer) button can be added after those more popular products (see Fig. 3), which, if clicked by customers, will show a detail comparison between the popular product and the new product. However it is customers who decide whether to click the button for such information. Another very similar idea is to add a “Compare Them” or “Compare XXX” (XXX is a popular product) button to the line of the new product. The function of the button is the same as the previous one.

DELL Dimension 9200	Compare Me	Dell	6V945-DBZRL1	Del Online	\$1,899.00
EVO D300V MCTE441690		Compaq	A29A76E	Compaq atHome	\$735.95
Rendition 780u		HP	29GX1898	HP Online	\$1,398.00
Gateway 700XL		Gateway	700hd	Gateway Online	\$1,599.00
Presario 5430SE	Compare Gateway	Compaq	5430se	Compaq atHome	\$1,642.20
IBM Netvista A41 Series		IBM	a41	IBM Online	\$2,179.00

Fig. 3 Comparison challenge (From [7])

By offering a comparison with the products bearing a more well-known brand, manufacturers can prove superiority of their own products and persuade customers to make a favorable decision.

Jae Lee et al. have done some tests to measure the effectiveness of comparison challenge. The result has showed it is a successful persuasive technology [7].

3.2. Simulating experience

Users are presented with a simulated environment which is very similar to the real counterpart. Inside this simulation, they will obtain some experiences and finally make decisions based on the experiences. The decisions are the key to the strategy’s persuasiveness since the users will make same decisions in their real life.

A good example which adopted this strategy was “Baby Think It Over”, a computerized doll used in U.S. high school to motivate responsible sexual behavior [8]. The doll is designed to cry at random intervals day and night. Once it cries, students need to carry it in their arm for 5 to 15 minutes to quiet it. Soon, they will feel tired of it. This technology provides students with a simulated but realistic environment in which they will taste of the annoyance of being a parent. Through using this artifact, teenage will pay more attention to their sexual behavior and take the decision to become a parent more seriously.

3.3. Personalizing

Generally speaking, personalized information receives more attention than general information and may potential influence the person more effectively. So personalizing information for users can be an effective persuasion strategy.

And it has proved to be effective. “Scorecard.org” is a Web site which uses personalized information to persuade people to protect environment [3]. Instead of the environmental situation of the whole America, it gives people information on community pollution at a local level. Actually, people are very concerned with this kind of information since the local environment can directly affect their health and life. After having people know these facts, the Web site lists some possible actions people can take to solve the pollution problem. These actions are the goal of the persuasion. Since the need to take these actions has become very apparent, the possibility of people doing them will increase greatly.

3.4. Recommendation

Nowadays, recommender systems have been used by many e-commerce Web sites. They provide different

recommendations for different users depending on users' particular interests or opinions about items and services. Users' interest information is collected whenever they do some actions on the Web site, such as assign ratings to a product, give some comments, or purchase an item. However, how to use this information to generate good recommendation for users is a crucial problem for this persuasion strategy.

The tradition solution to this problem is content-based filtering. It often builds a profile of keywords from the items users like or purchase and then recommend new ones which match the profile [4]. Although this strategy works well in the text domains, it encounters some problem when the content of the item is hard to parse.

Herlocker et al. proposed another solution — automated collaborative filtering (ACF), which is very interesting [9]. Instead of recommending the items according to their contents, ACF system bases the recommendation on human. First, it sets up a profile of interest for each user by recording every rating the user assigned to the items she has experienced. When a recommendation for a user is needed, ACL tries to find other users whose interests and tastes are very similar to that user. Then ratings from those like-minded people are used to generate recommendations for that user.

Herlocker et al. argued that compared with content-based filtering, ACF has the following advantages [9]:

- ✓ It does not depend on machine analysis of content, which is error-prone.
- ✓ It can be used to recommend any type of item such as art work, music and movie, whose content is hard to analyze.
- ✓ Complex concepts do not need to be represented in a text-format.
- ✓ It can make serendipitous recommendations.

Although ACF has many advantages over tradition content-based filtering, Herlocker et al. emphasized the fact that using the two methods together usually brings a better filtering effect.

ACF has been used in many research projects and

commercial Web site and evaluated to be successful [9]. A good application of this strategy is “MovieLens”, a Web site on the Internet which already has thousands of users (www.movielens.org).

3.5. Monitoring and tracking

If a person realizes that she is being monitored or tracked, her behaviors will be influenced greatly. Since this strategy may result in the loss of personal freedom or privacy, it is a controversial persuasive technique and should be applied more cautiously. To some extent, it is a kind of coercion other than persuasion [3]. I present it here because it does change people's behaviors.

“Hygiene Guard” is a representative application of this persuasion strategy [3]. It is used in restaurant and hospital to motivate the employees or workers to wash their hand before leaving the restrooms. The equipment is installed in the restrooms and every employee is required to wear a badge. Whenever the employee goes to the restroom, she has to use the sink for a period of time (There is a minimum limit for the time). Otherwise, her identification and behavior together with the time will be recorded by the central server.

Like other applications of this strategy, “Hygiene Guard” is also a controversial technology. People who oppose the use of this technology would argue that it offends the privacy of the employees. However, it is a good technology as a whole since the customers (or patients) would benefit from it.

3.6. Competition and recognition

Competition and recognition can be used to motivate people's behaviors since most people desire to win in contests and hope to obtain the glory as a kind of validation from others.

"Onsale.com" is an e-commerce Web site which makes use of this persuasion strategy [3]. It promotes people to participate in its online auction environment by launching competitions among them. The interface allows users to bid for an item and view the bid history. When there are several users bidding for the same item, a competitive auction seems to be held for them. Buying will become more like "playing" in the auction to "win"

the purchase rather than spending money to receive the item. And the name of the user who finally gets the item will be published, which is a kind of recognition in the virtual community.

3.7. Visualizing the personalities in virtual communities

User participation is very crucial to an online virtual community. If few users are willing to become the members of the community, it will never become successful no matter what excellent function it provides. However, how to motivate or attract people to participate remains an open problem.

Hugo Liu et al. designed an intelligent interface which enabled entrants to quickly and easily understand the dynamics of the community and the personalities of its members [10]. Although not proposed as a solution to the above problem, this strategy may be a promising one.

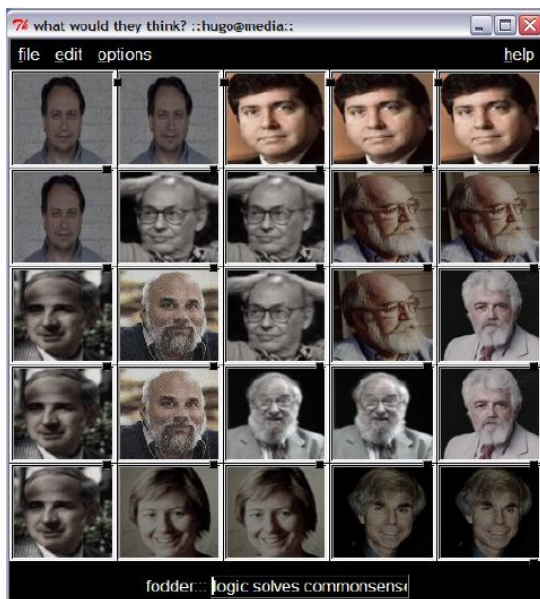


Fig. 4 What would they think (From [10])

What Hugo Liu et al. built is a system called “What would they think” (Fig. 4). It can set up a model of a person’s attitudes and opinions by analyzing her personal texts such as emails, instant messages, editorials, and interviews. (Nature language processing is used.) When user inputs a text, the system will display a real emotional face of each member of the community

to express their different attitudes toward the text. In other word, “the user can see visually the attitudes and disagreements of strong personalities in a community” [10]. And the system will use some text quoted from the person to explain why she will react in such an expression if user clicks the face.

Through such an interface, a newcomer can quickly have an at-a-glance impression of the attitudes and opinions of other members. I think this will greatly attract her to participate in the community because other persons seem no longer to be strangers but acquaintances.

4. ETHICS OF PERSUASION STRATEGIES

When designers or programmers adopt an existing persuasion strategy or devise a new one, there is an important issue they should scrutinize. That is, ethics. Actually, persuasion has long been an area for ethical debate. Since the introduction of Captology, ethical issues in persuasive computers have received more concerns than before.

Carey Heckman et al., who focused on the ethical problems in Anthropomorphic Agent design, argued that it was usually difficult to decide whether to employ a persuasive technology since most of them were double-edged. Therefore, they suggested that the designers must evaluate their persuasion strategies in terms of user welfare in order to make sure that the users, who will be persuaded, are the final beneficiaries of the technologies instead of a means to profit [11].

Daniel Berdichevsky et al. proposed a framework to be applied in evaluating the ethics of persuasion strategies [5]. Three factors were suggested to be considered: motivations, methods, and outcomes. In their paper, the reasons these factors should be thought over were presented. Based on this framework, they established a set of ethical principles which should be followed by designers and programmers of persuasive computers in the future. The principles can be summarized as following:

- The motivations and the intended outcome of a persuasion should not be unethical.

- The creators of a persuasive technology should make its motivations, methods, and intended outcomes visible to its users.
- The creators of a persuasive technology should be aware of their responsibility for all predictable outcomes of its use.
- The creators should respect the privacy of users.
- Persuasive technologies should not provide inauthentic information in order to achieve the persuasion goal.
- The creators of a persuasive technology should never try to persuade users when they would not consent to be persuaded.

Daniel admitted that sometimes it was hard for designers and programmers to follow these guidelines because they contracted to device persuasive programs. But they should be sensitive to the ethics of the persuasive technology they design.

Actually, Daniel's idea is consistent with Carey's. The difference lies in that he proposed a set of specific rules whereas Carey's is a general guideline.

5. CONCLUSION

With the development of persuasive computers, many persuasion strategies have been devised and used. Some of them have proved to be very effective. Analyzing these successful strategies is very necessary for designers to develop new persuasive computing technology. Although designers may figure out some new persuasion strategies, they should pay more attention to adopting or borrowing the existing one from other subjects such as psychology, communication, and media, since these subjects have a history of investigating the theories of persuasion. Ethical issues should also be considered carefully while the persuasive technologies are designed. Designers should evaluate their persuasion technologies in terms of user welfare to make sure that the users, who will be persuaded, are the final beneficiaries of the technologies.

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