Altruistic Interaction Design: a new interaction design approach for making people care more about others

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ABSTRACT
The importance of design ethics in HCI has gained increasing attention in the last several years. In this research, we propose a new concept of interaction that restructures its conventional notion. It is expected that this new concept will increase social empathy among people, which will eventually result in more positive ethical behaviors. This new structure of interaction breaks the current closed interaction cycle that focuses on a complete input-output feedback loop. Instead, it makes the cycle imperfect so that people cannot experience it without seeking help from others or being helped by the same. We call this concept altruistic interaction design and designed a case, the Altruistic Fan, as an applied product example. This paper explains the concept of altruistic interaction design and its application process to a real product. The study closes with the results of an exploratory user study utilizing an altruistic interaction design product (Altruistic Fan).

Categories and Subject Descriptors
H.5.2: User interfaces, User-centered design.

General Terms
Design, Experimentation, Theory.

Keywords
Altruism, Design ethics, Empathy, Morality, Social interaction, Interaction design.

1. INTRODUCTION
Ethical design is an important design research issue promoted by Papanek [7]. Humanizing technology by making it more human-centered and by enhancing its role in making people more aware of ethical issues is a naturally emerging trend. There have been many attempts of this kind in the area of persuasive technology [2]. For example, in some ethical design cases [4, 8], social influences that were inspired by a vision on a desired social transformation explicitly have been taken into account during the design process. Likewise, designers have been developing HCI to enhance the ability of persuading people into morality.

The traditional concepts of interaction promote individuals to be immersed in the use of interactive products by a closed cycle of its user-product interaction. The purpose of “interactive” products is to be used for and to satisfy the needs of the product’s owner only. As a result, interaction is an anchor that ties people to a closed circle, through which it makes it hard for people to look around and direct their interests to other people in the physical world. Interactive products, in fact, often prevent large-scale interaction among humans in the physical world. They tend to ensure that humans remain in an invisible private space. It is, therefore, important to remember the real meaning of interaction. In these days, lots of social networking services have appeared. Moreover, even social networking or social communication services have gotten more popular than ever. Nevertheless, it seems to be still difficult to enhance meaningful and sincere relationships among those connected people through this service [5, 10].

In order to overcome these issues, we propose the new concept of altruistic interaction, with which we provide a novel platform for interaction that breaks the current closed cycle of a user-product interaction, and has people complete the cycle only with the help from strangers, or by helping the same. This way, people may be able to naturally care about those around them without expecting any material rewards.

In order to examine the effects of our concept, we designed a new product called Altruistic Fan, which embodies the concept of altruistic interaction. We also conducted a series of user studies through which we explored how this new concept enhances social empathy and an altruistic mindset through its use.

2. ALTRUISTIC INTERACTION
Altruistic interaction is an ‘imperfect’ interaction. An altruistic interactive product will always need other functions and users in order to achieve its intended purpose as a product. This imperfection expands the cycle of interaction. In the traditional sense of interaction, a product combines both its input and output in one product, and the feedback upon using the product is provided to the user by that product. However, if the input and the

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output of a product are separated, the input of the product and the output of the product need to work complementary to achieve something in a complete and proper manner. In addition, as there are two separate products, more than one person is needed to complete the product operation.

We made a system with a pair of products—i.e. one only with an input and the other only with an output, and those two parts paired for a complete cycle of interaction. With this system, one user can only send the input signal to the other user, and the other user can only receive the output triggered by the other user’s input signal. Here, the users of the paired inputs and outputs do not have to be acquainted at all, because unlike other social media our concept is not meant to increase any social interactions, but to increase social empathy and care for each other.

3. PROTOTYPING

3.1 Preliminary study: willingness to overcome a physical barrier

Altruism is defined as a willingness to help others, even when facing temporal, monetary, and physical barriers. To examine which altruistic act is the least burden to people, we recruited 40 participants aged 15 to 40 and asked them to evaluate the level of readiness to each altruistic act on a 7-point-Likert-scale. Based on the ratings, we calculated the mean scores of a willingness threshold and found that the physical contribution [M=5.31, SD=0.73] was the easiest channel followed by monetary [M=4.37, SD=0.87] and the temporal respectively [M=3.89, SD=1.02]. The mean scores were different from each other at a significance level of 0.05 (paired-sample t-test).

3.2 Target device: everyday household appliances with a low level of automation and a visceral output

By applying interaction design to household appliances, we aim to ensure that easy control of everyday household appliances can be used to foster altruism. Also, there are several requirements of an output of the altruistic interaction design product. The product should have a low level of automation and give a visceral experience to the users through revealing physical expressions of output, so that people can feel the output ambient [1,9] and easily understand the conceptual model of input and output [6].

3.3 Method and material

We created a pair of altruistic interactive fans (Figure 1). For the input fan, we implemented an input function that requires one participant to blow into the center hole of the fan in order to make the output fan generate wind (using its own motor and fan blades).

![Figure 1. Mechanism of Altruistic Fan](image)

We used Arduino and Xbee technologies to facilitate communication between the input and output fan. Blowing into the center hole in the input fan results in the lighting up of the center-hole (by lifting the cover). An ultrasonic sensor was used to measure the distance from the same to the center-hole cover plate. For distances below some threshold, an activation signal was sent to the output fan (Figures 1-2). The distance sets the speed of the output fan motor resulting in the strength of the generated wind, where a smaller distance translates to a stronger wind.

![Figure 2. Physical structure of Altruistic Fan (Left: input fan, Right: output fan)](image)

4. EXPLORATORY USER STUDY 1

4.1 Goal of user study 1: Usability test and in-depth interview of Altruistic Fan

We conducted the first user study to see how real users use the Altruistic Fan. We recruited 8 participants aged 24 to 30. We split the groups according to gender. We also constructed one group (Group D) consisting of two participants that had already participated in other tests (one male from Group A and another male from Group B, but switched the role between sender and receiver), and alternated the use of the product. Through Group D, we hoped to better understand the reactions of the subjects when they had knowledge of the other side’s situation (Table 1).

<table>
<thead>
<tr>
<th>Table 1. User composition in user study 1</th>
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<tbody>
<tr>
<td>Pilot test</td>
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<tr>
<td>Group A</td>
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<tr>
<td>Group B</td>
</tr>
<tr>
<td>Group C</td>
</tr>
<tr>
<td>Group D</td>
</tr>
</tbody>
</table>

Each session lasted for two hours, including one and a half hours spent using each prototype and a half hour debriefing session. Before we conducted the main study, we carried out a pilot test. In this pilot test, we found that it was hard for users to concentrate on the test without being sensitized for this situation. Thus, we prepared a short pre-session for “senders” (the initiators of altruism) in the main study. We showed the senders pictures of sweating workers, elderly people, athletes, and the general public. We concurrently told them that the “receivers” were in precisely the same situation depicted in the picture. We turned off the receivers’ air conditioners to increase the temperature of their rooms—we conducted this study during summer; the senders were made aware of this. We then allowed the senders to freely provide wind to the receivers using our device.

Finally, we asked the participants to write down the time of blowing to the input fan and the reasons (including emotions) for doing so. Also after their use, we conducted an in-depth interview with both of the sender and the receiver.
4.2 RESULT FROM USER STUDY 1

4.2.1 Forming empathy by reflecting on one’s own feeling
During the interview, participants expressed their gratitude and contribution to each other and tried to understand each other’s situations better. Also, during the test, receivers wrote that they felt emotionally “warm” knowing that the sender was concerned about them. Senders wrote that they should have cared for the receiver, so they felt emotional warmth through their altruistic action, as well. When we compared the blowing frequency of Group D with the other groups’, we saw that the duration of blowing was longer. Participants of Group D said that they had already experienced the situation and knew how difficult it was to send wind, while long duration was more pleasant. Consequently, during the interview they expressed frequent gratitude to each other even though they not knowing to whom they sent the wind and from whom they received it.

4.2.2 No feedback, no fan, but amplifying altruism
Altruistic Fan provided no feedback, and as a result, some senders blew often at the beginning of the experiment, but the rate of blowing over time reduced particularly for the two groups with male senders (Groups B & C). Senders commonly felt ‘dullness’, ‘abstractness’ and ‘vagueness’ because of the lack of feedback. Interestingly, a sender from Group A said that she felt sorry towards the receiver because she was not sure whether the receiver was being cooled or not, and because of this lack of feedback, she blew the fan more frequently. The lack of feedback definitely provided some discomfort for the users. Nevertheless, they cared for sending wind to unknown receivers regardless of feedback, expressing: “Next time, I will blow the wind better than this time.” Our results led us to realize the potential of our approach for enhancing altruism and empathic social relationships when providing a means of sender-receiver feedback.

5. EXPLORATORY USER STUDY 2

5.1 Goal of user study 2: Evaluation on effects of Altruistic Fan
We tried to investigate the perception of Altruistic Fan in relation to other products by examining their conceptual distances with each other. We also examined which types of pleasure of Altruistic Fan appealed to users.

Table 2. User composition in user study 2

<table>
<thead>
<tr>
<th>Participants</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Demonstration</td>
<td>Output fan</td>
<td>Input fan and output fan</td>
</tr>
</tbody>
</table>

We recruited 40 participants aged 20 to 30. We divided them into two groups: Group 1 for not knowing about the new platform of Altruistic Fan, and Group 2 for knowing about it by seeing the full demonstration video of Altruistic Fan (Table 2). In order to make sure that Group 1 also experiences the function of Altruistic Fan while not knowing about its altruistic interaction platform, we showed the video of the fan only for its output part. We assumed that the conceptual distance between the traditional products and Altruistic Fan is possibly changing after we showed the full demonstration of Altruistic Fan to the participants, because we believed that the altruistic mindset is evoked only by knowing its new interaction platform which cannot be revealed by only seeing its form and fanning function.

We designed the survey in two parts. The first part was for examining the conceptual distance based on the perception of similarity (conceptual distance) among the products. For this part, we selected 4 categories of the products to be compared with Altruistic Fan. The 4 categories were based on their appearance, functionality, characteristic and meaning (Figure 3). Each category has the three product levels of close, neutral and far. For example, the air conditioner is located near the fan in terms of functionality when the product match is checked as close. We mixed the order of each product match randomly and asked the similarity of the product match.

Figure 3. Standard of categories

The second part was for checking their perception on the four types of pleasure [3] of Altruistic Fan (Table 3). Participants had to mark on each question in a 7-point-scale depending on the amount of pleasure that participants felt toward Altruistic Fan, before and after seeing the demonstration video. We used the statistical analysis methodology of multi-dimensional scaling for examining the conceptual distance and the T-test for investigating the scale of 4 types of pleasure.

Table 3. Survey based on 4 types of pleasure

<table>
<thead>
<tr>
<th>Types of pleasure</th>
<th>Contents</th>
<th>Question</th>
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</thead>
<tbody>
<tr>
<td>Physio pleasure</td>
<td>Appearance</td>
<td>Q1 Like its appearance</td>
</tr>
<tr>
<td></td>
<td>Ergonomics</td>
<td>Q2 It will be physically comfort</td>
</tr>
<tr>
<td>Psycho pleasure</td>
<td>Cognition</td>
<td>Q3 It will be easy to understand</td>
</tr>
<tr>
<td></td>
<td>Emotion</td>
<td>Q4 It will give emotional satisfaction</td>
</tr>
<tr>
<td>Socio-pleasure</td>
<td>Social relation</td>
<td>Q5 Through this, I can make better relationship</td>
</tr>
<tr>
<td></td>
<td>Face</td>
<td>Q6 People will be envy when I use this</td>
</tr>
<tr>
<td>Idea-pleasure</td>
<td>Ideology</td>
<td>Q7 Like its meaning</td>
</tr>
<tr>
<td></td>
<td>Attachment</td>
<td>Q8 I can get emotional attachment after using it</td>
</tr>
</tbody>
</table>

5.2 RESULT FROM USER STUDY 2

5.2.1 Conceptual distance shifting from functionality to meaning
Group 1 categorized the 12 products according to appearance and functionality rather than characteristic and meaning. They thought that the air conditioner, ventilator, humidifier and Altruistic Fan are similar and the distances between those four functional products are close (Stress=.19, RSQ=.77). However, Group 2 categorized 12 products according to the meaning. We found that the conceptual location of Altruistic Fan shifted near the group of donation box and coin box and the group of book and phone (Stress=.23, RSQ=.67). Group 2 said that they thought the conceptual location of Altruistic Fan as a communication medium and a symbol of moral good. (Figure 4)
Although the Stress values resulted from an MDS (Multidimensional Scaling) analysis in user study 2 turned out to be bigger than 0.15, it is still meaningful to discuss about it since it tells us which tendency the Altruistic Fan shows regarding the internal relationships with other types of products.

One of the remaining issues, however, is the use of feedback. Although participants felt more moral responsibility and altruism in the absence of feedback, this factor seemed to add some burden to the sender. We believe that giving a minimum feedback may be useful. For example, incorporation of a light at the sender’s end and a button at the receiver’s end allows sending a signal when wind has been received. The sender can in turn be notified that the blown wind reached the receiver.

We anamolized the structure of interaction and suggested a new platform called altruistic interaction. However, we thought there can be more directions of restructuring the interaction platform in addition to dissecting input and output. In the future, we plan to explore this issue as well, developing a series of altruistic interactive products that can accommodate other types of altruistic behavior.

7. ACKNOWLEDGMENTS
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8. REFERENCES