Persuasion In-Situ: Shopping for Healthy Food in Supermarkets

Ole Kallehave, Mikael B. Skov, Nino Tiainen
HCI Lab, Department of Computer Science, Aalborg University
Selma Lagerlöfs Vej 300, 9220 Aalborg East, Denmark
ole-kallehave@rocha.dk, dubois@cs.aau.dk, ninodk@gmail.com

ABSTRACT
Healthy lifestyle is a strong trend at the moment, but at the same time a fast growing number of people are becoming over-weight. Persuasive technologies hold promising opportunities to change our lifestyles. In this paper, we introduce a persuasive shopping trolley that integrates two tools of persuasiveness namely reduction and suggestion. The trolley supports shoppers in assessing the nutrition level for supermarket products and provides suggestions for other products to buy. A field trial showed that the persuasive trolley affected the behaviour of some shoppers especially on reduction where shoppers tried to understand how healthy food products are. On the hand, the suggestion part of the system was less successful as our participants made complex decisions when selecting food.

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Shopping, health, persuasive, supermarkets.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Healthy lifestyles is a hot topic in most Western societies as a rapid growing number of citizens are either over-weight or obese, e.g. more than 50% of the adult population in Denmark are either over-weight or obese [9]. Over-weight problems come from several circumstances, e.g. the lack of exercise or unhealthy food, but in general people buy and consume food that contains a lot of sugar or fat. Thus, we need to alter people's behaviour and attitude while they shop groceries and other food products in supermarkets.

When supermarket shopping, more studies have shown that consumer behaviour is highly controlled by routine and is not simply changed or altered [8]. In fact, even if shoppers want to change their shopping behaviour and patterns, they find it difficult to understand the nutritious values of many products, e.g. they cannot understand nutrition labels or how much sugar or fat the product contains [5]. Further, one of the fundamental problems resides in the fact that we are confronted with an overwhelming number of different food products and it is often difficult to identify and choose the more healthy ones. Iyengar and Lepper showed in an experimental study that consumers were more satisfied with their own selections when they have fewer options to select from [5]. Schwartz refers to this as the paradox of choice claiming that the huge number of choices decreases people's real choice and decision-making [10]. Thus, people are likely to continue their current routine type of behaviour (as illustrated by Park et al. [8]) and this could potentially prevent them from making healthier choices.

Emerging technologies are increasingly being used to alter people's opinions or behaviour, e.g. smoking cessation [4] or promoting sustainable food choices [7]. Fogg refers to such technologies as persuasive technologies or captology [3]. Fogg states that contemporary computer technologies are currently taking on roles as persuaders including classical roles of influence that traditionally were filled by doctors, teachers, or coaches [3]. Research studies within different disciplines are increasingly concerned with such persuasive technologies that may be used to create or change human thought and behaviour. As examples, Chang et al. [2] propose the Playful Toothbrush that assists parents and teachers to motivate young children to learn thorough tooth brushing skills while Arroyo et al. [1] introduce the Waterbot that motivates behaviour at the sink for increased safety. Both these examples propose rather simple, yet potentially powerful input and feedback that aim to inform users of their own behaviour.

Todd et al. [11] illustrate theoretically how nudging could persuade shoppers to select healthy food products based on simplified information to the shoppers in-situ, but call for empirical understandings of persuasive shopping. We propose a persuasive shopping trolley application called iCART that attempts to motivate change towards more healthy shopping behaviour. First, we outline the idea behind the design of the trolley application and then reports from field studies of use on its effects on behaviour change.

iCART: INFLUENCING SHOPPING BEHAVIOUR IN-SITU
iCART is a persuasive application mounted on a shopping trolley that attempts to persuade the shopper's behaviour and awareness. The system was implemented in C# using

Windows Presentation Foundation for the interface and a Microsoft SQL server.

From our previous research [6], we learned that many consumers actually attempt to buy healthy products when supermarket shopping, but often they would find it difficult to assess the nutrition value or energy level. In fact, several consumers are actually unsure what a healthy food product is. Shoppers find it difficult to understand the nutrition information labels on the food products and they usually don't bother consulting this information. Supermarket products and groceries are rather diverse, e.g. ranging from simple non-processed products (e.g. an apple) to more complex processed products (e.g. a pizza). Usually people find it difficult to assess how healthy processed products are. Furthermore, people find it difficult to change behavior and usually choose well-known products while shopping.

The overall idea of iCART is that all food products and items in a supermarket can be classified according to nutrition level and this classification will be presented to the user of the trolley every time the shopper puts an item into the trolley. For our persuasive system, we adapt the nutrition label initiative called Eat Most from the Danish Veterinary and Food Administration. For our purpose, it provides a simple classification of food products based on the nutrition values of a product. The classification label includes a table for calculating the value of all food products. According to the label, all products can be classified as Eat Most, Eat Less, or Eat Least.

The typical use situation could be as follows (illustrated in figure 1): The user walks around the supermarket with the trolley, chooses food products and places them in the trolley (a), the trolley recognizes the product and displays its classification according to the Eat Most label (b), and the system updates the status for the entire trolley on numbers of Eat Most, Less, and Least food products (c).

(a) (b) (c)

Figure 1: Illustrating the process of using iCART

Interaction Design

We adapted three persuasive design tool principles from Fogg namely reduction and suggestion [1]. The persuasive shopping trolley should 1) present or visualize product nutrition in a simple way and 2) present alternatives to less healthy products. Finally, we decided that the system should be a walk-up-and-use system on a shopping trolley.

Figure 2: Three classifications of the Eat-Most nutrition label with eat most (left), eat less (middle), and eat least (right).

Reduction reduces complex behaviour to simple tasks in order to increase the benefit/cost ratio and thereby influence the user to perform the behaviour [3]. As stated above, consumers find it difficult to assess the overall nutrition level for products. The persuasive trolley reduces this nutrition value assessment through the simplification in the Eat Most classification and thereby the assessment now becomes a simple task. This is illustrated in figure 2 where different products have been classified, e.g. milk as eat less (middle picture).

Figure 3: Example of reduction in persuasion: Classification of the cereal product Havrefras as Eat Least

We colour-coded the three categories with green, yellow, and red. Figure 3 shows the classification for a cereal product called Havrefras and this product is an eat least product. The implementation in iCART reduces the action of assessing the nutrition value of a product by providing a simple classification of only three categories.

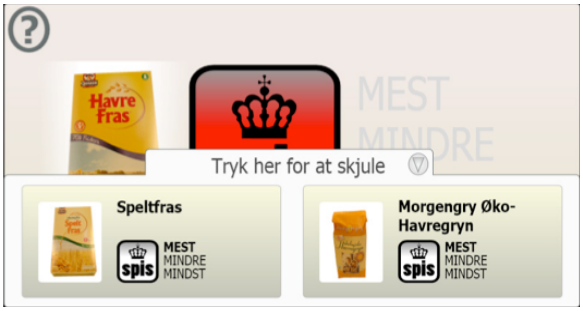

Figure 4: Examples of suggestion in persuasion: Two alternative cereal products that are both Eat Most products.

Suggestion means that persuasive technologies have greater power if they offer suggestions at opportune moments [3]. Consumers find it difficult to choice healthier alternatives as they often have limited understanding of the relative levels of nutrition between more products. The persuasive trolley offers suggestions for alternative products (Eat Most) within the same product group when the shopper choices an Eat Less or Eat Least product in the trolley. We consider this an opportune moment as the shopper often will find the alternatives in their present supermarket area (as illustrated in figure 4 where two alternative cereals are suggested for the cereal in figure 3).

FIELD TRIALS

We conducted field trials with the shopping trolley at the local supermarket called føtex. It was rather important to us to understand the use of the system in-situ to facilitate the whole shopping experience.

11 shoppers were recruited through public announcements and we required that they shopped for food products on a regular basis. The shoppers were between 27 and 58 years old and represented different kinds of households and worked in diverse job professions. We asked them to fill in a questionnaire on their supermarket shopping experiences prior to the trials. Some of the participants were highly concerned with nutritious food while others were less concerned. The participants were divided into two groups - one group used iCART while the other group served as a control group using a regular shopping trolley. We balanced them in the two groups based on their self-reported knowledge and attitudes towards nutritious food. Before the trials, we carried out a pilot test to verify and adjust the process and our instructions. Participants were not informed about the purpose of the study in order to minimize study impact and iCART participants were told about the system but not its focus on healthy food products.

The trials consisted of a three parts namely an introduction, the actual shopping, and a debriefing. We instructed the participants to shop items from a pre-generated shopping list using their own normal criteria for food selection. Thus, they should try to shop as they normally would. The shopping list contained 12 items, e.g. milk, cheese, pate. The list included only general product groups (except for one item) leaving the participants to choose within the group, e.g. cheese where they could choose more 20 different cheese products. They were free to choose in which order they would collect the items.

303 food items were entered into a SQL database representing all items in the store within the groups from the shopping list. Data collection was done through 1) a trolley-mounted video camera that captured verbal comments and shopping behaviour and 2) the system logged and time stamped all user interactions enabling to reproduce action sequences afterwards. The sessions were done during normal trading hours and they were not required to check out the collected items.

We evaluated iCART as a Wizard of Oz experiment where one of the authors acted as wizard implementing the actions taken by the participant. When a food product was put into the trolley, the wizard would update this information in the system. Another person observed the participant while shopping in order to facilitate the following interview. The same procedure was used for the control group, but without the trolley-mounted display. The total time spent ranged from 12:08 to 40:28 minutes. Finally, a debriefing session including questionnaires and semi-structured interview was conducted immediately afterwards, e.g. they were asked to assess their own session and the collected items.

OBSERVATIONS AND DISCUSSION

The five participants using iCART expressed that they liked the system and they would possibly use it if available in supermarkets. While food products in supermarkets already have different labels for determining the health or nutritious level, iCART became a personal technology that guided the shopper while shopping. This also had the advantage that shoppers always knew where to look for the nutritious information for all products. Today, this information is located on the packaging of the product and thereby distributed in the store.

The reduction element of iCART was quite successful. Out of the 60 food products selected by the participants using the system, 30 were classified as Eat Less or Eat Least. Thus, half of the selected products were less healthy. In several cases, the participants were surprised to realize that a certain product was less healthy. For example, one of the participants chose a bag of carrot buns and got surprised to see that these buns were Eat Least: "*I thought they were healthy as they contain carrots*".

On the other hand, several shoppers chose less healthy food products and were aware of it – even without the help from iCART. But the classification made them reflect upon their choices and several of them started talking about nutrition and healthy food. One participant said: "*But the Eat-Least classification makes you think and questions whether you have made the right choice*". From our analysis, it seemed that they acted out of routine behaviour and that they partially knew the consequences of these choices. This confirms the findings by Park et al. [8] on changing shopping routine behaviour. In summary, the reduction element of iCART was quite successful as it raised the awareness of the shoppers on the nutritious level of the chosen products.

The suggestion component of iCART was less successful compared to the reduction. The participants changed their choices 3 times out of 30 (10%). This low number was somewhat surprising, but shoppers gave several reasons for this. Some would not change their choice, as they would rather buy an unhealthy food product that was biodynamic than buy a healthy product that was not. So the shoppers would implement their own classification schemes based on other aspects than nutrition. Also, some shoppers stated that they never bought any light or zero products, which often were the products suggested by our system. They said that they would rather eat less of the unhealthy products than buy a light product.

During the field trials, 18 times did the shoppers take a look at the suggestions made by iCART, but in most situations (14 times) they chose not to follow the suggestion. This indicates that the shoppers are interested in receiving suggestions but the actual suggestions made by the system in the situation were not good enough. As illustrated above, they had different objectives when shopping and perhaps suggestion functionality should be carefully organized.

We identified an interesting observation concerning trust to the system. Some users expressed scepticism towards the suggestion part of the system while none of them really questioned the reduction part. Most of them stated that nutrition labelling whether on the actual product or implemented in an interactive system on the trolley should be controlled and accredited by public authorities. They

were more critical when it concerned suggestions than reductions. The problem with suggestion could reside in that it could feel like ads or commercials for other products. That could be a potential problem when implementing suggestion tools. However, as expressed by one of the female participants: "*It is cool to be guide. I don't mind help or receive suggestions, I'm a grown-up who can make my own decisions*". This could imply that to change behaviour designers should focus on providing reduction in complexity of assessing the food product, but they should perhaps not suggest or give recommendations to the user.

Shopping in supermarkets is noisy and complex and it can be stressing due to several multimodal inputs. We noticed how several participants missed reductions or suggestions on the screen while acting in the environment. Thus, they would actually not receive the information proposed by the system. Also, one participant stated that shopping is private even though it takes place in a public environment.

The participants who shopped without the persuasive guidance appeared to have fewer reflections on nutrition and health. In fact, the iCART participants eventually bought 25 food items classified as Eat Least whereas the other participants bought 34 Eat Least products. The difference cannot only be explained in terms of the suggestion tool implemented in iCART, but the interaction made them reflect.

CONCLUSION

We presented the persuasive shopping trolley iCART that guides supermarket shoppers in choosing more healthy food products by classifying all products in three groups namely Eat More, Eat Less, and Eat Least. Field trials with 11 shoppers showed that iCART proved to provide good input on reduction, e.g. reducing the complex task of assessing whether a product is healthy or less healthy. Our participants noticed when the system classified a product as Eat Least and usually they would start reflecting upon this. Only a few times did this result in change of behaviour where the user changed the original choice. But mostly the suggestion part of the system was less successful. This was mainly due to the fact that several participants had rather specific requirements to their products, e.g. they should be biodynamic or they never bought light-products.

Based on our findings, we see a number of future research avenues. First, rather than optimizing the algorithms behind suggestion tools, we propose that we should design systems that enables shoppers to make their own decisions in-situ. This could require a different approach to reduction. Also, we need to understand the long-term effects of such systems and we plan to conduct more longitudinal studies.

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