

# Managing Multiple Influences: Self-monitoring and Social Comparison at the Same Time and Context

Pedro Rosas, Steve Howard, and Martin Gibbs

Department of Computing & Information Systems  
The University of Melbourne  
Victoria, Australia

{pedro.rosas, showard, martin.gibbs}@unimelb.edu.au

**Abstract.** Persuasive systems that combine numerous behavior change techniques such as self-monitoring and social comparison, expose users to multiple influences. These influences can in turn generate motivation and/or stress. In a previous study with users of three commercial applications from the area of sports, we found that users generated a series of strategies to manage these multiple influences in order to control their negative effects. Moreover, the management took place in different times and contexts, as the techniques were designed to be used separately: self-monitoring during exercising, and social comparison before or after the activity. This paper presents a study in progress where we explore how the management of multiple influences takes place under a new condition: when users are exposed at the same time and context to the multiple influences from self-monitoring and social comparison. We will design a prototype that delivers the influences from these two techniques under a single platform and evaluate it in a laboratory test.

**Keywords:** Persuasive technology, Multiple Persuasive Techniques, Self-monitoring, Social Comparison, Social Influence, Sports technology.

## 1 Introduction

Combining multiple behavior change techniques in persuasive systems has become a regular practice in research prototypes [1] and in commercial applications [2,3]. Behavior change techniques are adoptions of techniques, theories, and/or frameworks from fields such as psychology, which are adapted into computing systems in order to influence people through technology [4,9]. Such is the case of self-monitoring and social comparison, techniques from social psychology [6] that have been notably used in persuasive systems. For instance, in the area of physical activity, systems have been designed to support athletes to maintain the motivation during training [7], and to motivate sedentary people to exercise more [8]. A concrete example is *Houston* [9], a system that motivates people to be physically active through the use of a pedometer (self-monitoring), and a mobile social application where the users share, compare and contrast their performances (social comparison).

Combining various behavior change techniques has been shown as a way to increase the influence over the user, and consequently enhance the possibilities of behavior change [4,2]. However, combining multiple behavior change techniques also exposes the users to multiple influences. A self-monitoring system can be designed to deliver three different influences [4,9]. In the same way social comparison can deliver an additional three influences through social applications [7,10]. Therefore, combining these two techniques could expose the user to two to six different influences.

The problem of exposing users to multiple influences is related to the generation of motivation and/or stress, whereby stress could affect people's performance [11,12]. Literature from social psychology demonstrates that people generate personal strategies to manage multiple influences in order to control the effects that they generate over their behaviors and thoughts [13,14]. Moreover, some strategies catalyze the negative effects of pressure in to motivators [12].

Persuasive technologies are systems explicitly designed to motivate people to achieve specific behavior changes [4]. Currently, there is a lack of understanding of the way people manage multiple influences, and the way the users deal with the stress or pressure generated by these influences. Therefore, the present research is interested in understanding the use of personal strategies to manage the multiple influences generated by persuasive technologies.

## **2 Background**

In the study one of the present research, we explored the ways in which 16 users managed the multiple influences generated by three commercial applications from the context of sports, which combined self-monitoring and social comparison. Two immediate factors emerged from the data analysis. First, the strategies to manage the influences were arranged in two major groups: for self-monitoring and for social comparison. Second, these strategies were used in different times and contexts. A possible explanation for these conditions is the design of the applications. Even self-monitoring and social comparison formed part of one unique overall persuasive system; each technique was supported by independent systems, delivering their influences in separate moments, generating a management of multiple influences in different times and contexts.

## **3 Problem**

The management of multiple influences in persuasive systems is a new and unexplored topic that provides opportunities and challenges for the design of persuasive systems. Presently, we have a basic understanding of the management of multiple influences through our previous study. However, it remains unknown as to how the management of multiple influences could take place, when a single platform and interface delivers the multiple influences of both techniques (self-monitoring and social comparison) at the same time and context.

## 4 Research Design

Currently, there is no technology available to understand the management of multiple influences simultaneously. Therefore, we will design a prototype that will work as a research tool within the context of exercise.

### *Design of the prototype.*

The design of the prototype has two main stages: the generation of the prototype and an evaluation of its persuasive design. To generate the prototype two design workshops will be conducted based on a collaborative design process between Human-computer interaction experts and regular performers of physical activity. We expect that this pairing will enrich the design of the prototype [15]. The product will be paper prototypes that will depict the shapes and contents in which self-monitoring and social comparison should deliver their influences to the user during exercising.

The activities in the workshop are: presentation of current systems that combine these two behavior change techniques. Secondly, a scenario will be explained to explain the conditions of use of the prototype. Thirdly, a brainstorming session will start to trigger design ideas. Finally, the design of paper prototypes will take place, concluding with their presentation to the group.

To enrich the persuasive design of the prototypes, the digital versions will be presented to an expert panel formed by two personal trainers and two psychologists specialized in behavior change in the area of sports and weight management. Discussion about the prototype will be encouraged in order to get feedback regarding the pros and cons of the persuasive system. The seminars and panel will be recorded allowing the researchers to observe the process and find potential elements that sketches could not depict. Based on the findings, low fidelity prototypes will be generated.

### *Evaluation of the prototype.*

The low fidelity prototype product will be evaluated with 10 participants that exercise frequently, who have to be over 18 years old. The laboratory evaluation will take place at Interaction Design Usability Lab (IDL) of The University of Melbourne, where the participants will be sitting on a chair at a table. A scenario of use will be given to the participant, who will be invited to describe the employment of the prototype. During and after the use of the prototype, participants will be asked about their feelings and thoughts related to the exposure to multiple influences. The evaluation will be recorded and notes will be taken by the researcher. The data collected will be transcribed and coded using a 3 step coding process [16].

## 5 Outcomes

We are interested to find out if the strategies from study number one are similar or different to the strategies from study number two. Possible differences or similarities will help us to increase our current understanding of the management of multiple influences from persuasive technologies. Moreover, it is expected that the present

research could give insights to Human-computer interaction designers and researchers about the implications of combining various behavior change techniques in persuasive systems. In particular when this leads to exposing the user to multiple influences, which in turn could generate not just motivation but also stress.

## References

1. Torning, K. and H. Oinas-Kukkonen (2009b). Persuasive system design: state of the art and future directions. Proceedings of the 4th International Conference on Persuasive Technology. Claremont, California, ACM: 1-8.
2. Harjuma, M., K. Segerst, et al. (2009). Understanding persuasive software functionality in practice: a field trial of polar FT60. Proceedings of the 4th International Conference on Persuasive Technology. Claremont, California, ACM: 1-9.
3. Lehto, T. and H. Oinas-Kukkonen (2010d). Persuasive Features in Six Weight Loss Websites: A Qualitative Evaluation. Persuasive Technology. T. Ploug, P. Hasle and H. Oinas-Kukkonen, Springer Berlin / Heidelberg. 6137: 162-173
4. Fogg, B. J. (2003). Persuasive technology: using computers to change what we think and do, Morgan Kaufmann Publishers.
5. Fogg, B. (1998). Persuasive computers: perspectives and research directions. Proceedings of the SIGCHI conference on Human factors in computing systems. Los Angeles, California, United States, ACM Press/Addison-Wesley Publishing
6. Bandura, A. (1991). "Social cognitive theory of self-regulation." Organizational behavior and human decision processes 50(2): 248
7. Oliveira, R. d. and N. Oliver (2008). TripleBeat: enhancing exercise performance with persuasion. Proceedings of the 10th international conference on Human computer interaction with mobile devices and services. Amsterdam, The Netherlands, ACM: 255-264.
8. Lin, J., L. Mamykina, et al. (2006). "Fish'n'Steps: Encouraging Physical Activity with an Interactive Computer Game." UbiComp 2006: Ubiquitous Computing 4206: 261-278.
9. Consolvo, S., K. Everitt, et al. (2006). Design requirements for technologies that encourage physical activity. Proceedings of the SIGCHI conference on Human Factors in computing systems. Montreal, Quebec, Canada, ACM: 457-466.
10. Petkov, P., F. Köbler, et al. (2011). Motivating domestic energy conservation through comparative, community-based feedback in mobile and social media. Proceedings of the 5th International Conference on Communities and Technologies, ACM
11. Feltz, Deborah, Sandra Short, and Philip Sullivan. "Self efficacy in sport: Research and strategies for working with athletes, teams and coaches." International Journal of Sports Science and Coaching 3.2 (2008): 293-295.
12. Auerbach, Stephen M., and Sandra E. Gramling. Stress management: Psychological foundations. Upper Saddle River,, NJ: Prentice Hall, 1998.
13. Richard S. Lazarus, P. D. and P. D. Susan Folkman (1984). Stress, Appraisal, and Coping, Springer Publishing Company.
14. Hedstrom, R. and D. Gould (2004). "Research in youth sports: Critical issues status." White Paper Summaries of Existing Literature
15. Muller, Michael J. "Participatory design: the third space in HCI." Human-computer interaction: Development process (2003): 1051-1068.
16. Strauss, A. L. and J. M. Corbin (1998). Basics of qualitative research: techniques and procedures for developing grounded theory, Sage Publications