

Sustained Use and Lasting Effects of Behavior Change Support Systems

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1 Introduction

Behavior Change Support Systems (BCSS), comprise a collection of systems constructs that are specifically designed to help and support behavior change in individuals or groups. The highly multi-disciplinary nature of designing and implementing behavior change strategies and systems for the strategies has been in the forefront of advancing persuasive technology from early on [1, 2, 3, 4]. The persuasive technology field is becoming a linking pin connecting natural and social sciences, requiring a holistic view on persuasive technologies, as well as multi-disciplinary approach for design, implementation, and evaluation. So far, the capacities of technologies to change behaviors and to continuously monitor the progress and effects of interventions are not being used to its full potential.

The use of technologies as persuaders may shed a new light on the interaction process of persuasion, influencing attitudes and behaviors. Yet, although human-computer interaction is social in nature and people often do see computers as social actors, it is still unknown how these interactions re-shape attitude, beliefs, and emotions, or how they change behavior, and what the drawbacks are for persuasion via technologies. Humans re-shape technology, changing their goals during usage. This means that persuasion is not a static ad-hoc event but an ongoing process.

Technology has the capacity to create smart (virtual) persuasive environments that provide simultaneously multimodal cues and psycho-physiological feedback for personal change by strengthening emotional, social, and physical presence. An array of persuasive applications has been developed over the past decade with an aim to induce desirable behavior change. Persuasive applications have shown promising results in motivating and supporting people to change or adopt new behaviors and attitudes in various domains such as health and wellbeing, sustainable energy, education, and marketing.

The International Workshop series on Behavior Change Support Systems (BCSS) aims at connecting multidisciplinary researchers, practitioners and experts from a

variety of scientific domains, such as information sciences, human-computer interaction, industrial design, psychology and medicine. This interactive workshop acts as a forum where experts from multiple disciplines can present their work, and can discuss and debate the pillars for persuasive technology. The Seventh International Workshop series on Behavior Change Support Systems comprises new and interesting work on BCSSs in general and also a more focused theme of longevity either as regards sustained use of a system or in terms of lasting effects.

2 Longevity

Whether lifestyle-related or managing a chronic illness, behavior change requires longevity. Either through sustained use of a system, or in terms of lasting effects. Where it is necessary to observe and understand the immediate effects of BCSSs on behavior, it is also necessary to highlight the need for the broader time span view on the use and effects of these systems. For example, with chronic illnesses such as hypertension, diabetes, or depression, the diagnosis and following treatments are often merely the beginning for the patient, who then enters a life-long self-management process regarding his or her condition. Similarly, a long-time favorite of the persuasive technology field and BCSS interventions, obesity [5], is a slow process where overweight that is collected over years will also take years to take off. Other behavioral domains, from well-being to ecological behaviors, often involve a more sustained learning and rehearsal curve, and systems that remain helpful and supportive for the users beyond a few weeks or months could potentially lead to behavior change that is still effective years later.

New technologies allow us to gather larger amounts of data from multiple sources, e.g., multi-sensor data and self-tracking data, that can be used for customization and personalization purposes. Where the focus was on small, exact datasets and causal connections in the past (i.e. knowing “why”); advances in big data cause a paradigm shift towards the gathering or linkage of large amounts of (noisy) data to demonstrate the presence of (unexpected) correlational connections (i.e. knowing “what”) [6]. Though this opens new exciting frontiers of research, important concerns have been raised as well concerning issues like safety, profiling, purpose limitation, liability, data ownership, and (above all) privacy [5, 6, 7, 8]. Such issues should be dealt with appropriately, to enhance the public’s trust in technological advancements.

The persuasive technology field is becoming a linking pin connecting natural and social sciences, requiring a holistic view on persuasive technologies, as well as multi-disciplinary approach for design, implementation, and evaluation. So far, the capacities of technologies to change behaviors and to continuously monitor the progress and effects of interventions are not being used to its full potential. Specific aspects of the intervention (its content or the system) contributing to the results and user adherence often remain unknown, known as the ‘black box’ phenomenon [9].

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Validated and suitable evaluation methods are needed, as well as mixed-methods approaches to measure engagement, emotions, and social influence of persuasive technologies in smart environments. BCSSs pose a number of specific challenges, such as personal goal-setting, personalized feedback, support for computer-mediated communication, 24/7 availability, feasible business models, as well as suitable methods and processes to develop scalable software platforms and architectures for these systems.

3 The Seventh International Workshop on BCSS

This year's implementation of the workshop was organized in conjunction with the 14th International Conference on Persuasive Technology 2019, in Limassol, Cyprus, by Prof. Sriram Iyengar (Texas A&M, USA) as Programme chair, and Dr Piiastina Tikka (University of Oulu, Finland) as Organising chair. The founders and general co-chairs of the workshop series are Harri Oinas-Kukkonen (University of Oulu, Finland) and Lisette van Gemert-Pijnen (University of Twente, The Netherlands).

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- Dr Laurance Alpay, Inholland University, The Netherlands
- Dr Grace Dal Sasso, Federal University of Santa Catarina, Brasil
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- Dr Scott Sittig, University of South Alabama, USA
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4 Presented work

In this seventh occurrence of the BCSS workshop, we have nine papers presented by a global network of researchers.

In the area of assistive and rehabilitation research Peres et al. present "Augmented Crutches", a persuasive system designed to assist those with impaired mobility enhance independent movement and reduce dependence on therapists [10]. Kekkonen and colleagues address usability issues in persuasive systems that incorporate social comparison [11]. Konstanti et al. present Behavior Change Design Cards, a structured and creative design methodology for developing persuasive systems [12].

De Franco et al present a case for incorporating the Transtheoretical behavior change model to design persuasive systems with sustained effectiveness [13]. Chow and colleagues discuss embedded persuasive technologies that take advantage of smart

and connected sensors [14]. Almutairi et al. present a case for nudging in systems for asthma management [15].

Kashimoto and colleagues describe a persuasive system for encouraging use of electronic coupons received on smartphones [16]. Kegel et al. explore the potential of using computer literacy in software design as means of creating tailored of adaptive systems that would enhance the likelihood of continued system use [17]. Finally, Klaassen and colleagues describe two case studies related to persuasion by doing and performing actions [18].

Overall, the rich variety of presented work at the workshop once again illustrated the necessity of interdisciplinary approaches and the benefits of viewing BCSSs from a variety of scientific perspectives. From such a multifaceted starting point we are bound to learn both the science and the art of building and studying BCSSs that work for the intended users in the intended manner.

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