

Can Beneficial Habits Be Induced through Reflection?

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Abstract. Persuasive technology aims at changing people’s behaviour. In health, in particular, such technology tries to promote healthy habits. Systems using persuasive techniques typically provide an external motivation (e.g., a reward). They often face two challenges: what reward will make people change their behaviour, and how can people maintain a healthy habit once the reward has been removed. Both are heavily debated issues. In our work, we look at encouraging *reflection* and see if it can lead to an *intrinsic motivation*, which in turn can affect behaviour. If it is possible to induce an intrinsic motivation, the two challenges mentioned above would disappear. In this paper, we present a study we conducted in the health domain: we tried to encourage people to reflect on their lifestyle and find ways to improve it. We present some of the interesting findings regarding intrinsic motivation and behavioural change from our study.

Keywords: Intrinsic motivation, reflection, behaviour change, reward mechanism, health promotion.

1 Introduction

Systems that use persuasive technology aim at changing people’s behaviour. In health, in particular, these systems try to promote healthy habits through external motivation (e.g., a reward). This workshop focuses on user models for effective persuasion. Before we look at user models *per se*, we believe an interesting issue is that of how to motivate people to change their behaviour. There are two types of motivation: an extrinsic (or external) one, which provides people with, for example, a reward for doing the right thing; and an intrinsic (or internal) one, in which people are internally motivated to perform an action or change their behaviour.

Approaches that rely on external motivation typically face two challenges: what reward will make people change their behaviour, and how can people maintain a healthy habit once the reward has been removed (and the associated question of how long does one need to give the reward). Both are heavily debated issues. In our work, we look at encouraging reflection and see if it can lead to an intrinsic motivation, which in turn can affect behaviour. This is illustrated in Fig. 1. If it is possible to induce an intrinsic motivation, the two challenges mentioned above would disappear. We believe that an intrinsic motivation is more sustainable than an extrinsic one.

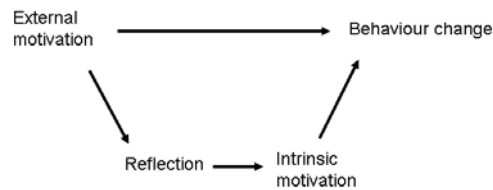


Fig. 1. Affecting behaviour: directly or indirectly through reflection

In this paper, we review the literature on motivational strategies from both a technology perspective and a psychology one. We present a study we conducted in the health domain: we tried to encourage people to reflect on their lifestyle and find ways to improve it. We present some of the interesting findings regarding reflection, intrinsic motivation and behavioural changes from our study.

2 Related Work

The possibility that incentive systems could overturn people’s behaviour and induce a targeted behaviour has led to a large body of work. In this section, we examine different models and theories on the effect of incentive systems on behaviour and look, in particular, at alternative approaches to engage people in beneficial health habits.

2.1 Motivational Strategies

Over the years, there has been a growing interest in understanding people’s behaviour, and, in particular, what motivates behaviour. That work aims to develop method and technology that can foster good habits or stop bad ones: for example, to support residential energy conservation [1], to promote and increase physical activity (e.g., [7] and [19]), to reduce water consumption in the shower [14] or more generally, to encourage environmentally responsible behaviour [21].

These approaches embed motivational strategies into everyday electronic devices to encourage and sustain long-term lifestyle changes. They are usually based on a variety of psychological models and behavioural theories [13], with the aim to provide support and encouragement that ultimately can impact people’s attitude and behaviour.

One commonly used strategy in wellness applications exploits the setting of a goal in conjunction with some feedback (e.g., [7], [15] and [17]). Although there has been to date only moderate evidence as to the effectiveness of this approach in the context of health behaviour change (for a review of literature, see [20]), persuasive technologies have been capitalising on the ability of goal setting to mobilise and direct people’s effort and on the potential for feedback to increase motivation (for a retrospective on goal setting see [16]). Indeed, feedback has often been used as a mean to provide personal awareness of one’s own behaviour, and a way to make

behavioural patterns visible and memorable [8]. Feedback has also be utilised as positive reinforcement as it is perceived as a more supportive and motivating mechanism than threats or punishments to help people engage in a healthy behaviour.

Although these applications are usually well received by users, there is still limited evidence as to their efficacy as they do not necessarily demonstrate significant long term behaviour changes.

2.2 Intrinsic vs. Extrinsic Motivation

Understanding what influences people's behaviour has been a long term focus of interest in psychology with a large number of studies examining the effect of rewards and reinforcement mechanisms (for a review, see [4]). One particular controversial discussion has been the effect of these incentive mechanisms, implemented either as monetary or points rewards, or verbal praise, on motivation and their potential to change the valence associated with particular activities.

One school of thoughts led by Deci [9] argues that rewarding people for performing a particular activity (or adopting a particular behaviour) may undermine people's natural inclination (which is also referred as *intrinsic motivation*) towards the reinforced activity or behaviour. Although external reinforcements may temporarily result in an increase in the targeted activity or behaviour, the theory predicts that the change in behaviour does not persist, and, in some cases, the behaviour may be less often performed, when the external intervention is taken away.

Gneezy and Rustichini [10] found similar results when studying the effect of small and large rewards on people's motivation. They showed that the introduction of monetary compensation did undermine performance, in particular when the reward is considered small. This suggests that introducing external reinforcements may change the way people perceive the targeted behaviour and the valence they attribute to it.

It is worth noting however, that a substantial number of studies demonstrated positive effects of incentive mechanisms [4], showing that change in behaviour can persist after reinforcement is removed. In their incentive to exercise study, Charness and Gneezy [5] argued that this positive effect may be attributed to the formation of a habit. The idea, based on a theory developed by Becker and Murphy [2], is that if people are encouraged to exhibit a particular behaviour for a sufficient period of time, as people pass a certain "threshold", it may lead them to adopt the behaviour.

Whereas there seems to be some positive effects when introducing people to develop a behaviour they do not exhibit, the effectiveness of the same methods are quite unclear for people genuinely interested or inclined towards the targeted behaviour. To date, there has not been enough evidence to clearly understand the implication of incentive systems on both motivation and sustainable long-term behaviour change.

2.3 Promoting Reflection to Develop Good Habits

In contrast to most of the research done in behavioural change technology, a number of studies have looked at emphasising reflective thinking about health. Instead of

asking directly people to change their behaviour by following a particular diet or increasing their level of physical activity, the focus has been on raising people's awareness about their health. For example, in the *EatWell* mobile application, Grimes and colleagues [11] designed a system for people to create and share nutrition-related memories. They demonstrated how the crafting of stories that were emotionally and culturally charged could motivate people to follow health ideas from others. Similarly, Brown et al. [3] showed that a photo-based food journal could be useful for supporting student's reflection and assessment of their diet and physical activity habits.

In line with this work, we are interested in the role that technology can play in helping people reflect on their own behaviour, and through this process, encourage them to make the appropriate changes. This approach differs from the methods usually employed in persuasive technology that focus on feedback and monitoring strategies. By facilitating health discussions and encouraging people to reflect on their health, we investigate to which extent this may be sufficient for them to decide to change their behaviour (i.e., to build an internal motivation).

3 Our Work

In our work, we are looking at ways to support a family to work *together* towards a shared goal—that of adopting a healthier lifestyle and potentially helping a family member lose weight. But instead of providing technology that promotes behaviour change directly, trying to motivate people through an external motivation, we want to promote reflection to lead to an intrinsic motivation, which, in turn, should result in behaviour change. We do this by providing technology that encourages reflection and promotes health discussions with the belief that this can induce behaviour change.

3.1 A Collaborative Platform for Families

We built a prototype of a collaborative platform for families to see if we could facilitate such discussions and encourage supportive behaviour within the family. The design requirements were drawn from an online survey we conducted with overweight and obese people. In this survey, we collected information about their needs and what they would find useful for them and their family [6]. The portal was designed around four sections (described clockwise with respect to Fig. 2):

- A message board, allowing family members to leave messages for each other, and providing the system with a means to send reminders and recommendations.
- A lifestyle suggestion tool, enabling family members to record their current lifestyle and think of how they could improve it.
- A health section, providing a set of resources about healthy lifestyle and wellbeing, e.g., links to external health websites, quizzes and fact sheets.
- A diary tool, giving families a way to record and potentially share their thoughts and experiences about moving towards a healthier lifestyle.

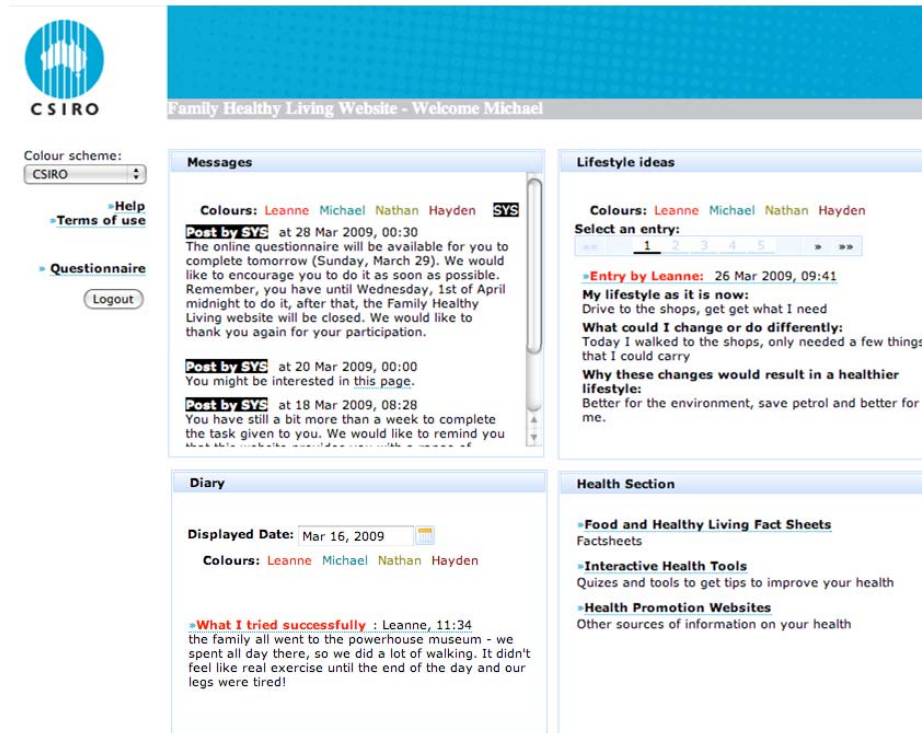


Fig. 2. The family portal. The top right hand corner shows the “Lifestyles ideas” tool which enabled participants to provide suggestions for making their lifestyle healthier.

3.2 A family study

We conducted a two-week trial with families of four (two parents and two children aged 12 to 17, living in the same household) and used the family portal as an evaluation platform. The aim of the study was twofold: 1) we wanted to understand whether technology could enable and support health reflection, in particular in the family context where most of the interactions happen offline, and 2) we wanted to explore different strategies to engage families towards a healthy lifestyle.

We chose families of 4 individuals for two reasons: (1) it is the average family size today in Australia, and (2) it ensured we could compare the different behaviours. As for the age of the children, we wanted children mature enough to (a) decide for themselves whether they wanted to participate in the study and (b) interact with the portal independently (i.e., without too much help from their parents). Families were recruited through a research marketing company: 86 families visited the portal at least once but only 44 families (i.e., 156 individuals) participated to the study until the end.

At the beginning of the study, each family member was assigned a personal login and password. This allowed us to record the families’ interactions with the portal,

including the data submitted on the portal (e.g., lifestyle change suggestions, diary entries), and the time spent on the portal (e.g., number of visits and their duration). At the end family members were asked to fill in a post-task questionnaire. It aimed at gathering information about the participants' experience and helped us understand how family members worked together.

We are not reporting here all the results of the study. The paper focuses instead on the participants' health reflection and how it has impacted their behaviour.

3.3 The Task given to Participants

Participating families were asked to look at their current lifestyle and to provide suggestions on how to change it, using the lifestyle ideas tool shown in the top right hand corner of Fig. 2. They had to come up with ideas on what could be changed. They were not asked to implement these changes nor to change their behaviour (e.g., follow a diet or increase their amount of exercise). We phrased the instructions so that the lifestyle entries reflected a judgment of capability (can – *Things I could do*) rather than a statement of intention (will – *Things I will do*). The task aimed to *promote reflection* about healthy living and *encourage* families to initiate health discussions, as in ([3], [11], [18] and [12]).

For each lifestyle suggestion, participants had to specify what they currently do, what they could change, and why these changes would result in a healthier lifestyle. Suggestions were not restricted to diet. They could include suggestions to reduce alcohol intake or cigarette consumption, become more active, or even perform regular health checks. We encouraged people to look at various aspects of their life. The aim was to make people think about their behaviour and what *healthy* meant *for them*, and what changes (no matter how small they seemed) they could make. At the end of the study, we annotated all the submitted suggestions and assigned them to one or several of the following categories:

1. Physical activity (PA): e.g., *“Drive to work every day. There is no public transport available – Ride the bike at least 1 once per week.”*¹ (a 49 year old father);
2. Diet: this included any suggestions in the type or the amount of food consumed – e.g., *“last night's dinner was: meat lasagna with cheese topping, garlic bread (kids love it) and fresh salad (at least I done something right) – I could have cooked spinach and mushroom lasagna with cottage cheese. wholemeal bread toasted with little margarine”* (a 53 year old mother);
3. Sleep: e.g., *“last night I was talking with my friends on FaceBook till very late (11.30 pm). – I could tell my friends it's late and I have to go to bed so I can have enough sleep”* (a 15 year old girl);
4. Stress: e.g., *“it is sunday afternoon and I'm still in my study doing paperwork for tomorrow's meeting in the office. – beating the stress in my life [...] simply learning to recognize stress and practicing deep breathing could lower high blood pressure”* (a 54 year old father);

¹ All italicised quotes are taken verbatim from our data – Any errors (e.g., capitalisation, spelling or syntactic) have been kept.

5. Smoking (Sm): e.g., “*I smoke too much. I smoke the most in front of the computer. – Don’t smoke inside. Then every time I want a smoke I would have to get up and go outside for a smoke.*” (a 40 year old mother);
6. Alcohol consumption (AC): e.g., “*During the week sometimes I have a drink but I go overboard and get drunk and still have to get up for work in the morning and I feel hungover and drained. – make it a point not to drink during the week [...] and leave that for the occasional weekend.*” (a 43 year old father);
7. Health and Well Being (H&WB): this included general health considerations such as the regularity of meal, the compliance to medication, etc. – e.g., “*Do not visit the doctor often enough. – Make effort to visit the doctor for biennial checkups.*” (a 49 year old father); and
8. Body Image (BI): e.g., “*I have terrible dermatitis and it takes away my self esteem. – I could go to the doctor and get some cream to help with the dermatitis.*” (a 42 year old father).

We asked some families to come up with a *specific* number of suggestions. Some were just asked to do their best. The number of suggestions to provide was somewhat high (60 per family or 15 per individual), to ensure the task was challenging (but not too difficult). The repetitive aspect of the task (having to provide a certain number of suggestions) was a mechanism to facilitate/initiate health discussion within the family and trigger personal health reflection. We did not want people to focus on the quality of their suggestions at this stage, as sometimes it can be difficult, potentially paralysing, to come up with *good suggestions*, or suggestions that one feels confident to follow through.

3.4 Discussion: Reflection and Behaviour Change

The lifestyle ideas tool was designed as a means to increase people’s awareness of what they currently do, and thus, could do differently, without necessarily telling them what to do. We were hoping that families would generally get a positive experience out of the study. Overall, they did, and we received positive feedback². Interestingly for us, we received numerous comments such as the following:

“I enjoyed taking part in this survey as it opened my eyes to just how much difference i can make to the healthy lifestyle of myself and my family by just making a few small choices” (a 40 year old mother).

Given our aim of promoting reflection, this was very encouraging. It also suggests that encouraging reflection can be a means to promote behaviour change, albeit indirectly.

Equally or even more interesting, we found that, overall, 77% of our participants (representing 111 users out of the 144 who responded to the post-study questionnaire) reported having tried a few (sometimes many) of their lifestyle change ideas. While a majority of entries were only statements of intention such as: “*I spent all day inside*

² We collected feedback at the end of the study through a questionnaire.

on the weekend. **I should have gone outside in the sun for a while.**³ (a 16 year old boy) or “I buy my lunch at work. **I could buy salad sandwiches more often.**” (a 51 year old father), some lifestyle entries suggested more than just intentions, indicating that decisions had been made and actions implemented. Consider, for example: “I have a bike gathering dust in the garage for the last year. **I have decided to take weekly rides with my daughter on her bike.**” (a 42 year old father); “I do very little exercise on school days and avoid PE at school. **My friends and i have decided not to catch the bus home and we are going to walk on fine days, we also made a pact to all do PE together at school and encourage each other.**” (a 14 year old girl); “Met friends for coffee and cake. **We all went for a walk instead - took us over an hour. We are going to do this every week now.**” (a 43 year old mother).

When analysing the lifestyle entries and looking at the way participants were phrasing their suggestions, we realised that participants’ attitude changed over time, and that some proposed changes were more serious. This suggests that for some participants the process of reflecting on their own behaviour and thinking of what healthy meant for them was enough to trigger them to act on it. Working together as a family towards a healthier lifestyle may also have played a role in that change.

It is worth mentioning that when we report about change in attitude or behaviour, it is based on the analysis of the participants’ entries (that were recorded during the study) and also based on the participants’ self-assessment collected in the post-task questionnaire. We did not measure the actual behaviour change in any objective way mainly because it was not the purpose of the study and also because we were not expecting people to actually change their behaviour.

Although a period of two weeks is too short to draw any conclusions as to whether these changes are going to last or whether this is a sustainable approach, it is encouraging to see that creating a supportive environment can lead to some positive changes.

4 Conclusion

The comments we received in our study highlight the potential benefits of designing tools that foster reflection and encourage discussions. They also suggest that it is possible to induce an intrinsic motivation to change one’s behaviour simply by encouraging reflection. We believe that the repetitive nature of our tasks (provide many suggestions) helped in that process. Our study was only for a two-week period, and it would be hard, of course, to draw general conclusions. Yet we believe that promoting reflection to induce an intrinsic motivation is worth pursuing further, as it might alleviate some of the issues associated with providing an extrinsic motivation (e.g., sustainability).

Therefore we argue that, to motivate people, adaptive and personalised systems do not necessarily need to rely on incentive mechanisms. Persuasion and argumentation techniques could be directed not only towards the targeted behaviour but also used to promote reflection and discussion about people’s behaviour.

³ We added the bold face to highlight a specific expression.

We realise that this type of techniques might not be appropriate for everyone. For example, it is possible that only the people who are already contemplating a change or are ready to do it would respond well. Yet, it might still be useful and certainly worth investigating.

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