
Understanding Autonomy, Animism and Presence as a Design Strategy for Behavior Change

Xueliang (Sean) Li

Faculty of Industrial Design
Engineering
Delft University of Technology
Landbergstraat 15,
2628 CE Delft, Netherlands
X.Li-8@tudelft.nl

Marco C. Rozendaal

Faculty of Industrial Design
Engineering
Delft University of Technology
Landbergstraat 15,
2628 CE Delft, Netherlands
M.C.Rozendaal@tudelft.nl

Kaspar Jansen

Faculty of Industrial Design
Engineering
Delft University of Technology
Landbergstraat 15,
2628 CE Delft, Netherlands
K.M.B.Jansen@tudelft.nl

Catholijn Jonker

Faculty of Electrical Engineering,
Mathematics and Computer
Science
Delft University of Technology
Mekelweg 4,
2628 CD Delft, Netherlands
C.M.Jonker@tudelft.nl

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DIS'17 Companion, June 10-14, 2017, Edinburgh, United Kingdom

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ACM ISBN 978-1-4503-4991-8/17/06.

<http://dx.doi.org/10.1145/3064857.3079108>

Abstract

In this paper we investigate how autonomy, animism and presence of interactive products in daily life can positively influence people to change their behavior. Three interactive products were reviewed and compared on each of these three concepts. Based on this comparison we propose that a product's autonomy is a prerequisite to initiate behavior change when people are unwilling or unable to act, or are unaware that action is possible, while animism creates a sense of social engagement between user and product. Presence refers to the availability and readiness of a product to engage people on a daily basis. We conclude with discussing the potentiality of these concepts in developing an integrated design strategy for behavior change.

Author Keywords

Interaction Design; Affective Computing; Behavior Change; Stress Management.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.



Figure 1: Little Devil [25] acts as an excuse for people to take a break during working hours. Little Devil slowly moves from its relaxed state, to its uptight state over a period of 1.5 hours. Upon reaching its maximum of expansion, the box starts “breathing” quickly (hyperventilating) to demonstrate that the object has become ‘stressed’ because of your behavior. By taking a 10-minute break you ‘relax’ the object, and in turn get a healthy break. This design is especially intended for the non-smokers who required an excuse to take a break as they were scared of being told by their (smoking) colleagues and bosses that they should be working. Image courtesy of Rhys Duindam.

Introduction

Stress is widely recognized as a threat to a large proportion of people in society, which can lead to a decreased quality of life and lack of productivity [1,2] and can even cause chronic diseases [18]. In some cases, people may not even realize their stress before it is too late, and medical interventions are required [5]. To tackle these problems preventively, a variety of interactive products have been developed that measure stress-related physiological data and feeds this back to people. However, it remains troublesome to design these applications in a meaningful way and that people can adhere to.

Since it is recognized that particular physiological signals are correlated to one’s level of stress, a large quantity of products have emerged, ranging from simple stress-detecting tools such as StressEraser [21] and Pip [22] to complex life-logging systems such as Mindfulness APP [23] and bLife [24]. However, there are two main challenges emerging in terms of these applications. Firstly, assuming emotion as simply ‘a bodily condition’ is questionable. Emotional experiences are complex as they also have psychological and social components [12]. In that sense, even though the physiological data is presented by the product, users are prompted to reason about it and to examine the underlying causes [17]. Secondly, as indicated by a range of studies on eHealth interventions [11,15,13], such products often lead to nonadherence, i.e. some people don’t adhere to these products as long as they are intended for.

With a purpose of exploring how these challenges can be tackled by intelligent technologies, we come to an *agentic design approach* to behavior change. Such an

approach is inspired by an interactional perspective in affective computing and by the developing notions of agency in HCI. Proposed by Boehner et al. [4] and further elaborated by Höök et al. [10], the view of taking emotions as constructed in interaction between people and systems is required for people to make sense of their collected affective data. In work on agency in HCI, Rozendaal [16] proposes to design intelligent products as embodied agents that can collaborate with people towards shared objectives. Cila et al. [6] show how applying the notion of agency as a generative metaphor in design can lead to meaningful and aesthetic products.

This paper serves as a first step to look into what qualities of a product should be considered when developing such an agentic design approach. We investigate how *autonomy*, *animism* and *presence* of interactive products in daily life, can positively influence people to change their behavior. Three novel interactive designs are analyzed and compared with regard to these concepts. We discuss how these concepts are manifested in products to help people to change their behavior. We conclude with how we can work towards an integrated design strategy for behavior change.

Autonomy

In artificial intelligence, autonomy is referred to as “agents [that] operate without the direct intervention of humans or others, or have some kind of control over their actions and internal state” [20]. In this paper, we take a designerly view. The autonomy here refers to the extent to which the product is perceived to act on our behalf without requiring our action or conscious attention. According to this, the range of a product’s autonomy may be perceived as acting completely by

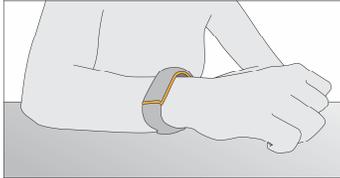


Figure 2: Olive [26], is a combination of mobile application and a wristband that measures stress-related biometrics in real time to manage stress more effectively. It tracks changes in heart rate, reactions on the skin surface, skin temperature as well as analyzes habits such as sleep, physical activity, light exposure and even communicates with your smartphone to take your calendar and schedule into account. This information is carefully stitched together to paint a complete picture of the user's lifestyle to create an actionable plan to balance stress. This picture is a simplified illustration of the Olive concept.

itself, merely being responsive to our actions, or something in-between, which opens up an interesting space of shared control and collaboration [7].

We consider all three products to be autonomous to some extent. For example, Little Devil [Fig.1] proposes the user to take a break despite of the user's willingness to take one. The autonomy of Olive [Fig. 2] deals with its ability to collect data from various sources and to inform people with personalized advice that users are unable to create by themselves. In the case of the Anti-stress pen [Fig.3], its autonomy is based on its responsiveness to unintentional human movements.

As we can see from the above descriptions, users are dependent upon, can collaborate with, or are influenced to some extent by the product. Hence, autonomy differs in the way it addresses behavior change on varying levels of user involvement and thus works at a fundamental level in defining the *interdependency* between user and product.

Animism

Animism entails the attribution of a living soul or personhood to inanimate objects, plants and natural phenomena [19]. In a designerly definition, animism is perceived as the extent to which interactive products can act in intuitive and expressive ways that allows users to empathize with it as agents. Thus, interactive products without any trace of animism, tend to be perceived as cold, technical and machine-like, while those designed to be animistic, tend to be perceived as spontaneous, personal and life-like. Such a tendency is becoming a shared point of concern as computing technologies start to permeate everyday life [14, 16].

The anti-stress pen appears to be designed without animism in mind. As for Olive, the animistic impression is produced by the use of natural language in the design of the interface (e.g. using text messages as well as an artificial human voice). Animistic notions in design are well demonstrated in the design of Little Devil. The breathing movement of the object that increases with frequency over time, expresses the urgency to take a break in a life-like manner.

In these examples, we believe animism has its use in providing an additional persuasive quality. Having the idea that you are dealing with another person or entity provides a social mode of engagement that appeals to feelings of empathy and loyalty to help change your behavior. From this perspective Olive is seen as a considerate personal assistant while Little Devil acts like a wild pet that is living on your desk.

Presence

Presence is referred to by Hallnäs and Redström [8] as an existential expression of objects that relates to how we invite them into our lifeworld. In that sense, an object goes beyond direct engagement but can exist in the background of our awareness hereby integrating into the social fabric of everyday life [9]. In this paper, we propose 'presence' as the availability of an object to be perceived in daily life and to provide continuous opportunities for interaction.

The anti-stress pen is present by being designed to be comfortable to hold and easy to use, just like a normal pen. By being present on the user's desk, Little Devil serves as a caring reminder to take a break regularly. On the other hand, its presence in an office space can draw attention from colleagues when it breathes



Figure 3: The anti-stress pen [3] can detect nervous movements and determine whether the user is stressed. It also provides a counterweight to these movements using built-in electronics and electromagnets. When it detects the quicker movements associated with stress, the pen gradually becomes more difficult to move around. This encourages users to handle the pen in a more relaxed way, which in turn makes the pen yield more easily again. In his design concept, this process largely occurs unconsciously. Image courtesy of Miguel Bruns Alonso.

heavily and hereby trigger social interactions. Olive's presence is slightly more complex as it consists of two parts; the wristband holds an unobtrusive presence as it is continuously worn on the body and the app requires conscious attention to be present as an information resource.

Presence of a product refers to understanding how it can embed in one's daily life. As can be seen from the descriptions, to be present means that the product can be easily used, fit into a specific context, can be worn unobtrusively or can respond to demands. It shows the potential of products to obtain a sustained empowering quality rather than an immediate persuasive effect.

Discussion

What lessons can be learned about how autonomy, animism and presence contribute to meaningfulness and adherence in stress applications. The autonomy of a product is a prerequisite to initiate behavior change when people are unwilling or unable to act, or are unaware that action is possible. Thus, autonomy is fundamental in stress applications. For example, Olive has a high level of autonomy in aggregating large amounts of personal information, something that is difficult for people to achieve by themselves. Specifically for meaningfulness, the animistic character of products provides a form of social engagement that people intuitively relate to. Little Devil, for example helps persuade users by means of projecting emotional experiences onto an inanimate object. Presence, however, deals with the potential of a product to be adhered to in the long term. Taking the anti-stress pen as an example, its presence is determined by its readiness to offer help when needed while being used. We should note that these design cases illustrate the

potential of agency-related qualities to contribute to meaningfulness and adherence in stress applications. Further studies are needed to assure how and to what extent products designed with these qualities in mind can have an actual impact.

Conclusion

Stress management has received much attention by the interaction design community and it is found to be a challenge to achieve meaningful and sustained behavior change. In this paper we have investigated autonomy, animism and presence as key concepts that can positively influence behavior change. An initial understanding of these concepts has been established by having compared three interactive products. Based on the insights gained, we aim to further develop an agentic strategy to behavior change.

Acknowledgements

This work was carried out in the Connected Everyday Lab at the Faculty of Industrial Design Engineering at Delft University of Technology. The authors would like to thank Boudewijn Boon, Patrizia D'Olivo, and others at the ID-Studiolab for their valuable input. This research is funded by the China Scholarship Council (CSC).

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