

Captology and Technology Appropriation: Unintended Use as a Source for Designing Persuasive Technologies

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Abstract. In this paper we theoretically reflect upon persuasive technology usage under the light of technology appropriation. The intended usage of technology often fails, meaning that the designers' intended use is not always translated into user behavior. This is also true for persuasive technology, since technology will always be used within a context involving users' own intentions that may not always be anticipated by designers. This clashes with Fogg's framing of captology, which explicitly focuses on endogenous intent, i.e., a persuasive intent that is designed into a technology. With this paper we open up an initial theoretical discourse around these two concepts, highlighting how the design of persuasive technologies can be informed by existing knowledge around technology appropriation. This is done by reflecting upon three identified 'action points': (1) learning from appropriation, (2) designing for appropriation, and (3) designing for personal differences and ambiguity of interaction.

Keywords: Technology appropriation · Captology · Intentionality · Unintended use

1 Introduction

In this paper we open up a discourse around the design and use of interactive persuasive technology (PT) by reflecting upon conceptualizations around technology appropriation and unintended use. Since *persuasion requires intentionality* (e.g., [1, 2]), we argue that these technological 'built-in' intentions will always be used within a context involving users' own intentions that may not always be accordingly anticipated by designers. Therefore, we discuss in how far *designing for the unexpected* [8], in terms of unintended use, can be a valuable source for designing PTs. In particular we will reflect upon Fogg's captological design [2] and on technology appropriation in terms of related design perspectives and principles. In doing this theoretical reflection, we highlight that also unintended use of PT does not necessarily have to be a sign of 'failure' but rather a sign that the technology has become "the user's own" (e.g., [8, 17]). Such phenomena need to be named and taken seriously and not neglected by considering them 'side effects' [2]. Especially, for the design of PTs the study of unintended use is critical to understand the manifold ways of how technology can be appropriated, to also counteract more systematically undesired negative consequences.

2 Intended and Unintended Use

The following section details related work on PT and intentionality complemented with remarks on technology appropriation and unintended use to outline the very characteristic foundations of these two concepts.

2.1 Intended Use and Persuasive Technology

As already defined in Fogg's early work [1], PT is an "interactive technology that changes a person's attitudes or behaviors" (p. 225). A central aspect of this definition is that persuasion always *implies an intent* to change attitudes and/or behaviors. So to say, persuasion requires intentionality (e.g., [1, 2]). The concept of *captology* (i.e., the study of computers as PT [2]) specifically focuses on planned persuasive effects of technology and not on potential side effects, i.e., that persuasive *intent is designed into a computing product*, also referred to as— "built-in"— persuasive intent [2].

However, Fogg's work has also been criticized (e.g., [3, 4]). For example, Johnson [4] emphasizes that captological design neglects user-centered design philosophies, since it excludes *unintended consequences* and instead focuses on attitude and behavior changes that are intended by the designer. Here, Atkinson argues that an "ethical design impasse is created" ([3], p. 171), since responsible user-centered design necessities and a sound examination of intended *and* unintended consequences of technology usage are missing. Verbeek [6] agrees with that and highlights that unintended consequences need to be fundamentally incorporated into design decisionmaking processes by better understanding and predicting them. These complementary viewpoints illustrate to explicitly include unintended use of PTs in research, design and theoretical reflections thereof to emphasize their innovation potential, but also systematically counteract undesired negative consequences.

2.2 Unintended Use and Technology Appropriation

Verbeek talks about the *uncertainty* that surrounds eventual effects of PT, as persuasion cannot be seen as an intrinsic property of technologies [6]. Therefore, technologies may be approached as entities that have no fixed identities, rather embody *interpretative flexibility* [16] and/or *multistability* [7]. These approaches towards understanding technologies in their actual contexts of usage, derive from various research disciplines and theorists, such as e.g., phenomenology [7], or mediation theory [6]. The theoretical core idea is that technologies need to be *interpreted* and *appropriated* by the user in order to be used [6]. There exist many examples of unintended use, coming from people's everyday life experiences and practices, but also from observations in various research disciplines, such as HCI (e.g., [17]). Technology that is used differently than initially intended by the designers and not simply what they gave to them [9], may not be a sign of 'failure' rather than a sign that the technology has become "the user's own" (e.g., [8, 17]). In regard to 'failing' technologies, Dix [8] and Carroll [9] counter that "design can never be complete" as it is impossible to design for the unexpected, but that "you can design to allow the unexpected". Thus, users complete the design as they adapt and appropriate it [9], fitting them into their working practices [10].

3 Deriving an Informed Basis: Appropriation and Persuasion

An important question deriving from this discourse around persuasion and appropriation is, in how far these concepts clash or complement with each other? In this section, we discuss this question on basis of their theoretical *foundations*.

Captological design focuses on planned persuasive effects and not on potential side effects [2]. Simply said, if a technological artifact is designed with an intent in mind to change a specific attitude or behavior (e.g., persuade drivers to change their driving style towards a more economic one), and you observe in your studies that your intended attitude and behavior change is met (e.g., people adopted your designed fuel-saving technology to drive more economical), your design has worked out. But what happens if the planned outcome is different than intended (e.g., no or different attitude/behavior change adopted)? We agree that unintended consequences categorically do not belong with having been persuaded [3]. However, is it also a sign of failure from a design perspective? In many disciplines, appropriation is considered as a positive phenomenon in system design and a source for technological innovations [8, 9]. Atkinson [3] and Berdichewsky et al. [5] state that it is central for the persuasive discipline itself to show (moral) responsibility and name such phenomena, i.e., side effects that are neglected in captological design.

Thereby, appropriation holds several advantages, such as, situatedness, dynamics and ownership [8]. *Situatedness* means that the end point of design is the *intervention* [11], and not just an artefact or an artefact and its immediate ways of interacting with it. It is rather the way it changes the environment in which it is set [8]. Therefore, in designing PTs, we cannot expect to understand each usage context fully and meet every possible need to change a certain behavior or attitude. It can rather be about the general changes/interventions (also unintended) a new technology brings into a given usage context that may be seen as initial leverage points to innovate and (re-)design. Concerning *dynamics*, it is critical for the design process, to envision that usage environments and needs change. Over time, the use context of technology may change (e.g., a persuasive app that was designed for individual use, is used by multiple users). The technology therefore needs to be responsive to this change (e.g., explicitly allowing for collaborative use). With appropriation a certain sense of *ownership* evolves. When designing technologies with a specific intent, people using these systems may feel a loss of control, i.e., not doing things their own way. This aspect has already been discussed in persuasive literature (e.g., [3, 5]), in terms of moral and ethic questions (e.g., human autonomy) surrounding PT design and use. In contrast, appropriation argues for ownership, to allow people to do things their own way to raise positive feelings that can be as important as the things that can be achieved with the very technology [8]. Therefore, designing *situated* and *dynamic* PTs that also allow for *ownership*, hold the potential to create technologies that persuade by being situated in peoples practices.

4 Action Points

Based on this general discussion around appropriable PTs that allow for situatedness, dynamic use and ownership, the following section details action points of how we can

leverage the users' different ways of appropriating PTs and thereby, complete the design through their actions. This is done by outlining how designers and users of PTs can learn from appropriation and unintended use practices as well as how designers can apply appropriation principles to fit the users' respective appropriation 'needs'.

Learning from Appropriation and Unintended Use. The knowledge on how a user appropriates a specific design or artifact is a valuable source for reflection for both, the user (i.e., learning from own behaviour) as well as the designer (i.e., learning based on the user's unintended use in context). By deliberately designing for open-ended use, the act of appropriation itself can become a reflective practice for the user, leading to new layers a persuasive design can address. For instance, technology can allow for confronting the user with his/her appropriations (i.e., how s/he uses the technology differently on a daily basis). This confrontation can be used by designers of PT as a way to induce behaviour change by allowing the user to reflect upon his/her own actions and usage appropriations.

We further argue for open ended persuasive designs in order to address long term persuasive goals, rather than short term. PT that is *appropriable* can potentially be more deeply rooted in a user's everyday practices. In that sense, persuasive technologies that are integrated into users' everyday routines, by the users themselves, can also become natural for the user, making such technologies inherently part of their lives to address long term persuasive goals. In that sense, technologies can become mediatory artifacts constantly adapting and communicating with the user.

Designing for Appropriation: Intended vs. Unintended Use. There exist several design approaches with a strong focus on appropriation, such as "continuous design and redesign" [14], "continuing design in use" [13], and metadesign "designing for design after design" [15]. What unites all of these approaches is that the main challenge for designers is to design *malleable technologies* that can be adapted to users' organizational, social and personal practices to harvest users' needs in order to improve its design [9]. The main question that arises is— How can we balance intentionality (for persuasion purposes) with open, flexible and dynamic design to allow for unintended use (for appropriation purposes)? We believe that designing appropriable PTs is a challenge, but the fact that design for appropriation is possible is made most clear by realizing that some sorts of design make appropriation difficult or impossible [8]. This might be true for PT as well. In the following we outline some major design principles from appropriation literature that can provide an initial step towards designing appropriable PTs.

Interpretation allowed! (e.g., [6–8, 16]) It is important that not everything in a system or product does have a fixed meaning. It is rather critical to include elements where users can add their own meanings, contextualize their own interactions, to make them adaptable to their own needs and surroundings of interaction.

Provide visibility! (e.g., [8]) It is central that the systems' functioning is clear to the users so that they can anticipate likely effects of their actions. This is how users are empowered to make the system do what they would like. This is particularly relevant for technologies when the effects of actions become visible at different time.

Reveal Intentions! (e.g., [8]) Appropriation can be used to subvert systems (i.e., deliberately using something different than intended). This is of particular relevance for persuasion, as designers may not try to prevent such subversion but aim to expose the intention behind the system. This supports users in choosing appropriations that may subvert the system rules but still preserve the intent. This means that persuasion may work in its inherent usage and not exclusively with the given functions.

Learn! (e.g., [4, 8]) A user's appropriation practices can lead to new technologies that incorporate these adaptations created by the user, supporting the development of new innovative technologies. In observing and documenting in our research the many different ways in which technology has been appropriated, technology may be re-designed or new technologies emerge to support newly discovered uses and resulting behaviors. This form of co-design, has often been criticized as being lacking in persuasive and specifically captological designs.

By considering interpretative flexibility, visibility and the exposure of intentions in the design of PTs, we argue that users may be given the opportunity to complete the design and persuasive intent with their own actions and appropriations.

Designing for Personal Differences and Ambiguity of Interaction. Besides allowing for appropriated use based on e.g., everyday practices of a user, we further argue for allowing appropriation and unintentionality on an interactional level. As physical action is an important component of human cognition and self-awareness, it is strongly related to how a human creates reason and perceives himself within the environment. This notion of *thinking through doing* [12] is for instance very prominent in body-based interactions. However, every body is different and individual movement differences are a matter of personal traits. Embracing this ambiguity of interactions can be a promising source for interaction designs of PT. If a PT allows for body-based interactions (e.g., interacting via a physical artifact), a user's personal way of doing and interacting with it can potentially foster the act of appropriation, leading to higher user engagement. Ideally, the act of using PT can then become a matter of self expression, which makes such technology much more likely to be adopted and used on a daily basis. This presents new design opportunities for PT that are deeply embedded into the user's everyday practices and routines.

5 Conclusion and Future Work

With this paper we took an initial step towards *designing for appropriable PTs*. In our discussion around persuasion and appropriation and our three derived 'action points' we have highlighted how conceptualizations around appropriation can potentially be a source for the design of PTs. Nevertheless, with this theoretical discourse new important questions emerge, such as, how to balance precise persuasive intent and open-ended design at the same time? Such questions will be part of our future work, aiming to derive concrete principles for the design of appropriable PTs on basis of empirical 'over time' research and theoretical reflections thereof.

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