

Designing to Support Autonomy and Reduce Psychological Reactance in Digital Self-Control Tools

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To help users reduce distractions, many digital self-control tools (DSCTs) use strong enforcement mechanisms (e.g., locking the user out of undesired apps during work hours). However, these tools often trigger psychological reactance: the desire to restore the restricted autonomy by circumventing or contradicting the tool. We propose ways that designers can leverage self-determination theory, an evidence-based theory of human motivation and wellbeing, to support users in internalizing the motivation behind their goals and reduce reactance.

Additional Key Words and Phrases: Autonomy, psychological reactance, nudges, self-determination theory, commitment devices, digital self-control, digital distraction, digital wellbeing, micro-frictions

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1 INTRODUCTION

Millions of people use digital self-control tools (DSCTs) to help them limit distractions [22]. These DSCTs often function as commitment devices: the user commits to a goal and the tool holds them to it. For example, a user might resolve to limit their Facebook use to 30 minutes a day and install a browser extension that warns them when time is up. In other words, the technology enforces the goals of a present self upon the future self (Figure 1).

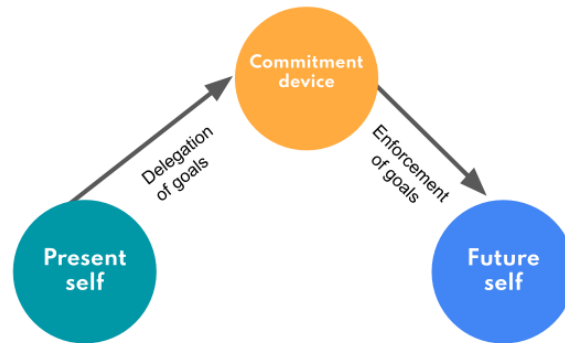
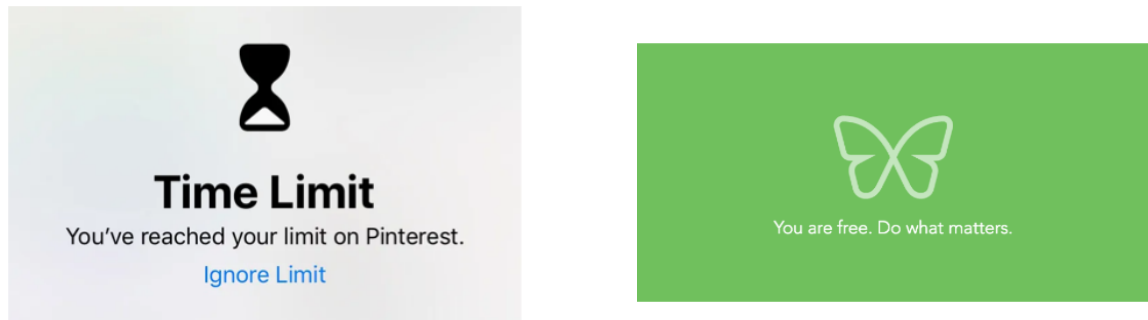


Fig. 1. The present self does not trust the future self to stick to their goal, so they delegate their goal to a commitment device (e.g., a DSCT). The commitment device then enforces the goals upon the future self. But the future self might react negatively if they perceive the enforcement as a threat to their autonomy. How might the designers of commitment device technologies address this challenge?



(a) **Weak enforcement.** Easily tolerated by users, but goals are also easily and frequently circumvented. Apple's Screen Time lets users easily ignore their time limit in apps.

(b) **Strong enforcement.** Helps users reach their goals, but often triggers frustration that can lead to abandonment of the tool. The desktop software Freedom blocks websites without an override option.

Fig. 2. Digital self-control tools use enforcement mechanisms that range from weak to strong. As a compromise solution, a moderate level of enforcement can offer moderate adherence and user retention. But is there a way for designers to implement strong enforcement without prompting annoyance and abandonment?

A major challenge for DSCTs is that users often reject enforcement at the moment of temptation [15, 16]. One factor that researchers have investigated is the severity of enforcement or degree of friction of the tool [7, 13]. Too weak and it might be too easy for the user to circumvent their original goal, for example by clicking "Ignore Limit" on a warning that time is up (Figure 2a). Too strong and it might trigger frustration and lead them to abandon the tool completely, as in software that blocks a website with no override option (Figure 2b).

As a practical compromise, designers might settle for moderate enforcement to achieve moderate levels of adherence and user retention [13, 14]. This guidance is a good first step, but incomplete because it does not offer a psychological explanation for *why* users often feel annoyed by strong enforcement mechanisms that they themselves chose. Is there a way for designers to implement strong enforcement mechanisms without prompting annoyance and abandonment?

The basic need for autonomy in self-determination theory (SDT) offers a promising explanation for why DSCTs can trigger frustration or even hostility. When enforcement mechanisms threaten a person's perceived autonomy, it leads to psychological reactance¹, the motivation to restore the restricted freedom [3]. This often manifests itself as aggression towards the source of the restriction (the DSCT). For designers, this raises two questions:

- RQ1: How can DSCTs be designed to support autonomy?
- RQ2: How can a DSCT's level of support for autonomy be evaluated?

The METUX model [27] offers general principles for designing autonomy-supportive technologies. We build on this work to consider implications for autonomy in the special case of commitment devices, where the technology itself is responsible for both receiving *and* enforcing the user's goal.

2 AUTONOMY IN SELF-DETERMINATION THEORY

Autonomy (feeling like one is willingly acting in accordance with one's goals and values) is one of the basic psychological needs identified by SDT. When this basic need is thwarted, it can lead to defensive behavior such as *reactance* [9, 24], an unpleasant motivational arousal to situations that seem to threaten specific behavioral freedoms. This reactance may

¹Also sometimes called a "boomerang effect," or more colloquially, the "screw you, don't tell me what to do" effect [12]

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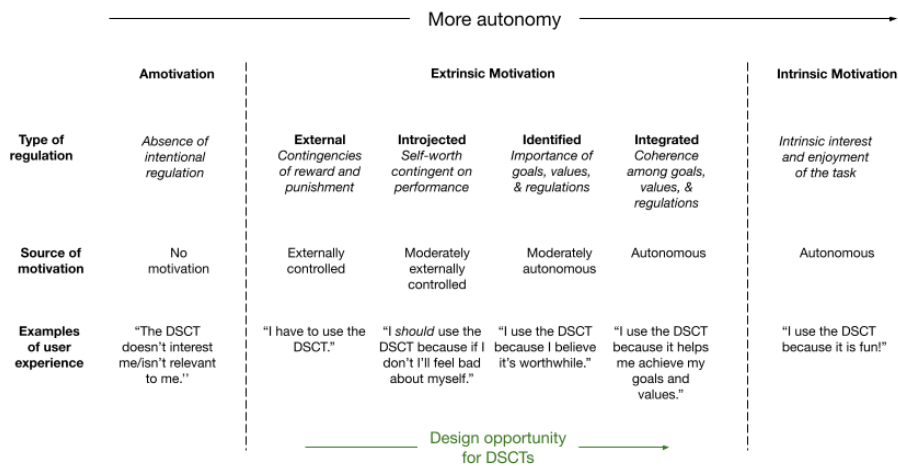


Fig. 3. Self-determination theory posits that motivation ranges from amotivation (the least autonomous) to intrinsic motivation (the most autonomous). DSCTs leverage *extrinsic motivation* to help users stay focused on tasks that are not intrinsically motivating and avoid distractions. At present, many DSCTs fall towards the externally controlled end of the spectrum of extrinsic motivation (“I have to use the DSCT”) and often trigger reactance. Designers have the opportunity to instead create DSCTs that are towards the autonomous end of the spectrum (“I use the DSCT because it helps me achieve my goals and values”). Adapted from [27] and [28].

result in “behavioral backlash,” when a person not only fails to comply with expectations, but intentionally contradicts them [9]. For example, in a study of goal reminders for supporting self-regulated Facebook use, a participant said the intrusiveness of the intervention made her want to “stay on just out of spite” [23].

SDT offers a useful explanation for why/when such reactions occur. Motivation occurs along a continuum of autonomy (Figure 3, [28, 29]), from *Amotivation* (no motivation), to *Extrinsic Motivation* (desiring some separable outcome), to *Intrinsic Motivation* (inherent interest or enjoyment). Extrinsic motivation itself can be more or less autonomous depending on the extent to which outcomes are internally valued, i.e., internalized [28]. At one extreme, activity is experienced as fully controlled by external rewards or punishment. At the other, it is experienced as fully autonomous and directed by one’s personal goals and values.

DSCTs are commonly used to support digital activities that are not intrinsically motivating, such as boring or difficult work tasks [21, Chapter 3]. From an SDT perspective, the risk for DSCTs is that their enforcement mechanisms are experienced as externally controlling (e.g., “I have to use the DSCT”). How can designers instead create tools that support autonomy (e.g., “I use the DSCT because it helps me achieve my goals and values”)?

3 RQ1: HOW CAN DSCTS BE DESIGNED TO SUPPORT AUTONOMY?

The features that users prefer in DSCTs depend upon personality, gender, and culture [24, 25] and context of use [19]. This suggests that DSCTs should be highly tailored to the individual and their situation. However, reactance can occur even when externally imposed restrictions align with a person’s underlying preferences, because they may still be seen as a threat to autonomy [9]. This further suggests that rather than using personalization (system-selected tailoring of features), DSCTs should use customization (user-selected tailoring) to maximize user autonomy [30]. This is opposite to the conventional wisdom in UX design that calls for minimizing user reflection [11] (e.g., the popular title *Don’t Make*

157 *Me Think* [17]). In the case of commitment devices, relying instead upon explicit user instructions should help tools
 158 support perceived autonomy.

159 The **first key time** to support autonomy is when the user delegates their goals to the DSCT (Figure 1). Here, DSCTs
 160 might borrow from motivational interviewing (MI), a directive style of counseling that helps clients explore and resolve
 161 ambivalence [26]. This kind of ambivalence is common for DSCT users [8, 31]: for example, they report wanting to
 162 avoid distractions from an important task at one time, but then also wanting to stay connected via social media at
 163 another [23]. MI draws upon the insight in self-perception theory that people become more committed to goals that
 164 they hear themselves defend [2]. Accordingly, it aims to evoke “change talk” wherein clients articulate their “WHY?”
 165 and the therapist rephrases it back to them [10]. DSCTs could draw upon MI techniques to better elicit and affirm the
 166 reasons behind user goals.
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168 A **second timing** occurs when the DSCT enforces the user’s goal. At present, most DSCTs present generic, impersonal
 169 messages, e.g. “You’ve reached your limit” (Figure 2a). A number of alternatives might be explored:
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- 171 • Reminding the user of the “WHY” behind their original goal using their own words;
- 172 • Increasing the salience of rewards they value (e.g., displaying a picture of a loved one they could spend time
 173 with upon finishing their work);
- 174 • Commending them for all the times they’ve previously resisted distraction to cultivate self-efficacy;
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178 Controlled studies might evaluate these strategies against each other to determine how they impact goal adherence,
 179 reactance, and autonomy.
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181 4 RQ2: HOW CAN A DSCT’S LEVEL OF SUPPORT FOR AUTONOMY BE EVALUATED? 182

183 Assuming that a DSCT’s level of autonomy support is important, how do we measure it? Here, we consider two
 184 questions: *which* items/scales to administer, and *when* to do so.
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186 Many SDT questionnaires assess motivation and autonomy in general as well as within specific domains such as
 187 work, exercise or education [5]. Peters et al. [27] provide adaptations of validated scales to measure how a given
 188 technology affects the user’s experience of autonomy, in spheres ranging from initial adoption to larger life.
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190 SDT researchers have also developed scales to measure the degree to which extrinsic motivation is internalized.
 191 These include sub-scales for, e.g., externally controlled motivation (e.g. ‘I do X because I might get a reward’) and
 192 moderately autonomous motivation (e.g. ‘I do X because it’s important to me’). Existing adaptations already exist in HCI,
 193 including the ones provided by Peters et al. [27], as well as the Gaming Motivation Scale [18], and the User Motivation
 194 Inventory [4]. These measures provide a good starting point for assessing autonomy support in DSCTs.
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196 As for *when* to evaluate perceived autonomy, it is important to measure at different times because DSCTs are used to
 197 manage behaviors with time-inconsistent preferences (e.g., I might decide to watch another recommended video on
 198 YouTube instead of going to bed, only to regret it later [1, 6]). We therefore recommend experience sampling approaches
 199 that measure self-reported autonomy at different time points.
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201 A useful example to follow might be [20], who prompted participants to indicate their current affect and motivation
 202 for use in relation to apps on their smartphone. Participants were randomly prompted either at the *start*, during, or
 203 at the *end* of app use. A similar approach might be an effective way to compare DSCT interventions’ influence on
 204 autonomy: behavior might be experienced as more externally controlled at the moment of enforcement, but more
 205 autonomous as time passes and the user refocuses on their original goal [2].
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5 CONCLUSION

When commitment devices such as DSCTs enforce user goals, they often trigger annoyance and hostility. To avoid this backlash, designers can draw upon self-determination theory, which suggests ways to encourage users to internalize their motivations for self-control. Motivational interviewing techniques might help DSCT users resolve their ambivalence towards change. Affirmations of the user's goal might replace the generic warnings currently found in screen time tools. Finally, SDT scales for measuring the extent to which motivation is internalized might help designers evaluate their progress.

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