Putting Self-Control at the Centre of Digital Wellbeing

Ulrik Lyngs
ulrik.lyngs@cs.ox.ac.uk
Department of Computer Science, University of Oxford
Oxford, United Kingdom

ABSTRACT

'Digital wellbeing' is receiving a great deal of attention, yet there is little agreement about its meaning nor what embodying it as a design goal looks like. I propose that the ability to exercise effective self-control over digital device use should be considered fundamental to digital wellbeing. I present findings from recent work which reviews the current landscape of apps and browser extensions intended to support digital self-control, and suggest that dual systems models of self-regulation will be helpful to analyse the design space and guide the road forward. The future of digital wellbeing might involve 5 years of exploration of design interventions to support user self-control followed by 5-10 years of market forces and/or government regulation driving best practices to become the default digital design.

KEYWORDS

digital wellbeing; self-control; distraction; interruptions; attention

INTRODUCTION

From public discussion around negative effects of 'screentime' to related initiatives by some of the tech giants [1, 5, 6, 15], the theme of 'digital wellbeing' is currently receiving a great deal of attention. However, it is also a topic engulfed in controversy. The relationship between 'screentime' and wellbeing measures is anything but clear [10], and despite Google and Apple's current efforts [1] it remains largely unknown what best practices in designing for 'digital wellbeing' look like [5, 9].

In my view, digital wellbeing fundamentally concerns the extent to which *people are able to exert self-control over how they use their digital devices*, and in particular whether they are able to *align use of digital technology with their personal long-term goals* [cf. 3].

Defining digital wellbeing

I propose we view digital wellbeing as being fundamentally about *the extent to which the user thinks their digital device use is well-aligned with their personal, valued, long-term goals.*
That is, the user's feeling of control over device use is central to digital wellbeing, with the added constraint that device use must be well aligned with their *long-term* goals.
Therefore, excessive device use for e.g. online gaming would be considered detrimental to digital wellbeing in so far that it is detrimental to their long-term goals, even if they in the moment of action feel in control and wishes to keep on playing [cf. 3, 8].

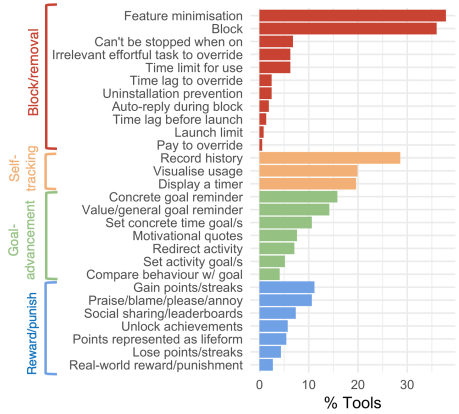

Figure 1: Functionality of digital self-control tools (N = 367) clustered into block/removal, self-tracking, goal-advancement, and reward/punishment features.

In line with this perspective, my PhD project explores how to design digital devices that support self-control over their use. More specifically, my work attempts to ground such efforts in (i) systematic reviews of design interventions explored in current apps and browser extensions for 'digital self-control' on app and browser extension stores, (ii) analysis of design features using well-established dual systems model of self-regulation from cognitive psychology, and (iii) collection of quantitative and qualitative evidence on how common design interventions on the stores actually affect actual user behaviour and subjective perceptions of control. In this position paper, I briefly summarise findings from (i) and (ii) before ending with a paragraph about the evolution of digital wellbeing.

FINDINGS FROM MY PHD PROJECT

The market for digital wellbeing

A substantial niche has emerged on app stores and browser extension 'web stores' for tools that assist people in aligning their actual use of digital devices with their intended use, through interventions such as removing or blocking access to distracting functionality, tracking and visualising device use, or adding rewards and punishments [14].

In our paper for CHI'19 [9] we systematically identified current such tools on the Google Play, Chrome Web, and Apple App stores, and analysed their design features. A summary of the frequency of design interventions is shown in Figure 1.

When clustering features by intervention type, the most frequent feature type was block/removal (some form of which was present in 74% of tools) followed by self-tracking (38%), goal advancement (35%), and reward/punishment (22%). 65% of tools focused on only one cluster in their core design; and most others (32%) combined two, most frequently block/removal in combination with goal-advancement (e.g. replacing the Facebook newsfeed with a todo list) or self-tracking in combination with reward/punishment (e.g. a pomodoro timer in which a virtual creature dies if the user accesses distractions before the timer runs out).

In our paper, we also highlight a number of popular and/or theoretically interesting design features for further research. For example, some tools automatically redirect the user in line with their goals (e.g. *Timewarp* [13] reroutes the user to a website aligned with their productivity goals when navigating to a distracting site, say, from Reddit to Trello). These tools seem to be automating 'implementation intentions' (*if-when* rules for linking a context to a desired response [4]), an approach digital behaviour change researchers have highlighted as a promising way to to scaffold habit formation [11].

Another highly popular intervention type is to gamify of self-control by tying device use to the well-being of a virtual creature (e.g. *Forest* [12] which grows virtual trees during productivity sessions; trees are killed if they user accesses blacklisted functionality — Forest has gathered millions of users [7], and numerous clones and variations exist on the app and web stores). This approach presents

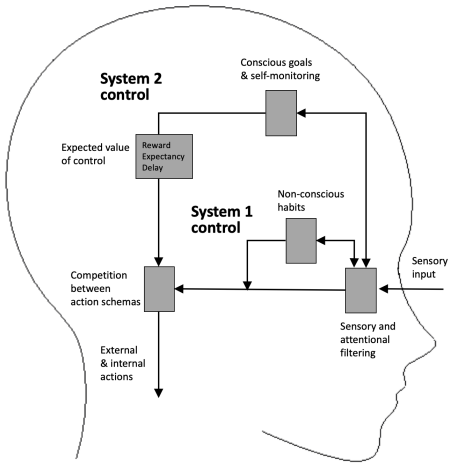

Figure 2: An extended dual systems model of self-regulation. System 1 control is rapid and non-conscious, whereas System 2 control is slower, conscious, and capacity-limited. The strength of System 2 control is mediated by the expected value of control.

[1]Our mapping from design features to cognitive components can be found on osf.io/zyj4h along with data, materials, and the R Markdown source file for the paper

a novel use of 'virtual pets' that requires the user to abstain from action (resist using their phone) rather than take action to 'feed' the pet, and has not been studied in the context of digital wellbeing.

Applying a dual systems model to conceptualise the design spaces

Our work applies an integrative dual systems model of self-regulation drawn from cognitive neuroscience to guide design efforts (see Figure 2). In brief, this model distinguishes between automatic, non-conscious 'System 1' control, that is, well-learned habits or instinctive responses triggered by external stimuli and internal states; and deliberate, conscious 'System 2' control triggered by goals, intentions, and rules held in working memory.

'Self-control' refers to the capacity of conscious System 2 control to override automatic System 1 responses when they conflict with consciously held goals. The capacity for System 2 self-control is mediated by the 'expected value of control', a cost-benefit analysis of the outcomes that might be realised through conscious control.

The design interventions found in current tools can be mapped to the cognitive components in this model that they have the most immediate potential to influence, yielding an alternative lens with which to think about the design space and which areas have been explored (see Figure 3).

When doing so[1], one observation is that aversion to delays, a component of the expected value of control, is less frequently targeted: the proportion of tools that include functionality that use delays to scaffold self-control drops to 4% if we exclude tools that display of a timer (which raises time awareness rather than affecting actual delays). This is somewhat surprising from a theoretical perspective, because the effects on behaviour of sensitivity to delay are strong, reliable, and central to self-control difficulties [2].

THE EVOLUTION OF DIGITAL WELLBEING

Portable universal computing devices have rapidly become the most powerful and flexible tools in human history, making a very broad range of behavioural options available to their user anytime, anywhere. Our psychology, however, contains numerous biases and shortcuts that were not designed for a situation where everything is always available. Therefore, to ensure that digital devices improve rather than harm wellbeing, they must be designed in ways that help people act in accordance with their long-term goals.

I believe the next 10-15 years will include two overlapping phases in this regard: First, an exploration phase in which researchers and practitioners attempt to bring our understanding of how to design in ways that support self-control up to speed with the capability of the technology. This phase has already begun, but is likely to pick up speed now some of the tech giants have addressed the topic publicly and started to experiment with interventions at the operating system level.

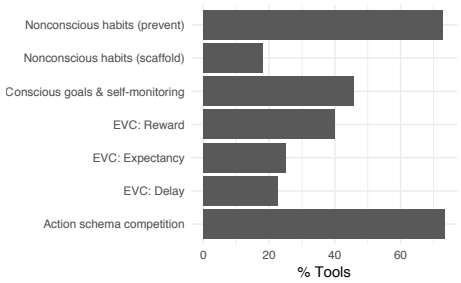

Figure 3: Percentage of tools which include at least one design feature targeting a given cognitive component of the dual systems model of self-regulation.

Second, a dissemination phase in which digital wellbeing features become embedded by standard in most digital devices, either driven by consumer demand and/or by government regulation due to public health concerns.

As powerful digital devices have become ubiquitous, understanding how to support user self-control and thereby digital wellbeing by design has become exceedingly important. Challenging researchers, industry, and end-users to discuss what 'digital wellbeing' looks like, is an appropriate starting point.

REFERENCES

[1] Apple. 2018. iOS 12 introduces new features to reduce interruptions and manage Screen Time. (2018). https://www.apple.com/uk/newsroom/2018/06/ios-12-introduces-new-features-to-reduce-interruptions-and-manage-screen-time/

[2] Dan Ariely and Klaus Wertenbroch. 2002. Procrastination, deadlines, and performance: self-control by precommitment. *Psychological science* 2000 (2002), 219–224. https://doi.org/10.1111/1467-9280.00441

[3] A. L. Duckworth, T. S. Gendler, and J. J. Gross. 2016. Situational Strategies for Self-Control. *Perspectives on Psychological Science* 11, 1 (2016). https://doi.org/10.1177/1745691615623247

[4] Peter M. Gollwitzer and Paschal Sheeran. 2006. Implementation Intentions and Goal Achievement: A Meta-analysis of Effects and Processes. *Advances in Experimental Social Psychology* 38 (2006), 69–119. https://doi.org/10.1016/S0065-2601(06)38002-1

[5] Robbie Gonzalez. 2018. The Research Behind Google's New Tools for Digital Well-Being. *Wired* (may 2018). https://www.wired.com/story/the-research-behind-googles-new-tools-for-digital-well-being/

[6] Google. 2018. Digital Wellbeing. (2018). https://wellbeing.google

[7] Google Play. 2017. Forest: Stay focused. (2017). https://play.google.com/store/apps/details?id=cc.forestapp&hl=en_GB

[8] Ulrik Lyngs, Reuben Binns, Max Van Kleek, and Nigel Shadbolt. 2018. "So, Tell Me What Users Want, What They Really, Really Want!". In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems (CHI EA '18)*. ACM, New York, NY, USA, alt04:1—-alt04:10. https://doi.org/10.1145/3170427.3188397

[9] Ulrik Lyngs, Kai Lukoff, Petr Slovak, Reuben Binns, Adam Slack, Michael Inzlicht, Max Van Kleek, and Nigel Shadbolt. 2019. Self-Control in Cyberspace: Applying Dual Systems Theory to a Review of Digital Self-Control Tools. In *CHIConference on Human Factors in Computing Systems Proceedings (CHI 2019)*. ACM, New York, NY, USA. https://doi.org/10.1145/3290605.3300361

[10] Amy Orben and Andrew K Przybylski. 2019. The association between adolescent well-being and digital technology use. *Nature Human Behaviour* (2019). https://doi.org/10.1038/s41562-018-0506-1

[11] Charlie Pinder, Jo Vermeulen, Benjamin R. Cowan, and Russell Beale. 2018. Digital Behaviour Change Interventions to Break and Form Habits. *ACM Transactions on Computer-Human Interaction* 25, 3 (2018), 1–66. https://doi.org/10.1145/3196830

[12] Seekrtech. 2018. Forest: Stay focused. (2018). https://www.forestapp.cc

[13] Stringinternational.com. 2018. Timewarp. (2018). https://chrome.google.com/webstore/detail/timewarp/mmmhadpnjmokjbmgamifipkjddhlfkhi?hl=gb

[14] Nitasha Tiku. 2018. The WIRED Guide to Internet Addiction. (2018). https://www.wired.com/story/wired-guide-to-internet-addiction/

[15] Troy Wolwerton. 2018. Apple's Tim Cook says he's also spending too much time with his phone. (jun 2018). http://uk.businessinsider.com/apple-ceo-tim-cook-used-new-company-tools-to-track-his-phone-use-2018-6