

---

# You Have 5 Seconds: Designing Glanceable Feedback for Physical Activity Trackers

## Rúben Gouveia

Madeira Interactive Technologies  
Institute, Portugal  
rubahfgouveia@gmail.com

## Fábio Pereira

Madeira Interactive Technologies  
Institute, Portugal  
fabio\_pereira\_22@hotmail.com

## Ana Caraban

Madeira Interactive Technologies  
Institute, Portugal  
ana.caraban@gmail.com

## Sean A. Munson

University of Washington  
Department of Human Centered  
Design & Engineering  
smunson@uw.edu

## Evangelos Karapanos

Madeira Interactive Technologies  
Institute, Portugal  
e.karapanos@gmail.com

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).  
*UbiComp/ISWC '15 Adjunct*, September 7–11, 2015, Osaka, Japan.  
Copyright 2015 © ACM 978-1-4503-3575-1/15/09...\$15.00.  
<http://dx.doi.org/10.1145/2800835.2809437>

## Abstract

People engage with activity trackers in short sessions: over 70% are defined by glances – brief, 5-second sessions where individuals check ongoing activity levels with no further interaction. We explore how to best leverage such short sessions to maximize positive impact on behavior. To do so, we explore the design of Glanceable Behavioral Feedback Interfaces, focusing on three directions for design: increasing the frequency of glances, increasing the impact of glances on physical activity, and promoting moments of exploration and learning with activity trackers.

## Author Keywords

Physical activity tracking; glanceable displays; engagement; behavioral feedback interfaces.

## ACM Classification Keywords

H5.2. User Interfaces: Evaluation/methodology.

## Introduction

Our recent work has shown that many activity tracker users lack the interest, skills, or motivation to reflect extensively on data about past behaviors. In fact, more than 70% of the usage of our activity tracker related to *glances* – brief, 5-second sessions where users check their current activity levels with no further interaction



Figure 1: *TickTock* employs scarcity by highlighting periods of time in which an individual was active over the previous half an hour.



Figure 2: *Catchup* enables just-in-time comparisons by contrasting current goal completion (outer ring) to a day where goal completion was barely met (inner ring).

[5]. If glances are the dominant form of interaction with activity trackers, how can we design Glanceable Behavioral Feedback Interfaces (BFIs) to best support positive behaviors?

In this paper we identify three directions for the design of Glanceable BFIs, namely: *increasing the frequency of glances, increasing the impact of glances on physical activity, and transitioning glances to moments of exploration and learning.*

### Sustaining the frequency of glances

While glances were found to drive 70% of interactions with a tracker [5], their frequency decreased over time. This drop in engagement may have detrimental effect on behavior change as studies have shown individuals to quickly relapse to ill habits once self-monitoring stops (see [6] for an elaboration on the argument for user engagement).

We propose two design strategies towards sustaining the frequency of glances: *novel* and *scarce* information.

#### *Sustaining the novelty of information*

Motivated by the success of computer gaming and the airline industry, which regularly update content to sustain interest in games or safety instructions, we ask: *what if feedback provided by an activity tracker is constantly updating?* Prior work has shown dynamic content in smartphones, such as email and social media to lead to regular “checking habits” [11]. An example design operating upon this principle is *Habito* [5], a mobile app that sustains the novelty of feedback through constantly updating messages. In the design of *Habito*, we created a pool of 91 messages, which were presented over time and when certain conditions were

satisfied. We found that when seeing a message for the first time, users would take less time to come back to the app than when seeing a recurring message.

#### *Emphasizing the scarcity of information*

Scarcity is a powerful persuasion strategy – individuals are, for instance, more likely to attend a workshop if they know seats are limited [2]. Existing media already apply this principle. For instance, individuals often endure TV commercials to assure they do not miss parts of an interrupted show. Likewise, social media users, such as those on Facebook, frequently reengage to ensure that they do not miss major content among many updates. Overall, people often build their revisit patterns around the update patterns of content to be viewed [1]. Building upon this principle, behavioral feedback could be displayed for a limited amount of time, thus reinforcing re-engagement habits. As an example, *TickTock* (see Fig 1) portrays physical activity levels of only the last half an hour.

### Increasing impact on physical activity

Having the user glancing frequently at the feedback is a means to an end; the overall objective is helping people increase or maintain their physical activity levels. We believe that just-in-time comparisons, opportunities for activity, and provocative content are promising strategies for doing this.

#### *Enabling just-in-time comparisons*

Fitbit’s wristband includes five LEDs, each lighting up when another 20% of the user’s daily goal has been reached. While goal setting is a proven technique for behavior change, sustaining one’s awareness of goal completion throughout the day may not be the most effective glanceable feedback, as this requires a



Figure 3: *CrowdWalk* provides a list of nearby walking challenges as well as their contribution towards goal accomplishment.



Figure 4: *Provact* taunts users to take action by highlighting how inactive they have been over the past day and forecasting the outcomes of such behaviors through provocative textual messages.

projection of one’s likelihood to meet his or her daily goal based on the distance walked at the time. One’s ability and willingness to perform this judgment may be lower early in the day, when users are far from meeting goals [8]. *Catchup* (see Fig 2) attempts to circumvent this issue by enabling comparison of walking distances, at the moment, to the distance walked at the same time, during a day where goal completion was barely met. This normative, directly interpretable feedback helps keep users on track, while sustaining awareness of performance each time the watch is glanced upon.

#### *Identifying opportunities for physical activity*

Current activity trackers tell users how much they walk, but do not provide suggestions for how, specifically, they can increase their activity [4]. Can trackers inspire individuals to incorporate walking activities into existing routines? *CrowdWalk* (see Fig 3) presents walking challenges that are available near someone’s current location (see [10] for similar work). For instance, *CrowdWalk* may suggest leaving a shopping cart behind while walking back and forth to gather shopping items at a local supermarket.

#### *Providing provocative content*

Provocative appeals are powerful stimuli towards action or reflection – humanitarian campaigns, for instance rely on provocative advertising to sensitize and gain support of the masses (e.g., raise donations to end worldwide hunger). What if activity trackers used provocative content to instill behavior change? Hafstad et al. [7] have found that provocative mass media campaigns can reduce smoking in adolescents. Leveraging this principle, *Provact* (see Fig 4) taunts users to take action by forecasting the outcomes of their (lack of) physical activity with provocative

messages. Activity trackers could further support provocation by leveraging on competition (e.g., “you’re the least active person at work! Are you really going to let everyone be healthier than you?”).

### **Transitioning glances to moments of exploration and learning**

Individuals often lack motivation to review and reflect upon data about past behaviors, or find that collected data do not contain the right information to identify opportunities to act [4,5]. In addition to supporting in the moment motivation, we also desire to use frequent, short glances with trackers to promote moments of exploration and learning, in which individuals engage with their data towards developing newfound self-knowledge. In other words, *how can glances be leveraged as proxies to further engagement?*

We propose two design principles for that: *providing snippets of information* and *fostering surprise*.

#### *Providing snippets of information*

Showing the “right” amount of information is an important factor in engaging and fostering interest among individuals. Movie trailers, for instance, portray small and enticing segments of upcoming movie scenes to attract and instill curiosity among viewers. Likewise, sport media select short highlights to create engaging and informative summaries of longer sport events. What if activity trackers provide snippets of information to foster users’ interest in exploring additional data? As an example, *Meanfull* (see Fig 5) highlights trends in users’ data through textual messages (e.g., this week you have been less active than previous weeks), while offering users the opportunity to further explore the



Figure 5: *Meanfull* highlights trends in data through textual messages, which can be further interacted towards respective historical data (e.g. graphs or counts).



Figure 6: *Predicto* fosters surprise by forecasting daily walking distances based on parameters such as sleep patterns, weekday or recent walking tendencies.

underlying historical data (e.g., graphs comparing ongoing to last week's walking distance).

#### *Fostering surprise*

Surprising stimuli have the power of drawing interest and challenging assumptions. Drama movies, for instance, introduce suspense and unexpected scenes to stick viewers to their seats and have them anticipating upcoming scenes. Further, product designers have leveraged surprising stimuli to prolong the attention value of products and elicit explorations [9]. How can activity trackers use surprising or challenging content to create similar moments of exploration? In particular, traditional elements such as goal completion could be replaced by unfamiliar content such as predictions of goal completion or sedentary levels. As an example, *Predicto* (see Fig 6) analyzes parameters such as sleep patterns and walking tendencies to predict user activity levels during an upcoming day. *Predicto* leverages on the unexpectedness of predictions to capture users' attention and make sense of the data *Predicto* has based those predictions upon.

#### **Moving towards a glance-dominated world**

Previous work has identified the importance of glanceable BFIs [3], and we propose to begin systematically exploring the design space for these interfaces. Within this paper, we propose strategies for designing glanceable BFIs and to inspire researchers towards designing for glances. The upcoming market of devices that afford brief interactions (e.g. smart watches and other wearable devices) will only make this design space, and understanding best practices within it, more important.

#### **Acknowledgments**

This research was supported by the Portuguese Foundation of Science and Technology grant SFRH/BD/89796/2012.

#### **References**

1. Adar, E., Teevan, J., & Dumais, S. T. (2008). Large scale analysis of web revisitation patterns. In *Proceedings of CHI'08*, pp. 1197-1206.
2. Cialdini, R. B., & James, L. (2009). *Influence: Science and practice* (Vol. 4). Boston, MA: Pearson education.
3. Consolvo, S., Klasnja, P., McDonald, D. W., & Landay, J. A. (2014). Designing for Healthy Lifestyles: Design Considerations for Mobile Technologies to Encourage Consumer Health and Wellness. *Human-Computer Interaction*, 6(3-4), pp. 167-315.
4. Epstein, D., Cordeiro, F., Bales, E., Fogarty, J., & Munson, S. (2014). Taming data complexity in lifelogs: exploring visual cuts of personal informatics data. In *Proceedings of DIS'14*, pp. 667-676.
5. Gouveia, R., Karapanos, E., & Hassenzahl, M. (2015) How Do We Engage with Activity Trackers? A Longitudinal Study of Habito. In *Proceedings of Ubicomp'15*.
6. Karapanos, E. (2015). Sustaining user engagement with behavior-change tools. *interactions*, 22(4), pp. 48-52.
7. Hafstad, A., Aarø, L. E., Engeland, A., Andersen, A., Langmark, F., & Stray-Pedersen, B. (1997). Provocative appeals in anti-smoking mass media campaigns targeting adolescents—the accumulated effect of multiple exposures. *Health Education Research*, 12(2), pp. 227-236.
8. Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal level theory and consumer

9. behavior. *Journal of Consumer Psychology*, 17(2), pp. 113-117.
10. Ludden, G. D., Schifferstein, H. N., & Hekkert, P. (2008). Surprise as a design strategy. *Design Issues*, 24(2), pp. 28-38.
11. Ornelas, T., Caraban, A., Gouveia, R., & Karapanos, E. (2015). CrowdWalk: Leveraging the Wisdom of the Crowd to Inspire Walking Activities. In *adjunct proceedings of Ubicomp'15*.
12. Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, 16(1), pp. 105-114.