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

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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...
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 where 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
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
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.

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**References**


