Reflection in Theory and Reflection in Practice*:
An Exploration of the Gaps in Reflection Support among Personal Informatics Apps

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What's the problem?

- While Personal Informatics (PI) systems are intended to support reflection, many current tools focus solely on quantitative data collection and visualization, providing little or no support for *transformative* or **critical* reflection [1].

*bringing unconscious aspects of experience to conscious awareness, thereby making them available for conscious choice that transcend the immediate context [1,2].

What's our approach?

- Our study seeks to understand how we can design PI tools to cultivate critical reflection
- We propose a series of operational definitions of reflection by applying Fleck and Fitzpatrick's [2] conceptual definition (five levels of reflection).

What did we do?

- We surveyed 102 PI apps in the Apple and Google app stores, coding their interaction features they relate to Fleck and Fitzpatrick's levels of reflection.
- We focus on how different interface components might serve as a precursor for or instigator of reflection, based on the existing taxonomy.

What did we find?

- Reflective practices in PI apps are unevenly supported: the lack of reflective question prompts, little scaffolding for setting goals and configuring data collection, and poor support for considering wider implications limit meaning-making and frustrate nuanced insight generation.

Figure 1. Features that support descriptive (R0) and dialogic (R2) reflection in apps. Left, *Argus* (R0 support), describing users' status without any elaboration. Right, *Sleep Cycle* (R0 and R2 support), which display the relationships between two data points that enable users to diagnose the relations among variables.

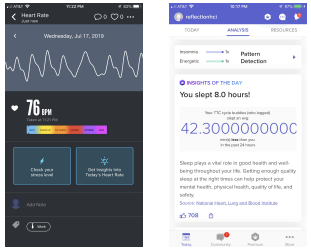

Figure 2. Features related to explanatory reflection (R1). Left, *Instant Heart Rate*, an example of an app that provides explanatory prompts that ask users to describe their behavior in a qualitative manner. Right, *Glow*, an example of an app featuring system-driven informational content.

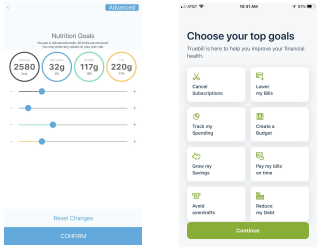

Figure 3. Features that support goal-setting, one aspect of transformative reflection (R3). Left, *Keto*, a nutrition app that allows its users to dial in specific nutrient consumption targets. Right, *Truebill Budget*, a personal finance app that helps users to prioritize their spending and saving goals.

What does it all mean?

- There is a misnomer of reflection and fallacy of insight in contemporary PI apps
  - The lack of explanatory reflection (R1) support may lead to poor self-insights (meaning-making process).
  - Preconfigured data presentation and goal-setting in PI apps set a boundary of reflective practices (system-driven vs. individual-driven insights).
- To better support reflection in PI apps, we provide several design implications: (1) Emphasizing the *qualitative* self and thinking more holistically than the *quantified* self (e.g., delivering more persuasive and provocative prompts), (2) Empowering users through customizable design (e.g., providing additional flexibility during the data collection and interpretation phases), and (3) Transcending ego-centric design (e.g., supporting people in understanding the social reach of data sharing)

[1] Sengers, P., Boehner, K., David, S., & Kaye, J. J. (2005, August). Reflective design. In Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility (pp. 49-58). ACM.
[2] Fleck, R., & Fitzpatrick, G.(2010). Reflecting on reflection: Framing a design landscape. In *Proceedings of the 22nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction.*