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# Thinking about Side Effects of Personal Informatics Systems

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**Abstract**

In this paper we discuss how Personal Informatics systems that aggregate and display data back to users can have unintended side effects. Based on three examples from our prior work, we see that these side effects can be negative and vary from discouraging use of the system to creating tunnel vision where users bias parts of their experience over others. However in some cases these side effects are not negative, just unexpected. Regardless of their valence, it is important to consider the possibilities of these side effects when designing and evaluating personal informatics systems, and we present a few strategies for being attentive to these effects early on.

**Author Keywords**

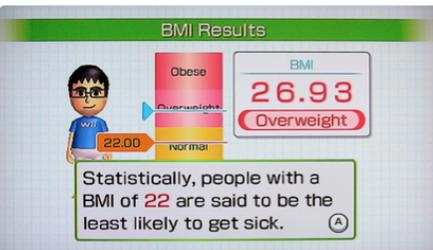
Personal Informatics, side effects, lifelogging, reflection.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**Introduction**

Personal Informatics systems often deal in domains and utilize data that are just that: personal. These systems make use of data that we create through our daily activities and help us review it in a way that



**Figure 1.** After being weighed by the system, the user sees the following screen including their Mii, BMI and weight label juxtaposed with what the system considers to be a normal BMI—22.

encourages reflection and self-knowledge [4]. While systems often have unintended uses and consequences, it is especially important that designers of Personal Informatics systems think about how their systems may be used and impact users, because they are dealing in domains that are fundamentally tied to individuals' ideas of self. In this paper we discuss a set of side effects that we have encountered in our work studying and designing Personal Informatics systems in health and fitness, interpersonal relationships, and reminiscing.

### **Overly Negative Feedback Can Discourage Use (and Users)**

Tools designed to encourage weight loss and physical activity like Nike+, FitBit, SparkPeople and Wii Fit strive to help users reach their goals by tracking data about the individual such as calories consumed, amount of exercise and/or current weight. One way these tools motivate users is by having them explicitly set goals in the system and then displaying the collected data back to the user as positive or negative progress towards their goal. This strategy follows from theory that shows motivation is sustained by people setting small, achievable goals, identifying the difference between their current state and their goal state, and then exerting effort to achieve the goal [1].

Presenting these data without considering users' mental states and potential reactions to the data can be harmful, however. One example can be seen in Wii Fit's Body Test [6]. As part of creating their Wii Fit profile and their system avatar—or Mii—users must complete a Body Test that weighs them, tests their balance and asks them to set a goal. If the user is overweight, they see an animation where their Mii's girth increases and

looks down at its midsection with disbelief, accompanied by an ominous sound effect. As shown in figure 1, the system then displays how far away from a normal BMI the user is.

In principle, according to [1] this should be valuable and useful feedback that helps people know what they need to do. In practice, however [6], users rarely returned to track their progress using the Body Test because they often found this display "harsh" and thought "it's one thing to see your [weight], it's another thing to see yourself—your [avatar]—as a Stay-Puft Marshmallow man." If Wii Fit used a more constructive and less degrading visualization, perhaps users would have found the feature motivating and would not have abandoned it after a few weeks as most of our users did in [6].

### **Displaying Certain Types of Data Can Create Tunnel Vision**

Another potential use of Personal Informatics tools is to help users gain broader self-knowledge about areas of their lives such as the interpersonal relationships they engage in. Communication tools like text messaging, email, and Facebook capture interactions that are important to the expression and development of relationships [9] and can be used after the fact to help people make sense of these relationships through visualizations such as [10,12].

Perhaps the most commonly used tool that aggregates and displays communication data from a relationship is Facebook's See Friendship page. See Friendship gathers wall posts and comments, photos, mutual events, liked topics, and friends in common between two Facebook users (see figure 2). While this



**Figure 2.** The top portion of the See Friendship page between two Facebook friends.

visualization includes several types of data about a friendship, when asking people to spend some time reflecting about a friendship using the See Friendship page, we found that the data limited what participants reflected on [8]. Participants often started with the most recent content since See Friendship displays data in reverse chronological order, and didn't always go far enough back to view content from early on in their friendship. Visual content also tended to receive more attention than text content and reminded people of events and activities that were shared instead of encouraging reflection on deeper, more personal, and longer-term aspects of a friendship such as its evolution. The overall positive communication that happens on Facebook and the lack of capture of mundane, daily communication further biased reflection towards positive and novel events in a friendship.

## User Interpretations and System Goals

A third consideration for Personal Informatics systems is that users will appropriate them, with goals and ways of making sense of the system not anticipated by the designers [2]. This is apart from Sellen and Whittaker's argument that too many lifelogging type systems have no clear goals expressed [7].

These appropriations are not necessarily bad, as we saw in our own work with Pensieve [1]. Designed from the ground up to support individual reflection and reminiscence, we found that instead many people used the system as a tool for remembering, and occasionally reconnecting with, other people.

Even exercises in evaluating personal informatics systems can have major effects. Reflecting on content in their See Friendship page encouraged a number of people to feel better about their friendships [8]. Things were more mixed in a recent study that asked people to complete a two week diary study in which they reflected on how their romantic relationship affected their Facebook use, and vice versa [12]. Here, some people valued their relationships more after explicitly reviewing the content they create and the reasons they create it—but others talked of ending the relationship entirely.

In these studies we were looking at use cases for personal informatics systems that used social media to think about their relationships. Had we actually designed and deployed the systems and seen these results, we might not have thought of them as side effects. But given that there *was no system*, just a suggestion of how to think of existing tools, the size and strength of the effects were surprising, and leading

people to end a romantic relationship is a serious matter. In some sense, people appropriated the study itself for their own goals—another thing for designers to think about.

### **Conclusion**

Our work suggests that health interventions, and other kinds of Personal Informatics systems, are likely to frequently lead to unintended side effects that occasionally might be harmful to either system use or to the users themselves. We call on designers to think much more carefully about the potential impacts these systems might have on people's lives, and hope to talk about strategies for anticipating, cases where other designers have seen such consequences, and (parallel to similar discussions in the persuasive systems literature [3]), discussion of the practical and ethical responsibilities that accompany the design of systems that help people know and change themselves.

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