The Effects of Multi-sensory Notifications on User Reactivity

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Abstract

Typically, mobile application notifications are limited by the capabilities of a mobile device (sound output, text banners, etc.). More so, traditional alarm clock applications rely on a mobile device's sound output to wake sleeping users with their notifications. We propose an alarm clock application that alerts multiple user senses by using both sound and light. User reaction to these notifications will be compared to their reaction to traditional alarm clock application notifications.

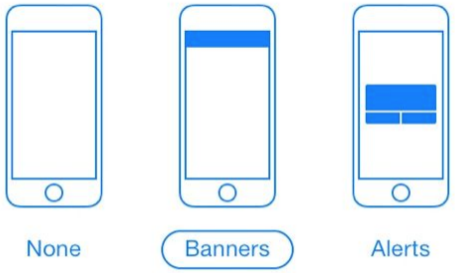

Figure 1. Typical notifications sent from iOS applications. [1]

Daylight Simulation

In the implementation of *SmartAlarm*, I decided to present the multi-sensory notification in the form of a daylight simulator, exposing users to brightness 30 minutes prior to alarm time [2] [3].

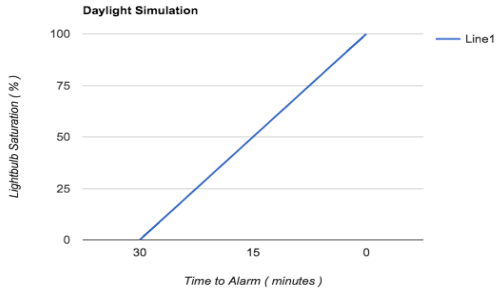

Figure 3. Daylight simulation implemented in *SmartAlarm*

Figure 2. The app icon and main user interface of *SmartAlarm*

Usability Study

I conducted a usability study over a 6 week period on 34 participants to measure the effects of multi-sensory notifications on user reactivity. Each participant spent 2 days waking with multi-sensory notifications, and 2 days waking with typical alarm notifications.

Reactivity Metrics and Data Collection

Participants recorded the following metrics via an Internet-based, morning-time survey:

- **Original Alarm Time**
- **Reaction Time (when the user gets out of bed)**
- **Number of times "Snooze" is pressed**
- **Level of comfort using *SmartAlarm***
- **Level of morning-time grogginess**

High-Level Takeaways

The usability study provided me with several conclusive results regarding each of the metrics recorded in the morning-time surveys. Most notably, the following observations were made:

- **Daylight simulation had the most significant effect on reported grogginess when the snooze button was not used by participants.**
- **When the snooze functionality was not used, participants were ~62% more likely to report low grogginess levels when presented with multi-sensory notifications and ~81% more likely to report high grogginess levels with uni-sensory notifications.**
- **Users were ~21% more likely to react in under 10 minutes when presented with multi-sensory notifications, and ~50% more likely to have reactions greater than 29 minutes with uni-sensory notifications.**
- **Participants were roughly 41.4% more reluctant to use the snooze functionality when waking with a multi-sensory notification, and about 140% more likely to press snooze 3 or more times with uni-sensory notifications.**
- **Participants were about 155% more likely to report the highest level of confidence in *SmartAlarm* after waking with a uni-sensory alarm clock notification, while they were ~37% more likely to report low comfort levels with multi-sensory notifications.**

References

[1] Patterson, Ben. *iOS 7 Tip: Alerts, Banners, and Badges – What's the Difference?*. Here's the Thing Blog. 22 Jan, 2014. Web.

[2] Thorn, L. and Hucklebridge, F. and Evans, P. and Clow, A. *The effect of dawn simulation on the cortisol response to awakening in healthy participants.* Elsevier: Psychoneuroendocrinology, Volume 29, pages 925-930, 2003.

[3] Van de Werken, Maan and Gimenez, Marina and De Vries, Bonnie and Beersma. *Effects of artificial dawn on sleep inertia, skin temperature, and the awakening cortisol response.* Journal of Sleep Research, Volume 19, pages 425-435, 2010.