

Interaction Restraint: Enforcing Adaptive Cognitive Tasks to Restrain Problematic User Interaction

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Background

- Smartphone usage provides instant gratifications to users.
- Such gratifications are known to reinforce frequent checking behaviors
- However, these behaviors cause user to get distracted from ongoing tasks and result in making a negative impact on his or her cognitive performance.
- Therefore, we suggest a novel intervention mechanism called '*Interaction Restraint*' to degrade the interactivity of a smartphone.









Research Objectives

Interaction restraint aims to

- Place some cognitive burden on user interaction as a nudging mechanism to encourage self-reflect and regulation.
- Change '*automatic interaction*' to be '*conscious interaction*'
 - By enforcing users to perform a light cognitive task at that moment of user interaction.
 - By intentionally slowing down user interaction and thereby suppressing user craving.

Preliminary Study

- We interviewed 13 participants to investigate how people considered our intervention method.

<p>1. Kai is studying for the quiz tomorrow.</p> 	<p>2. After 10 minutes of studying, he begins to lose concentration and feels boredom; so, he decides to do some Internet surfing with his smartphone for a while.</p> 	<p>3. However, when he tries to do Internet surfing, Smartphone Gag application pops up and delays launching the Internet by requiring 10 random numbers to type.</p> 	<p>4. He types in 10 numbers, opens the mobile Internet and starts searching some random keywords.</p> 
<p>5. After few minutes, he puts down his phone and begins to study again.</p> 	<p>6. After three minutes, articles related to what he searched keep running through his mind.</p> 	<p>7. Because he tries to surf the Internet again within a short interval, Smartphone Gag app, now requires more random numbers (30) to delay the Internet usage.</p> 	<p>8. Looking at the increased random numbers, he realizes that he wastes his time on using smartphone, and focuses on studying for the quiz again.</p> 

1) Intervention Target

- To determine the coverage of intervention
- "I usually do Facebook a lot, and would like to get some intervention on apps that I lose track of time and immerse myself in."

2) Workload Assessment

- How users thought about the intervention method of the number inputting task
- "It is just like typing in a password for unlocking a smartphone, so it is pretty familiar."

3) Workload Variation

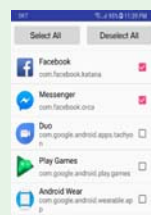
- To understand users' preferences on varying task workload based on the seriousness of problematic usage
- "Intensity has to be maximized when the usage interval is below a certain limit."

System Design

Configuration

Setting:

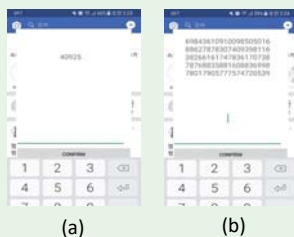
- Configuration of installed apps where users are allowed to select any apps to be intervened (including select and deselect all button)



Restraint Tasks

Examples:

- Two restraint tasks that require the minimum (a) and the maximum (b) numbers to type in respectively depending on the app usage interval



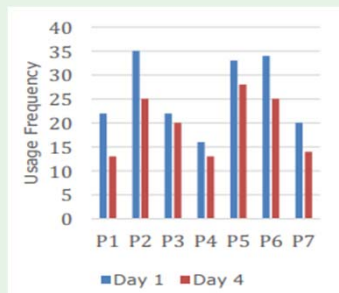
(a)

(b)

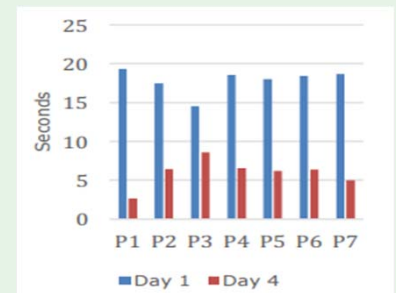
- Restraint task is a simple digit input work.
- Task workload is set based on the time interval between the last and the current time.
- Set Min/Max intensity threshold of the restraint task.

Field Trial

Results



Total Usage Frequency



Average Time Staying on Restraint Tasks

- As a result, participants commented that the interaction restraint effectively increased users' awareness of smartphone usage by making user interaction cognitively conscious.
- We also found that our interaction restraint helped our participants self-reflect on their daily usage behaviors.

Future Work

- Design a controlled experiment to validate the benefits of the interaction restraint mechanism
- Perform longitudinal field study to see whether such restraints effectively change their actual behaviors