

# Facebook or Fakebook?: The effect of simulation on location privacy user studies

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## 1. INTRODUCTION

There is a well-known divide between users’ actual privacy behaviours and their responses to survey questions [1]. In an attempt to reduce this divide, monitoring and questioning users *in situ*, during day-to-day life — using tools from psychology such as the Experience Sampling Method (ESM) [4] — is a popular research method. The results are data concerning real behaviour in real systems.

But what if the real system does not yet exist, and is non-trivial to build? Some researchers instead *simulate* systems: ask experimental participants ESM questions *in situ* about how they would use such a system if it did exist.

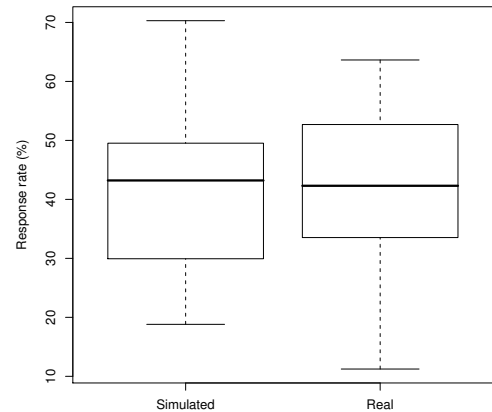
Our research question is: for location privacy user studies, does simulating a system change the behaviour of participants compared to using a real system? Do real social consequences change the study results?

## 2. METHODOLOGY

To study location-sharing behaviour in the online social network *Facebook*, we recruited 40 undergraduate students (17 male, 23 female) who were active users of Facebook. Each participant was asked to carry a Nokia N95 smartphone for one week and offered £50 for participation. Due to hardware constraints, we ran the experiment over two different weeks with two runs of 20 participants.

At the start of the experiment, participants were asked to group their Facebook “friends” into lists, to which they would like to be able to disclose similar amounts of information. In addition we added two lists for “everyone” (publicly-viewable information) and “all friends” (all of a user’s Facebook friends). The phones sensed participants’ locations every five minutes and uploaded these to a central server. Based on these sensed locations, participants were sent ESM questions asking whether, and with which lists of friends, they would be willing to share their locations and photos of their current activities. Their responses were collected and uploaded using the phones.

Participants were randomly divided at the start of the experiment into two groups of 20 participants: the *real group* experienced *real* publishing of their location information to their chosen friend lists, while the *simulation group* experienced *simulated* publishing, where information was not dis-



**Figure 1: Question response rate. The response rates are similar for the simulated and the real groups. (Median: 43% for simulation group; 42% for real group.)**

closed to any friends, regardless of user preferences.

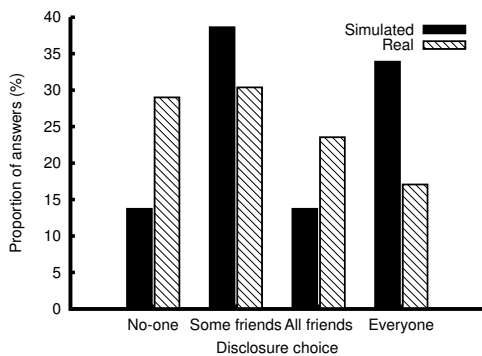
To control for differences between runs, half of the participants in each run were assigned to the simulation group and half to the real group. When reporting results, we combine results from both runs. Participants were informed to which group they belonged at the start of the experiment; participants in the simulation group were instructed to answer the questions exactly as if their information were really going to be published to Facebook. For further details, see [2].

We investigate whether publishing the information “for real” (the real group) results in a difference of behaviour compared to simulated publishing (the simulation group).

## 3. RESULTS

Figure 1 shows the response rates across the two groups (simulation group and real group). We observe *no significant difference in response rate between the two groups*: participation level in the experiment seems not to be diminished (or encouraged) by simulation.

Figure 2 indicates a large difference in disclosure choices



**Figure 2: Disclosure choices.** The simulation group disclose their locations more freely than the real group: the simulation group disclose less frequently to no-one, and more frequently to everyone, than the real group.

between the two groups. The simulation group disclosed locations to everyone 34% of the time (compared to 17% for the real group); and to no-one 14% of the time (compared to 29% for the real group). *The people in the simulation group share their location information on Facebook more openly than those in the real group.*

#### 4. RELATED WORK

Tsai et al. [6] examine the effect of feedback in a real (i.e., non-simulated) location-sharing application tied to Facebook. Feedback — in the form of a list of viewers of who had viewed each published location — was found to influence disclosure choices. Although they do not investigate a simulated application, that real feedback has an effect may mean that simulated feedback (e.g., using a randomly-generated list of viewers) may affect behaviour in a different way.

Consolvo et al. [3] investigate privacy concerns in a simulated social location-tracking application, employing the Experience Sampling Method to query participants *in situ* [4]. They also note problems with simulation in the post-experiment debriefings: unrealistic, “out-of-character” simulated location requests were rejected by at least one participant.

Stutzman and Kramer-Duffield [5] examine real-world privacy settings of Facebook users employing the site’s relatively-restrictive “friends-only” option. More generally, Young and Quan-Haase [7] present Facebook as a case study for privacy concerns on online social network sites.

#### 5. DISCUSSION AND CONCLUSIONS

We study the behaviour of 40 participants in a location-sharing online social network application, where half of the participants experienced a simulated location-sharing OSN as in previous studies by other researchers, and half experienced a real Facebook application. Although response rates were the same across the groups, the simulation group shared their locations more openly.

If this difference between real and simulated behaviour

holds in the general case, then there are interesting implications for user-studies and for system design. For instance, had our simulation group results been used to inform design of privacy defaults for a location-sharing system, then these defaults might have been overly permissive. For example, the least popular disclosure choice in the real group was “everyone” (17%), but “everyone” was the second most popular disclosure choice in the simulation group (34%).

Our results indicate that simulating location-sharing applications — and perhaps context-aware applications in general — may lead to significantly different findings. How then can we evaluate privacy concerns accurately in future systems which do not yet exist, and are non-trivial to build? Can one compensate for the effect of simulation (e.g., by finding a consistent, normalisable effect across studies, or through improved understanding of the decision-making process)? We believe that these questions need further study.

We are performing further analysis of the data collected during our study, to supplement this initial analysis. We are also investigating *privacy metrics* — given behavioural data from two groups of people (one of which is a control group), we aim to more rigorously *quantify* (as well as *qualify*) the magnitude of the dependent variable’s effect.

#### Acknowledgements

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