Probing for Privacy: A Digital Cultural Probe to Support Reflection on Situated Geoprivacy and Trust

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Abstract

In this paper, we report on a digital cultural probe study as a method for testing sensitivity to contextual integrity and situated privacy in relation to location-data sharing through digital media. In recent years, (geo)location has emerged as a focal point for discourse and debate about privacy and trust. As smartphone penetration

approaches saturation point in the Global North, an app and data economy built on and monetizing the locative affordances of mobile media has emerged. This rise of ubiquitous geolocation has led researchers to identify location as a uniquely sensitive datapoint and to frame *geo*privacy as an emergent form of situated—and highly situational—privacy requiring critical attention (Leszczynski, 2017; Keßler & McKenzie, 2018; Martin & Nissenbaum, 2020). Alongside this, a strand of research has also addressed geolocation's role as a "technology of trust" (Withers, 2018; Leszczynski & Mitchell 2019) that assembles particular affects of trust to incentivise ongoing engagement with and through digital media.

These intersecting concerns about geolocation, privacy, and trust can be seen in the ways that smartphone manufacturers and providers of mobile operating systems have progressively improved end-user location privacy controls year on year. On any major mobile operating system, location-sharing requires user consent; however, the scale and complexity of data being used and shared among differing parties means that is more challenging than ever for end-users to fully understand the privacy risks, benefits, and implications involved in sharing their location with and through their device. As a result, as research has shown, many smartphone users default to giving consent when they receive notifications asking to allow or disallow location sharing, with the conveniences of sharing location data often overriding the perceived risks (Atteneder & Collini-Nocker, 2018; Riedlinger, Chapman, & Mitchell, 2019; Dobson & Herbert, 2021).

Complicating this further is the fact that privacy—and particularly *geo*privacy—is highly situational, and user concerns about sharing location may change depending on *what* is shared, *why* it is being shared, *who* it is being sharing with, *how* it is being shared, and, importantly *where* and *when* it is being shared. Moreover, whether we feel our privacy has been protected or violated often depends on our roles, relationships, power structures, norms, and internal values (including the goal and purpose of geo-locative data). Building on contextual integrity and privacy regulation theories (Langheinrich, 2001; Nissenbaum, 2004), we understand the concerns people have when they encounter these location-sharing decision points and privacy paradoxes can vary from person to person and even from scenario to scenario.

To respond to the privacy challenges outlined above, and to explore the situated and situational nature of geoprivacy and trust in geolocation, we conducted a study to understand how people interpret location-based data privacy in different situations and contexts. Aiming to explore how different situations, locations and contexts influence the way people intellectually and emotionally respond to privacy decisions, we adopted a cultural probe research method to explore geoprivacy (location-based privacy) and trust in situ. Our goal was to gain an in-depth understanding of situated privacy needs in order to inform the broader discussion of designing for data privacy.

The cultural probes approach is a prominent research method in the field of Human-Computer Interaction and Interaction Design. Cultural probes were initially developed by Gaver et al (1999) as a design-oriented method to acquire

glimpses of people's lives. Gaver et al's (1999) original probe package consists of maps, postcards, a disposable camera and other materials to encourage critical reflection. More recently, studies have used the term "technology probe" to describe cultural probes that incorporate "simple, flexible, [and] adaptable" technologies (Hutchinson et al., 2003) as a design inspiration or as prototypes to allow people to envision how these new technologies may be integrated in their life. Relevant to this study, Boucher et al. (2019) developed ProbeTools, which integrate digital components into the original concept of cultural probes. ProbeTools were designed to offer configurable and "unconventional" digital devices that would enable study participants to engage independently with the research inquiry in their everyday life in creative and playful ways.

The cultural probes approach values play and exploration as ways to engage with research participants (Gaver et al., 2004) and emphasises tangibility through physical engagement with digital and/or analogue artefacts. Privacy research has also engaged to some extent with these concepts of playfulness and tangibility. In privacy studies, the concept of playfulness has been used to carry out privacy training (Dincelli & Chengalur-Smith, 2020) or to influence participants' privacy decision-making (Shklovski & Grönvall, 2020; Shklovski et al., 2014). Where privacy studies has incorporated or focused on tangibility, the tangible technology employed has tended to take the form of a physical interface to manage privacy settings (see, e.g., Ahmad et al., 2020; Jedrzejczyk et al., 2010; Mehta, 2019; Mehta et al., 2021).

In our study, we developed a self-contained digital cultural probe that closely aligns with the ProbeTools concept. We named our probe TamaGeochi (pictured below in fig. 1), referencing the "digital pet" toy Tamagotchi to highlight the probe's physical and playful qualities and incorporating the term "geo" to highlight its focus on location. TamaGeochi's personality was designed to be naïve, curious, and childlike. The device prompted provocative questions about location-based privacy and encouraged participants to reflect on their situated response to privacy by eliciting photos, drawings, and written reflections alongside location data sharing (see fig. 2).

In our paper, we introduce the design elements and research implementation of the TamaGeochi probe and report on the findings from our study, particularly the ways in which TamaGeochi increased awareness of—and self-reflection in relation to—the meaning of location, location tracking technologies, and individual in-situ privacy concerns. We also discuss how trust figured in our participants' responses, highlighting their often contradictory and mercurial feelings about experiences of sharing and tracking in the geodata economy. Finally, we offer insights from a follow up co-design workshop in which our participants were invited to imagine the future of geoprivacy and trustworthy design.

Figure 1

Figure 2

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