

Managing Mobile Multitasking: The Culture of iPhones on Stanford Campus

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ABSTRACT

This paper discusses three concepts that govern technosocial practices among university students with iPhones. First is the social expectation of *constant connection* that requires multitasking to achieve. Second is the resulting *technosocial pecking order* of who gets interrupted or ignored for whom. Third is the way that many students push back against these demands with *techno-resistance*, deliberately curtailing constant connection to reduce the negative effects of multitasking, in spite of the risk of social censure. These concepts are developed from interviews with 57 students, 30 hours of field observations, and a survey of 177 students on Stanford campus, which in particular explored iPhone use. This research concludes that so-called “digital natives” must still navigate familiar social dynamics and personal desires, both online and off. Providing a detailed description of how students from across campus make sense of iPhones in their everyday technosocial assemblages, this research suggests opportunities for more socially and cognitively sensitive design of smartphone features.

Author Keywords

iPhones; mobile phones; smartphones; multitasking; ethnography; digital native; ANT; SCOT; technofeminism.

ACM Classification Keywords

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

INTRODUCTION

Mobile phones, and increasingly smartphones, are a ubiquitous part of student life on many college campuses in the United States and around the world. In spring 2009, when data collection for this research took place, an estimated one quarter of students on Stanford campus, the site of this study, owned an Apple iPhone. At the end of 2011, 43% of mobile phone users in the United States had smartphones, most of

them either iPhones or Android devices [20]. However, there is still little scholarship that examines smartphone use specifically. This paper explores the rules, etiquette, and practices that governed the use of iPhones on campus, which tended to balance two competing desires. On one hand, students reported social expectations of *constant connection*, which often led to heavy multitasking, emphasized by iPhones but also enabled by other mobile phones, laptops, and other devices. On the other hand, two-thirds of students practiced *techno-resistance*, actively setting boundaries or disconnecting from their iPhones and other devices. This let them minimize the negative cognitive effects of multitasking and reinforce personal identities and values opposing constant connection. This latter finding in particular presents a contrasting perspective to the often celebratory tone of other research on mobile phone culture in discussing the constant connection mobile phones enable.

This tension underscores broader issues concerning the social effects of mediated communication, multitasking, and constant technology access, especially through smartphones. In particular, the prevalence of techno-resistance complicates the unilinear S-curve technology adoption model [26] as well as the monolithic category of “digital native,” the generation who grew up with the Internet and mobile phones and, according to some, embrace these technologies and the multitasking they require in a fundamentally different way than older generations [24,32]. The digital natives in this study did have to negotiate the social expectations enabled by these new technologies, but almost none embraced them wholeheartedly, and those who did found that embracing them, like rejecting them, carried social consequences.

Life on Stanford campus—a wealthy, elite, and technological university—is almost certainly not typical. However, I posit that living so close to California’s Silicon Valley, where new technologies are often quickly adopted and actively discussed, can act as a focusing lens for emergent practices involving new technologies, making people cognizant of issues that may otherwise lie dormant in more lightweight usage scenarios. In short, Stanford presents a self-conscious, if privileged, snapshot into how students make sense of smartphones and other technologies in their everyday lives. The emergent tensions may be accentuated by this environment, but as some of the findings presented here echo or amplify previous analyses of mobile culture or multitasking, they are likely not unique to it.

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RESEARCH ON MOBILE PHONES AND MULTITASKING

University campuses are not the only places that have developed cultural practices around mobile phones or struggled to balance constant connection and techno-resistance. The human-computer interaction and the social studies of science communities both have rich ecologies of research on the social life of the mobile phone. Though lacking space for an exhaustive survey, I will highlight several that have particularly informed this research.

Katz and Aakhus's edited volume, published in 2002, provides one of the earliest comprehensive social analyses of mobile phone culture around the world, especially as it relates to "private talk" and "public performance" [15]. A common theme throughout the volume is the "perpetual contact" that mobile phones enable, as this paper's section on *constant connection* echoes. The next year, Katz edited another volume further exploring the development of mobile phone culture as distinct from landline telephone culture, particularly in negotiating technosocial control [16]. However, foreshadowing this project's finding of *techno-resistance*, Nafus and Tracey describe how mobile consumption was at times implicated in oppositional identities even when mobile phones were still relatively new [15:13]. This paper provides an updated and differently-articulated account of this identity-work in a world where mobile phones are ubiquitous and smartphones common.

More recently, Rich Ling has explored the ways in which mobile phones have affected social cohesion, borrowing from Durkheim's and Goffman's theories of ritual in social interactions to examine the ways that mobile phones have become part of ritual communication [18]. His findings that mobile phones strengthen close ties, though sometimes at the expense of copresent acquaintances (also discussed in [15:14]), are echoed in the discussion below of the technosocial pecking order of college students with iPhones.

Ito *et al.* have examined mobile phone use among Japanese teenagers, describing the many ways in which these *keitai* are negotiated in their everyday social worlds [13,14]. The authors also discuss the popularity of mobile email (defined broadly as any mobile textual communication) as a lightweight method of maintaining *ambient virtual copresence* [13:13], buttressing this research's finding that email (defined more narrowly) was the most popular mode of contact among the US college students in this study.

There are fewer studies of the social ecology of *smartphones* specifically, though the topic is still one of interest to the CSCW community as smartphones continue to grow in popularity. Here, a 'smartphone' is a portable computing device with a high-resolution screen (usually a touchscreen), Internet connectivity, a number of multimedia features, and an "app store" for fetching content and applications for the phone, in addition to standard mobile phone features of calling, SMS, and voicemail. This particular set of features was first established by the iPhone in 2007 and has since appeared on smartphones from various manufacturers.

Sherry Turkle implicates smartphones in her explorations of the brave new social worlds enabled by our many always-connected devices in *Alone Together*. She found that many of her participants—and, increasingly, she as well—were constantly tethered to a liminal space between the physical and virtual, not fully present to either but comforted (if coldly) by the simulation of personal connection in both [33:8]. Several of the themes explored in *Alone Together* are echoed in the following pages, particularly the cognitive and social consequences of constant connection and the multitasking it entails. Turkle does also touch on techno-resistance, but mostly in describing her own ambivalence toward her smartphone; this study suggests that her desire to disconnect from the virtual world in order to better connect to the physical is an increasingly prevalent aspect of many people's technosocial negotiations.

There have been a few other explorations of smartphone use in HCI literature as well. Studying early smartphones, Swallow, Blythe, and Wright describe the ways they became implicated in issues of identity, sociability, security, and organization among their participants [31], and Ames *et al.* explore photographic practices on early Nokia smartphones [1]. Focusing on the iPhone, Blythe and Cairns discuss the ways YouTube videos shaped perceptions of the iPhone 3G prior to its release [5], and Oren *et al.* provide user-tested guidelines for internationalizing the iPhone [22].

This paper adds to this literature a systematic exploration of iPhones (and, by extension, smartphones in general) in daily life. We will see that while iPhones did not differ from other mobile phones as social actors in some ways, there were instances where their smartphone capabilities did set them apart; in particular, the constant connection they enabled forced their users to be more deliberate in setting boundaries.

The social demands and cognitive costs of the multitasking that iPhones and other devices 'demanded' emerged as central concerns among the participants in this study. The implications of multitasking, interruptions, and fragmented work—especially in the workplace, but also in the classroom [10] and elsewhere—is a topic with extensive scholarship in CSCW, as well as the broader HCI community (e.g. see [4,6,11,19,30]). While research on multitasking in the workplace and classroom often focuses on productivity or learning outcomes rather than the broader social implications explored here, some have examined multitasking and interruptions beyond the workplace as well. Baron explores multitasking and discourse control, similar to and described in the "technosocial pecking order" section below [2]. Salvucci *et al.* propose a *multitasking continuum* defined by the rapidity of task-switching, from seconds (e.g. talking and driving) to hours (e.g. reading and cooking), and also theorize the elements of multitasking [28].

On a cognitive level, Ophir *et al.* show that chronic multitaskers are actually *less* able to keep track of multiple inputs than those who avoid multitasking in psychological testing [21]. Oulasvirta *et al.* measure the cognitive load of fragmented attention on mobile phones in particular, noting

decreased reaction times and eventual interaction breakdowns [23]. To these studies, this account adds a qualitative, *in situ* perspective on the social expectations of mobile multitasking and how students resisted them.

This analysis utilizes two theoretical frameworks for understanding technology and social life. In discussing the social practices that have developed around iPhones and other technologies, it highlights how the iPhone both acts like and is treated as another *social actor*, much like humans and other machines in the influence it can have, in the way that Bruno Latour has described in Actor-Network Theory [17]. This research additionally discusses how iPhones became part of *networks* of friends and family, both local and extended. The use of 'networks' here also hails from actor-network theory, where both humans and non-humans (like iPhones) are actor-nodes constantly co-articulating both their identities and their connections.

This research also acknowledges a degree of *interpretive flexibility* in how the iPhone is understood (which was by no means stable) and also of distinct *relevant social groups* in its adoption (which can be summarized as a continuum between embracers and resisters, as well as the have-nots), in keeping with The Social Construction of Technology, or SCOT [25]. It also notes how and why participants resisted the dominant meanings associated with iPhone use through *techno-resistance*, borrowing from technofeminism's critiques of SCOT to provide an oppositional perspective on SCOT's generally technology-positive adoption model [34]. It furthermore complicates the classic innovation-adoption model in which only 'laggards' (itself a socially loaded term) do not adopt technology, mainly because of low social standing or lack of knowledge [26]. In this study, even 'early adopters' cultivated habits of techno-resistance, indicating that technological adoption of iPhones was not a unilinear process of ever-increasing acceptance.

However, this research does not directly address the power differences between those who have iPhones and those who do not. While several interviewees mentioned elitism and iPhones, they felt that that was more of a concern between the campus and elsewhere than within the campus community. As this research is an analysis of practices on campus, addressing this concern is beyond the scope of this work.

RESEARCH METHODS

The field observations, interviews and survey data presented in this paper were collected by nine doctoral students over ten weeks in spring quarter 2009 as part of an anthropology class, in which we explored iPhone culture on campus. The bulk of the results presented here are drawn from open-ended interviews with 57 students, of which 45 owned iPhones, seven owned iPod Touch devices but no iPhone, and five owned neither. Of those who did not have an iPhone, four owned Android smartphones and the rest owned non-smartphone mobile phones. The twelve students without iPhones helped us contextualize our findings in the broader campus community.

We recruited students from many departments all across campus, including the humanities, engineering, social sciences, natural sciences, and various professional schools. We used a variety of recruitment techniques: some students were spotted with iPhones during field observations around campus and asked to participate, some were recruited through student dorms (which house 96% of undergraduates and 56% of graduate students, and are assigned by lottery¹), and some through snowball sampling, using the initial participants and contacts of the researchers as seeds.

We developed and used an interview protocol to ensure that all interviewers covered the same topics, but kept the interviews open-ended and conversational to allow for the discovery of unexpected themes. These topics were formulated broadly and included questions about recent usage patterns, types of use (phone, text, email, apps, music, video, etc.), rules for use, thoughts on others' use, changing perceptions of space or time, privacy, cost, elitism/politics, friendships, family, romance, disconnection/breakage, and the proposed iStanford plan. We encouraged participants to corroborate what they were telling us by showing us examples on their phones during the interview. Finally, to understand how mobile phone use fit into students' broader sociotechnical ensembles, we asked similar questions about their use of laptops, iPods, other mobile phones, and other technologies in their day-to-day life.

The interviews were each one to two hours long. They included 46 individual interviews and three focus groups with two to four participants each; we used the same interview protocol for both types of interviews. We organized the three focus groups to explore whether the group setting might enable or inhibit certain kinds of discussions, but found that the results did not differ from those of individual interviews. Each researcher watched at least one interview conducted by another researcher to verify that our interview techniques were consistent. We offered tokens of appreciation to interview participants, either a free meal or a \$5 gift card to a campus eatery. VerbalInk (<http://verbalink.com>), a professional transcription service, transcribed the interviews.

Along with these interviews, we collectively carried out 30 hours of field observations (about 3 hours per researcher) in various campus settings: the campus library, the student union lounge, the campus bookstore café, an outdoor campus café, two other cafés just off campus that are popular with students, a busy pedestrian intersection in the center of campus, two campus bus stops, a jogging track on the west end of campus, and a local pub popular with students. We discussed these locations ahead of time and also developed a guide to help us determine what to record, focusing on noting the context and content of mobile phone use, actions preceding and following mobile phone use, and instances of the passive presence of mobile phones not in use (*e.g.* on the table, attached to headphones, etc.). These observations

¹ <http://facts.stanford.edu/campuslife.html>

allowed us to triangulate the self-reported behavior collected in interviews.

We pooled the interview transcripts and fieldnotes generated by each of the researchers and distributed them for individual analysis. For this paper, the author analyzed the interviews and field observations using Atlas.TI software, iteratively coding to identify emergent themes based on the perspectives of the participants themselves, as described in [29].

To test whether the themes we had observed were shared by a larger proportion of the student population, we used the themes that we each uncovered in our individual analyses to develop a survey, which we distributed to 177 students who owned iPhones. We each generated several questions for the survey, which were then collated, organized, and edited for coherence. We recruited the 177 survey-takers from classes, dorms, and public locations (such as eateries and walkways) throughout campus; these settings were chosen collectively to create, in aggregate, a representative sample. This included 131 undergraduates, or approximately 8% of the estimated iPhone-owning undergraduate student population, and 44 graduate students, or approximately 2.5% of the estimated iPhone-owning graduate student population, as extrapolated from Stanford's 2008-2009 enrollment numbers. As before, we pooled the responses each researcher had collected and then distributed them for individual analysis; the author of this paper analyzed the survey results using SPSS.

Why focus on iPhones? After all, students used not just iPhones but a suite of technologies, and the majority of students did not own iPhones at all. We chose to focus data collection around iPhones for two reasons. The first was to limit our study to a reasonable scope by choosing one particular technology that has a relatively uniform set of features and a strong presence on campus. The iPhone fit this description. We estimated that in spring 2009, fully one quarter of students used iPhones, based on our systematic counts of iPhone ownership in freshman dorms and (non-engineering) undergraduate classes; this proportion has almost certainly risen since. Over half of our interviewees and survey respondents received their iPhones in the last 3-12 months, many as a gift for Christmas and some as hand-me-downs from family members upgrading to the iPhone 3G. Though ownership was not universal, the iPhone was still prominent in student interactions and often discussed on campus.

Second, the experimental iStanford program, led by the university registrar, proposed to replace student ID cards and dorm keys with iPhones and to develop a suite of iPhone-specific tools for students. Though the ID card part of the proposal was shelved shortly after our data collection concluded, iPhones were given to a group of residential computing consultants for the 2008-2009 school year as part of a pilot program, and Stanford's computer science department offered iPhone development classes. Because of this, we were interested in learning about iPhone culture to inform this initiative or similar initiatives elsewhere, should they ever come to pass.

IPHONE USE ON CAMPUS

This analysis will start with an illustration of the ubiquity of mobile phones and other technologies in general and iPhones in particular, which were present in sites of transit, quiet areas, and social areas all across campus. It will then turn to the dimensions of *constant connection*, discussing preferred methods of connection as well as strategies and reasons for social censure. The double-standard that constant connection created—of being present in one's immediate surroundings and over the network simultaneously—led to a *technosocial pecking order*, where students privileged some people and devices over others, though this often produced feelings of guilt and the stress of multitasking. This research will conclude with a discussion of the implications of some students' personal desires for *techno-resistance*.

Sunny with a Chance of 3G: a Snapshot of Campus Technology Use

Stanford University lies just west of the affluent town of Palo Alto and just north of Silicon Valley. Visitors typically arrive at the university via Palm Drive, a striking mile-long road lined with trees separating the pastoral campus from the city around it with a stretch of native forest. At the end of Palm Drive is grassy Palm Oval park surrounded by parking, and beyond that the arches and low-slung buildings of the main quad, built with Stanford's characteristic tan sandstone and brick red roof tiles. Both the park and the main quad bustle with students on a busy day between classes.

I will begin this technological snapshot of Stanford campus, based on our collective field observations, here. It is between classes on a sunny spring afternoon, and students whiz down Serra Mall on bicycles and longboards. Over half sport white earbud headphones leading to a pocket, backpack, or purse, suggestive of an iPhone or iPod. Approximately one in thirty hold a phone with one hand, using the other hand or sometimes balance alone to navigate the crowds. Even more pedestrians—one in ten—hold a phone to their ear or in their field of view, looking up occasionally to avoid obstacles but otherwise allowing bicyclists and others to swerve around them. Some walk bikes while they peck at their phones. Undergraduates in witty T-shirts and business school students in blazers crowd the bus stop on the left side of Palm Oval; some have phones out, though most of these are watching or listening, not talking. A couple resting on the grass in the park take pictures of one another and then peer together at the screen of an iPhone with a Stanford-branded cover.

One of the buildings bordering the main quad to the left is Green library, facing the quad with grand columns and arches and flanked by a hodgepodge of wings. The study desks and broad tables inside are half-full of students on this sunny spring day. Some have laptops and some have books in front of them, and many have mobile phones laying beside their study materials, at which they glance periodically. About half have earbuds and are listening to music off of their phones or laptops. Occasionally a student jumps up and hurries out of a study hall to the lobby, phone in hand, to take an incoming

call, leaving books and laptop behind. “I’m in the library.” “Oh, *now* you call.” Some students stand at the public computers across from the lobby browsing the library website or Facebook, each with a mobile phone laid out beside the keyboard.

Outside of the lobby, on the other side of the library from the main quad, is a popular outdoor café, and another grassy area by a fountain. Here, we again find phones on tables or in hands while students study or chat. Students occasionally glance at their phones during their studies and conversations. One student has two phones out on the table, a clamshell and an iPhone. Another peers at her friend’s iPhone, exclaiming, “Text him! Text him right now. Or send him a picture. He’ll check it on his Blackberry.” Occasionally a student pauses on the steps by the red hoop fountain, suggestive of a giant power button, across from the cafe to take out her phone and send a text before hurrying on her way to class or a meeting.

Other sites of campus—the clock tower, the bookstore café, Old Union lounge—are like one of the three described: sites of transit, where phones may be out or in pockets; quiet areas, with phones as electronic companions; and social places, where phones may be implicated in exchanges or themselves become a social actor. They all share the characteristic of extensive mobile phone use. Even in classrooms, some students keep phones beside their computers or (if laptops are banned, which has become increasingly common in lecture halls [10]) paper notebooks, or furtively between their knees, where they check their email, visit Facebook, play games, or surf the web during class.

Of the students surveyed, fully three-quarters of the respondents said they fell asleep with their iPhones in bed with them, and just as many checked their iPhones before getting out of bed in the morning. A few interviewees said that their sweeties joked about being “iPhone widows,” left behind for this new, alluring social actor. One graduate student said her husband often said that he was “married to my wife and her iPhone,” acknowledging the role the device had in their relationship. In short, the devices were a constant companion and often played an active role for many students throughout their daily activities: studying, eating, socializing, attending class, even sleeping.

We at first found the diversity of technology practices among students to be overwhelming. Analysis showed, however, that these practices tended to follow a coherent pattern primarily balancing two competing desires: to be available and responsive to one’s extended network of friends and family via email, text, and voice on one hand, and to be present and focused on one’s immediate surroundings on the other. As we will see in the following sections, both desires fulfilled various social obligations to friends, peers, and authority figures. I will first discuss the social expectations for constant connection, and how they are balanced with social expectations for being present with friends. The second desire—to be focused on one’s immediate surroundings—allowed students to minimize the drawbacks

to multitasking they have noticed in their own lives and to mitigate the perceived demands and stress of always-on technology.

Constant Connection: Demands of Extended Networks

All 57 interview subjects talked, sometimes at length, about the social expectation of constant connection: the demands others placed on them to be electronically available and the similar demands they placed on others. While students did alter the mode of communication they used—email, SMS, and voice—to fit their own circumstances and the expected circumstances of the remote party, they generally assumed that *some* mode should get through.

This section contributes an updated description of the social practices and expectations associated with each of these modes, including how the iPhone in particular shaped its use. It will then discuss the ways they are collectively enrolled to establish social expectations of connectedness, expectations that were heightened by the multi-featuredness and uniformity of iPhones.

Email: The Mode of Choice

Though email is often discussed in human-computer interaction literature as a method of asynchronous communication, where the recipient is expected to attend just a few times a day (or less) to a number of messages at once, the students we talked to said that those with iPhones, smartphones, and other always-present devices were expected to receive email as it arrived and in turn expected the same of others. One participant explained that because his phone buzzed when email arrived, he could check it anytime, in effect delegating the constant polling to his iPhone. Another said that if she didn’t check email constantly, she’d have over fifty to deal with every evening, which was just too overwhelming. A third described email as by far the most-used feature on his iPhone, and actually encouraged multitasking *less* than a computer:

I probably check my mail thirty to fifty times a day [on my iPhone]. It used to be, I’d sit and check my email [at my computer], and then open Facebook and browse the web, but now I can check in about thirty seconds which makes my day way more productive.

Moreover, email was the contact method of choice for many iPhone users because they found voice calls inconvenient and they did not want to risk incurring extra charges for text messages amongst their receivers. Thus, though some report that SMS has replaced email for the “digital generation” [24], these findings indicate otherwise.

Despite email’s popularity on campus, many did not respond to email from their iPhones, or they responded tersely, because of the difficulty typing on the iPhone’s small on-screen keyboard. One participant explained,

I keep pushing the physical button that would kick me out of the program, not the buttons on the screen [of his iPod Touch]. I am more of a tactile person.

Another said,

I have big hands and thumbs, and you have to go [push keys] straight on. ... The learning curve is high.

This echoes the findings of Haywood and Boguslawski that the iPhone's touchscreen interface presents a number of challenges for users that non-touchscreen mobile phones do not [9]. In most cases, iPhones provided a convenient, portable method of checking messages, but the device was largely read-only. Some students said they liked the "sent from my iPhone" addition because it excused terseness, and a few had customized this (e.g. adding "please excuse any typos") to make short replies more socially acceptable.

Many students reported having their laptops on hand around campus anyway, and would prefer to take those out to compose longer replies. (In fact, one longtime student pointed out that due to the ubiquity of laptops, constant connection through email had been a social expectation on campus—though to a somewhat lesser degree—before iPhones. According to her, iPhones simply heightened a social norm that was already present.) A few others carried iPhones instead of laptops through the day or to their homes, leaving laptops in offices, confident they were still reachable via email but wanting to loosen the electronic leash their advisors and peers had on them.

Text Messaging: The SMS Black Hole

While texting has been reported elsewhere as the mainstay of youth communication [3,13,18], Stanford students—iPhone users and not—said they tended not to use it much because it was less reliable, and often no more convenient, than email. Nearly one third of our iPhone-using interviewees said they refused to pay the surcharge of \$20/month or \$0.10/message that AT&T levied on text messages, choosing to disable messaging instead. Others reported disliking the silent failure that happened when they sent messages to friends who had disabled messaging, unbeknownst to them. In either case, students said that the fact that text messages that never reached their destinations were not reported to the sender led the sender to think that the recipient was ignoring or shunning them—a social faux pas committed by the mobile phone system itself, but with blame passed on to the intended recipient. One student explained the consequences of this:

They are ripping people off [so I opted out of getting texts]. ... Right now I'm using email to text, but people send me these texts that I don't get. My friend was mad at me not getting texts.

SMS had thus failed to become a common mode of interaction among Stanford students largely for economic and technical reasons, especially the absence of enough users for beneficial network effects and the lack of feedback on failure.

The sites where texting did regularly occur were between close friends or sweethearts who had established one another's texting capabilities or were even on shared "family" plans. All interviewees agreed that texting was one of the most "casual" forms of contact, and that they would never text someone above them in the social hierarchy, such

as a professor (echoing [27]). However, few students texted those closest to them throughout the day simply to maintain a sense of virtual copresence, contrasting what has been reported in research on other populations [13,15,18]. This may be due to frequent in-person contact on the relatively small campus. Several said they liked to be able to text when they did not want an "actual conversation"—when all they had to do was coordinate with someone or communicate one piece of information, without all the social niceties that went with calling someone.

Texting (along with email) was also particularly popular at the start of relationships, when new sweethearts could send "casual" (though of course very carefully-crafted) flirtatious messages, realizing a potential discussed in [31]. This interaction, many students felt, was less pressure than voice or even email because it seemed more transitory: texts were generally read once and then disappeared from view unless they were sought out, rather than lingering in an inbox, demanding a reply. However, a few interviewees specifically disliked the practice of flirtatious texting: as one student put it, a potential partner should "have the balls to call" rather than hiding behind texting.

Voice: Intimate but Bothersome

Students' thoughts on voice calls were mixed. Most interviewees said they used their iPhones for checking typed messages, surfing the web, or listening to music much more often than making voice calls, and our observations recorded many times more instances of students peering silently at their phones than talking on them. Some said voice calls were particularly annoying because of all of the required social niceties—"Hello, how are you" and "Thank you, I'll see you soon, goodbye"—even though Ling found that such rituals were the very fabric of social cohesion [18]. However, some preferred a 20-second phone conversation over multiple emails or texts when trying to reach consensus.

Overall, most agreed that it was more momentous to make a voice call than to send an email or text message. Phone conversations were naturally more intimate, students explained, and they demanded certain conditions on both ends: students had to be in a relatively quiet place, but able to talk (not in a classroom or library, for instance, and able to disengage from others); they had to be able to hold the phone to an ear or engage a hands-free device (more difficult when in transit); they had to be available right then; and most importantly, they had to be able to devote a fair amount of their attention to the conversation—they could not multitask in the same way they could with email or texting. One student explained,

It's kind of a big deal to make a phone call. You hear their voice. I don't keep up with 'phone people' very well because it's intimidating and you have to dedicate an hour to them.

Thus, voice calls were reserved for—and signaled the need for—particularly urgent, formal, or intimate communication.

One may argue that one does *not* actually have to be immediately available to receive a voice call: this is what voicemail is for, of course. However, students largely disliked voicemail, even with the iPhone's flexible playback options. Like voice calls, voicemail demanded a quiet environment and a fair amount of attention. Moreover, many messages did not actually contain much content beyond the signal a missed call left already (namely, "call me back"), making the benefit to listening to many messages negligible. In fact, unless they were expecting the caller to add more information, some students we interviewed said they would often just contact the caller without even listening to the message they left. Around one dozen interviewees complained that "others" (though only one admitted to personally doing this) would go weeks without checking their voicemail.

Constant Connection and Social Censure

These sundry modes for contact all fed the expectation that others should be always available. The prevalence of iPhones in particular raised the bar on expectations of constant connection. However, we will see that students are *not* always available, sometimes by circumstance and sometimes by design. In interviews, students talked about no longer being able to use the excuses of not having their laptop with them or of being out of mobile range. Because the whole campus had wireless Internet access, iPhone owners had no infrastructural excuse for not responding to emails, and using behavioral excuses for these *butler lies* [8]—"I was in class," "I was sleeping," "I was biking," "I was studying"—were sometimes taken as mere pretexts for neglect by more demanding friends. Thus, some felt pressured to monitor their iPhones during times they would otherwise put them away.

Students reported that over time, they developed general expectations for their friends' degree of connectivity, a combination of the behaviors and the affordances of the device they owned. They learned that this friend always responded to email within an hour, and that friend *never* returned phone calls. Some students also talked about keeping track of which friends were not AT&T subscribers, which at the time was the only provider for iPhones as well as the only provider with decent reception on campus.

These expectations were not value-neutral. Students, especially the most heavily-connected ones, often judged their friends based on how responsive they were, and applied social pressure to make them more reachable, from teasing to anger to gradual shunning and estrangement. Corroborating our interviews, we also observed some instances of social censure in our field observations. We overheard one woman say to a friend, "Hey, I guess you don't reply to email anymore. You're not as fast as you used to be." Another teased into her handset, "Oh, *now* you call. I have nothing to say. I wanted to get a froyo [frozen yogurt] but I can't now." In interviews, two graduate students reported annoyance with others on their project who did not respond quickly, one because he did not own a mobile phone and the other because

he did not respond to work-related email on weekends. Some students also described the experience of being on the receiving end of this social censure when they were not as connected as their friends expected. One student was cut out of an important decision with a rude email stating that "she did not have a say in this anymore" when she did not respond for twelve hours one weekend because she was visiting her parents. Another described how keeping track of who answered calls became part of the official policy for Resident Computing Consultants in the dorms:

In my staff meetings we would call late people, but they had two marks on them if they were late and didn't answer their phone.

These judgments did not just result in social pressure. At times, they weakened the friendships between those who were heavily connected and those who were less so. "You can tell who's a real friend after a while," said one student. Another similarly stated,

There are some people that you say 'oh, don't even bother calling that person.' That in itself says something about a person. It defines true friends.

A third explained,

People who don't answer their phone but call you when they need [you]—I ignore them. I always try to catch up with people before I ask them for something.

While this may say as much about the friendship as the technology, we will see below that technology may play a larger role than is initially apparent.

Students reported additional problems when the expectations their friends had developed for them about their *usual* connectivity did not match their *current* connectivity. The student above who was cut out of an important decision after not being reachable via email for twelve hours one weekend is one example of the consequences of unexpected changes in connectivity—and she reported feeling a lot of anxiety about the lack of mobile signal and data connectivity at her parents' place, knowing that such a thing might happen. Another student whose parents live in a canyon in Los Angeles without mobile signal drove to the bottom of the canyon at least once a day when visiting in order to check his messages and to "stay in the loop" for both social and academic coordination. Other students took vacations where they did not have cell coverage and often expressed how strange and difficult it was to not be available to others. In fact, one student who went on a spring break cruise with friends carried his phone with him as a comfort even though it could not connect at sea, much to his companions' amusement. In our survey, about one-third of students said that if their iPhones broke, they would treat it as an emergency and skip class to get it fixed, which echoed a few stories from interviews of students doing just that.

Technosocial Pecking Orders: Balancing Extended Networks and Immediate Surroundings

While students often expected *others* to be constantly

connected, they were not always available themselves. This section explores how students balanced the social demands of extended networks with those of their immediate surroundings. It describes of a spectrum of behavior that on one side equally privileges the copresent and distant (as also discussed elsewhere), and on the other shuts out the distant in favor of the copresent. I describe this spectrum as a “technosocial pecking order” that stretches across both extended and copresent social obligations. This section then describes the consequences of the awkward double-standard in availability that many students described: they were expected to be “fully” available and attentive to *both* their immediate surroundings and their extended networks, leading to pressure to multitask. It concludes with a discussion of how iPhones affect being in “the moment.”

On one side of the spectrum, some students applied the same rules to networked interruptions as they did to face-to-face interruptions, which were tied to general social hierarchies and accountabilities. One graduate student explicitly spelled out her hierarchy to us: her academic advisor was at the top, followed by the students she helped advise, then her colleagues, then her boyfriend, then her friends and parents. This work-focused hierarchy contrasts with the more intimate ones, focused on family and loved ones, described by other researchers [2,13,15:14,18]. Another student explained that his hierarchy was situation-specific—if he was expecting communication from a particular person, he would privilege that, whether it was face-to-face or over the phone.

One consequence of this policy is that these students said that they did poll their email and texts to check for high-importance messages throughout the day, in many different settings. Most would refrain only if they were in an important social situation such as a one-on-one meeting or job interview where they were directly interacting with someone in a position of power over them. But when talking with friends or in group situations (even classrooms or group meetings—or, as we found, our interviews), they would often have their iPhone out as well, like an uninvited companion, and would glance at it from time to time. These students were fully aware that this policy bothered some of their peers, but like Ling’s plumber [18] or Turkle’s tethered teens [33:8], they felt that they also have obligations to their extended network and did not want to treat them like second-class citizens just because they were not copresent. One student responded to a peer who chastised him about the ‘bad etiquette’ of taking a call when with him, “It’s also bad etiquette to always miss your calls.” In his study of earlier mobile phone culture, Gergen observed similar tendencies toward privileging a select few contacts, noting that “rather than the leveling of significance in relationships, the cell phone lends itself to a retrenchment of verticality” [15:240].

On the other side of the spectrum—and less present in previous research on mobile phone cultures—a few students reported almost never answering their phone or checking messages when they were with others. For them, the pull of the extended network was significantly weaker than the

influence of immediate surroundings. These students said that they would never interrupt a face-to-face interaction with a phone call, regardless of who it was from, and also avoided checking messages or even having their phone out when with other people. One reported making a show of turning his mobile phone off in “special social situations” such as dinner with friends or dates, which he said others often found flattering. Others just ignored the vibration of always-on but always-silenced phones. One avoided getting an iPhone in favor of an iPod Touch specifically because “it doesn’t make me accessible. I hate being accessible—my family had to cajole me to even get an answering machine before I got a cell phone.”

Why did these students privilege their immediate surroundings over their extended networks? Many expressed concerns about being tethered to “electronic leashes,” able to be yanked at any time out of the present, which Turkle also discusses [33] and which we will see echoed again below in students’ more personal reasons for turning off and tuning out the media in their lives. Others adopted the values of those around them: when their families or friends derided them for not being fully present or even just having their phone out, they chose to yield to this social pressure. However, most also felt increased anxiety about what their extended network thought about them as a result.

While a few students occupied each of these extremes, most negotiated practices somewhere in between, balancing various social obligations and making choices about when to check their phones on a case-by-case basis. These kinds of negotiations have also been described by other researchers, particularly Naomi Baron, who used of a “volume control” metaphor to describe communicative multitasking [2], and Lee Humphreys, who describes the in-person negotiations that take place when a mobile phone call arrives [12]. Almost all students kept their phones on vibrate—usually noticeable by them but not disruptive to others—throughout the day. (Several women complained that because much of their clothing lacked pockets and it was difficult to feel the phone’s vibration from a backpack or handbag, they had to either carry their phone or risk ignoring their extended networks. One man mentioned frustration from not always being able to reach his girlfriend because of this.) While voice calls were most intrusive and least likely to be answered, students often checked messages throughout the day: in class, with friends, while eating, while walking, while biking, and while driving, though the last two are illegal in California.

Double-standards, Guilt, and Multitasking

Overall, the double-standard that students should be fully available to *both* their local and extended networks led to feelings of anxiety and guilt in about one third of our interviewees as well as one third of those surveyed. When they could not answer their phones or return messages, they felt guilty about neglecting their extended networks. When they did, they felt guilty about ignoring their surroundings. The double-standard also compelled them to try to multitask

more than they would otherwise like to, behavior that the iPhone's multi-functionality exacerbated.

One student we interviewed, Nate [note: all names are pseudonymous], exemplified this culture of constant connection and the juggling of various inputs that it necessitated. Nate checked email at stoplights and made calls while riding his bike to utilize what he called the "dead time" of transit. Like many students [10,33:8], he multitasked throughout the day in many different settings, visiting Facebook and browsing the Internet in class while "selectively" taking notes on his laptop, with his iPhone out for checking email as well. "I keep my phone between my legs," he explained, laughing. "Just check for students looking down." (Another student explained away her use of Facebook and iPhone applications thusly: "isn't it better to stay semi-engaged by playing games than to fall asleep?")

After getting his iPhone, Nate told us that he had gotten "a lot worse" about spending too much time on his mobile phone because it enabled so many different kinds of connections and "time-wasting": not only was he keeping up with friends, but he enjoyed playing multi-player iPhone games with them and could easily check on Facebook and other sites on the go, rather than having to take out his laptop to do so. He also attested to the constant connection of Stanford students by commenting on how fast things advertised on campus mailing lists are sold—often in seconds.

Nate had established rules for himself about using his phone when with others: it was "okay to read email at dinner with a group but not one other person." However, if he was not able or willing to check his phone in a particular situation, he reported feeling anxious until he found an excuse to do so, and guilty about missed messages; if he did check, he felt guilty about neglecting friends or classes. Though he allowed himself to be 'tethered' [33:8] and feared the social censure of disconnection, Nate also recognized its cognitive and emotional tolls.

iPhones and "The Moment"

These discussions about immediate surroundings versus extended networks prompted us to ask, do iPhones only take one out of the present, or can they contribute to it as well? We certainly saw and heard of many instances of iPhones taking people out of "the moment." For some students, an iPhone was not only a connection device, but a time-killer, especially with the availability of "addictive" games (which were already popular on campus in 2009, even before the advent of Zynga's bestsellers or Angry Birds). One student explained, "The iPhone interface invites distraction by displaying too many options ... it was designed to be a toy." In our field observations, we witnessed students walking around campus using their mobile phones and oblivious to their surroundings: one student walked the long way around a roundabout against traffic while pecking at her iPhone's screen, some were unaware of how loudly they were talking on their phones or of the irritated looks they were receiving from others, and a few initially missed turns while using their phones in transit and had to come back around.

A few students said they liked that they could use the many apps on their iPhone as an excuse to not make eye contact while walking around campus, much like shy book-readers do, or to create the appearance of busyness [7] while waiting. While other students derided these practices as "shallow" or "rude," it served an important function of giving students a relatively acceptable way to withdraw from the always-on culture of campus life. This simultaneous inhabitation of physical and virtual spaces—in essence, creating private spaces within a larger public space—is described by Turkle as "tethering" [33:8] and is similar to the lightweight *nagara* ("while-doing-something-else") culture of Japanese teens discussed by Fujimoto [13:4].

However, iPhones did not always detract from immediate surroundings, as Ito and Okabe also noted among Japanese youth and mobile phones more generally [13]. Interviewees told us cases when iPhones enhanced face-to-face interactions, often in ways that highlighted features that were unique to smartphones. Almost all interviewees talked about using their iPhones to show off applications, play music or videos for friends, or look up information on the fly to contribute to a conversation, sometimes doing so collaboratively to include the other person in what would otherwise be an exclusionary interaction with just the phone. In the words of one participant, "These apps are a great conversation starter." A few discussed the "YouTube time" at parties, which generally happened fairly late at night when those still present wound down by showing each other funny videos on their iPhones or laptops. Some played social games with friends on their iPhones, either over the network (competitive word games were particularly popular) or in person (e.g. two-player Tap Tap Revenge, played on opposite ends of the same screen).

Still relatively new, iPhones also served as a status symbol for their owners: three-quarters of survey respondents said their iPhones made them feel "cool" (see [16:15] for more on mobile phones, status, and fashion), though the technology fetishism surrounding the iPhone was often an uncomfortable topic of discussion in interviews. In fact, one student said she was "ashamed" when her family gave her one because "only pretentious people had them. I didn't want people to see me with it." (However, she explained that the maps feature later won her over, as she saw herself as "direction-impaired.")

Some students also said that their iPhones made them more aware of their surroundings by allowing them to explore new areas and discover local restaurants using the maps feature—though others said that this reduced the serendipity of getting lost and wandering. Other students did not think the seat-of-the-pants planning typical of mobile phone culture (discussed at more length in [13]) changed their overall awareness of their surroundings at all. In short, the evidence on whether iPhones took students "out of the moment" is mixed and highly idiosyncratic.

Techno-resistance and Oppositional Identities

A few of our interviewees had never thought of limiting the reach of technology in their lives. Some graduate students in

particular reported that the constant connection that their multi-featured iPhones enabled freed them from being tethered to their computers all day, allowing them to work outside their office or run errands, confident that they can be reached by their advisors, peers, or sweeties as needed. “It helps me structure my life to be more efficient,” one asserted. Another darkly joked, “If I didn’t have my iPhone for a month I’d end up on the roof with a rifle. It’s my lifeline.”

About two-thirds of the 57 students we interviewed, however, and about as many survey respondents talked about balancing the myriad social demands of constant connection, in person and over the network, with personal desires for control, concentration, and peace by sometimes turning iPhones and others technologies off. I describe this active push-back to the perceived overreach of iPhones and other technologies as *techno-resistance*, and note that among our participants, techno-resistance was often expressed as a part of their identity. The practice of techno-resistance, whether minor or all-encompassing, allowed students to use their self-imposed limits on interactions with technology to make a broader statement about their values, particularly when they were in contrast to the values they thought that those around them held. More importantly, it allowed them to stand by these values when others censured them for not being available, and it even enabled some to censure others for multitasking. By suggesting that their behaviors and values were part of their identity, students could make them appear more fundamental and unchangeable than mere choices.

Specifically, the belief that technologies and the multitasking they demanded were to blame for stress and scattered brains were often entwined with beliefs about what it means to be an “authentic” or “present” individual. Beatrice, an undergraduate who lived in a campus co-op and was interviewed in the campus community garden, exemplified the anxiety and need for discipline that these students felt regarding technology. She felt guilty that she sometimes used her iPhone to “fill time.” She did not want to be absorbed in her phone like others, oblivious to the world around her—in her words, she wanted to be able to “notice what’s around me, and the friend around the corner,” rather than being “addicted” or even “creepy” like some people she knew with iPhones. Though she brought both her iPhone and her Mac to Stanford’s community garden and checked both during the interview despite teasing, she said that she was thinking of getting rid of her iPhone because she did not like that she felt compelled to check email all the time, and she had to force herself not to. In fact, when we followed up with her a few weeks after the interview, she had gotten rid of it.

To students like Beatrice, the constant connection that iPhones entailed limited their freedom and independence, ultimately making them feel less whole, less adult, even less human. She and several other interviewees derided people who were always consulting their extended social networks for all of their decisions—another student described this as a technological “security blanket” from which these people should wean themselves. Beatrice was also concerned with

privacy and was against texting in romance. The reasons for this stance that she gave were more about her past than about technology: she pushed back because she was “from a ranch” and was thus “more on the nature side” (and, by implication, against pervasive technology). One female undergraduate described how technology “alienated” people from nature and face-to-face interaction and exacerbated “bad mental habits.” Another participant told us about how he deliberately disconnecting himself on occasion, explaining his preference in naturalistic terms and adding that he could quit anytime:

I like to be in touch with the environment and the space I find myself in—not just for safety reasons, but because I prefer the experience. ... I could leave it [the iPhone] behind quite happily.

Another student, though he used his iPhone all the time, expressed similar sentiments:

I don’t want to be texting all the time instead of enjoying nature and the people around me. People are going to stop seeing the beauty of the world because they’re so wrapped up in their iPhones.

In this way, technology use became implicated—often negatively—in some students’ sense of authenticity, naturalness, and the ways they perceived “real” relationships and connections as superior to virtual ones. While these students did use iPhones and other technologies, sometimes extensively, they also expressed age-old concerns about whether the social expectations enabled by these technologies were really what they wanted.

Moreover, by publicly defining themselves as in opposition to constant connection, they were, in a way, ensuring that they did not succumb to it themselves. About one quarter of the students who talked about their desire for techno-resistance compared their actions to what they saw as the “typical” iPhone user, finishing stories about this kind of user with some variation of the statement “I’m not one of *those* people.” This echoes Nafus and Tracey’s finding that some participants similarly defined themselves in opposition to the “the kinds of people [they] *think* use mobiles,” though some uses and social expectations have evolved since their study [15:208]. Typical iPhone users, the students in this study said, were always peering down at their screens, unaware of their surroundings and oblivious to the social gaffes they were making. Like Turkle’s tethered selves [33:8], they were “alone together,” never fully present either physically or virtually: they talked loudly on their phones in public places, they texted when with their friends, they checked Facebook during class. They were always consulting their extended network for where to go to dinner or what to do with an extra five minutes. In short, they were *addicted* to their iPhones, and their addiction stifled their initiative and creativity, did not let them enjoy the moment, and made them dependent on being constantly connected. Some of the strong language students used to describe these strawman users stemmed from students’ frustration with others, but it was also due to the fear that they could easily be making the same mistakes. A few students, in fact, reported that they feared becoming

like this, and a few others said they had been like this at one time before, like Beatrice, “seeing the light” and imposing limits on themselves.

Students had a variety of strategies for shutting out technology’s distractions and achieving techno-resistance. Several commented that being able to control intrusions was particularly challenging because both work and distractions were present on the same devices (whether laptops or iPhones), and the barrier to switch from one to the other was extremely low, making multitasking a constant temptation/threat. One student raised this barrier somewhat by putting his devices into “airplane mode” when he wanted to focus on something else, and another physically unplugged her wireless router and gave it to a friend while she studied. Others would try to *mentally* regulate their behaviors, though often with more limited success, by setting time or work goals for themselves, after which they would have a reward of a few minutes of distractions. (Though there are software tools that enforce these kinds of limits, none of the students in this study had used them.)

In sum, we can see that this generation of so-called digital natives was hardly uniform in embracing digital technologies. Rather than deterministically creating new sociotechnical worlds, iPhones and other technologies were integrated into existing webs of social relations, and their influence, like that of any social actor, varied across individuals and situations. These technologies were part of the ongoing social negotiations that all students faced, and their responses to the pressures of constant connection were heterogeneous. The prevalence of *techno-resistance* in particular pushes back at monolithic definitions of “digital natives”: even in such a technologically-savvy population as Stanford students, such definitions are too technologically determinist and do not match the complexities of reality.

Thoughts on the iStanford Plan

Toward the end of our interviews, we asked students about the plan to replace their ID cards and possibly dorm keys with iPhones. How would they feel about this, and how would it change campus life? Though most expressed concerns about what it would cost and how the university would pay for it (raise tuition?) and some expressed concerns about Apple/AT&T monopolies, their further thoughts about what effect it might have on campus often mirrored their thoughts about constant connection.

On one side, one student who sheepishly (though otherwise unapologetically) described herself as “addicted” to email said she would welcome such a plan because it would make other students “accountable” for communications from the university, teachers, and peers—in effect, institutionally *enforcing* constant connection. Students practicing techno-resistance also expected that this plan would enforce constant connection—and the thought appalled them. They already had trouble getting away from technology, they cried; why would the university want to make that even more difficult? In short, institutionalizing a technology like the iPhone may also institutionalize certain aspects of the social culture that

has developed around it, and Stanford’s culture of constant connection was one that not all students welcomed.

CONCLUSION

This paper provides a window onto the technosocial lives of college students, centered around the iPhone. Mobile phones, and iPhones in particular, were often treated like social actors, playing a role in students’ daily lives and social interactions. However, we have also seen that iPhone use was by no means stable or uniform: students exhibited an array of behaviors and rules regarding their use, some even rejecting the connectivity that iPhones enabled.

Throughout this paper, I have emphasized findings unique to iPhones. It is worth noting, however, that in many cases smartphones did *not* introduce a radical break in mobile phone culture. The iPhone’s multi-functionality and uniformity introduced some new practices, but it merely intensified others, such as the expectation of constant connection, that were already present. Students visited Facebook, played games, and looked up directions before the iPhone; the iPhone just made these more accessible. This in itself is an important finding: rather than creating from whole cloth an entirely new mobile phone culture, iPhones more often shifted the focus, and perhaps the valence, of the ongoing negotiations between mobile technologies and users.

In *Born Digital*, John Palfrey and Urs Gasser posit that the generation in college now is the first generation of “digital natives” who interact with, understand, and incorporate technology into their everyday lives in a fundamentally different way than older generations [24]. These students grew up multitasking between their surroundings and their extended networks and, as Don Tapscott further describes in *Growing Up Digital*, have adapted to it [32]. Arguably, Stanford students, having generally grown up with easy access to mobile phones and the Internet and surrounded by a casual ubiquity of cutting-edge technology on campus, should be some of those most deeply engaged in these brave new digital worlds. They should be the ‘innovators’ and ‘early adopters’ of new technologies, not the ‘laggards’ [26].

However, these students were negotiating their iPhones, social lives, productivity, and more in ways that were multivalent and, moreover, remarkable for their ordinariness. Their concerns about maintaining relationships, being productive, and staying true to themselves would be familiar to both sides of the “digital native” divide. While these students do live in a world where their peers, and even their professors and parents, expect them to be constantly connected, there are still recognizable social rules and personal preferences governing behavior, both online and off. Students must also deal with the same concerns about the cognitive and social perils of multitasking. As a result, surprisingly large numbers of students pushed back against the stress and cognitive load of constant connection and the multitasking it entailed by actively *disconnecting*, invoking tropes of wholeness and authenticity to justify their actions. In short, even the most savvy and privileged “digital natives” make sense of their iPhones in the same ways as any of us.

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