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RESEARCHING LIFE IN E-SOCIETY WITH DIARY STUDIES

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Abstract

To study life in an e-society, it is important to collect data in situ. One research method that provides for data to be collected as people live their e-society lives is a diary study methodology. Diary studies ask participants to record certain events, using various technological means, over a fixed period of time. While diary studies have their strengths, the most important of which is cost effective in situ data collection without the need for an outside observer, they also have their weaknesses, most notably the high level of commitment demanded from the participants. This paper reports on a 2005 diary study of lying in everyday communication, with a focus on lying via computer-mediated communication modes, such as phone, e-mail, and instant messaging. The study, which involved 25 undergraduate students logging their communication activities for seven days on personal digital assistants, serves as the vehicle from which to derive a set of lessons learned about the diary study methodology in practice.

Keywords: diary studies, deception, e-society

RESEARCHING LIFE IN E-SOCIETY WITH DIARY STUDIES

1 INTRODUCTION

The information society may have arrived as early as the late 1950s, when the proportion of workers employed in creating or manipulating information in several Western democracies surpassed the proportion employed in manufacturing (Porat, 1978). Although not everyone agreed on the definition of an information society (Lyon, 1986), over the ensuing decades, more and more countries, such as Australia, South Korea, Taiwan and Singapore, declared themselves information societies (George, et al., 1995). Today, we have moved beyond the information society to a society where the electronic creation, movement and storage of information enables and sustains a dynamic bundle of information services, typically denoted with an “e” prefix: e-commerce, e-government, e-society.

There are many issues related to the coming of e-society currently being studied by scholars around the world. These issues include access, inclusion and exclusion (digital divides), availability and censorship, privacy and surveillance, the influence of e-services and products on select members of society, such as the relationship between videogames and violence among teenage males. Many of the research methods that are common to academic disciplines such as management information systems (MIS) enable adequate study of issues related to an e-society. While it is possible to successfully study issues related to living in an e-society in laboratory experiments, the picture that emerges from the lab will necessarily be limited. Interviews and focus groups investigating past behavior will generate rich data, but some details may be lost due to the temporal distance between the events studied and the interviews. Generally, field studies are a more natural fit for studying the e-society *in situ*. While an ethnographic approach is probably best, there are other research methods that can be used successfully to study what life is like in an e-society. This paper is about one of those methods: Diary studies.

Diary studies have already been used to investigate life in an e-society. Examples of such studies include those by Reiman (1993), Gershuny (2002) and Palen & Salzman (2002), all discussed in more detail later. Another example of a diary study approach to investigating e-society is a project called “Multispeed Cities and the Logistics of Living in an Information Age,” headed up by Michael Crang¹ of Durham University. This paper is about using a diary study methodology to investigate naturally occurring behavior *in situ*. The research question is whether and how a diary study approach can be used successfully for the study of *in situ* behavior of the type that would interest e-society researchers. To help answer this question, the paper first reports on the diary study literature. It then focuses on a recent diary study conducted by the author and a colleague as an example of how such a diary study could be conducted. This study was designed to research the frequency with which people lie as part of daily discourse, with a special focus on lying when using computer-mediated communication (the inclusion of which qualifies the study as having an e-society focus).

Participants in diary studies keep track of their activities for some specified period of time. As such, these studies allow for the systematic collection of data about a series of discrete events that unfold over time, or about the psychological states of participants, measured at multiple instances. Diary studies also allow for the unit of analysis to be the individual or the discrete events themselves, or both. They can generate a large amount of data that can be rather rich. As such, diary studies seem to be a cost effective way to collect data from participants in the e-society as they live their electronically-influenced lives. They allow researchers to collect rich field data without having to actually be in the field. These studies are not, however, without their own problems and issues.

¹ <http://www.dur.ac.uk/geography/research/researchclusters/?mode=project&id=45>

The rest of this paper is organized as follows: The next section provides a brief overview of diary studies, their strengths and weaknesses. The following section provides a description of a diary study conducted by the author and a colleague, with a focus on research issues related to the study and some serendipitous findings that resulted. The paper concludes with lessons learned and the potential usefulness of diary studies for e-society studies.

2 DIARY STUDIES LITERATURE

Diary studies have been used in many different academic fields for many years. By some accounts, the first diary study was conducted in 1887, where in a study of language development, parents kept daily records of their children's speech (Darwin, 1887). In social research, large scale diary studies have been conducted in the UK for several decades, going as far back as the 1930s and continuing on in more recent studies such as the Home-on-Line study conducted in 1999 and 2000 (Gershuny, 2002). Diary studies have become common in computer-supported cooperative work (CSCW) (Palen & Salzman, 2002) and human computer interaction (HCI) research (Newman, 2004), with the first diary study in HCI reportedly conducted in 1993 (Reiman, 1993). Diary studies are common in some commercial enterprises as well. For example, ACNielsen routinely gathers data about television viewership habits in many countries around the world through diaries kept by volunteer household chosen to be "Nielsen families." As far as we can tell, however, there have been few diary studies in the MIS field.

Diary studies in information technology-related fields differ tremendously in study design, scope, and technology used. The original HCI diary study (Reiman, 1993) involved 10 participants who used standardized paper forms to record their daily activities and any Eureka moments they had in learning how to effectively use information technologies. The study lasted for five business days. In the "Busy Days" project, participants were asked to first establish a plan of all they hoped to accomplish on a given day and to keep track of all of their activities for the day, supplying a starting time, ending time, and activity description (Newman, 2004). The Home-on-Line study (Gershuny, 2002) collected data from all people aged 10 and over in 1000 British households in 1999 and 2000. Participants were asked to keep detailed time-use diaries, in 15 minute increments, covering 35 pre-determined activities, for one week. Sixty percent of the participants kept these detailed records in 1999, and 740 people from the same group did so again in 2000. Grintner and Eldridge (2003) enlisted ten British teenagers to keep paper logs of their cell phone text messaging activity over seven days. Other diary studies have involved having participants taking photos over the course of one day, calling in on their cell phones to answer questions about transit decisions over a two week time period, and collecting tangible objects at a one day jazz concert (Carter & Mankoff, 2005).

An excellent review of diary study methodology can be found in Bolger, et al. (2003). Bolger and colleagues characterize diary studies as focusing on one of three research goals: "(a) obtaining reliable person-level information; (b) obtaining estimates of within-person change over time, as well as individual differences in such change; and (c) conducting a causal analysis of within-person changes and individual differences in these changes (p. 581)." They also categorize diary studies by their overall design, which can be time-based or event-based. Time-based studies can be further divided into interval-contingent and signal-contingent. In interval-contingent studies, participants record their activities at regularly scheduled intervals, such as at the end of the business day or at each meal time. In signal-contingent studies, participants receive a signal from the investigator to stop what they are doing and record their activities. The best known type of signal-contingent method is the Experimental Sampling Method (ESM), developed in the mid-70s by Csikszentmihalyi, Larson and Prescott (1977). Using this method, participants are given devices such as pagers, which signal them that it is time to make entries in their diaries. Event-based designs call for participants to make diary entries when a particular event of interest to the researchers occurs. An example of such an event would be a decision about transit (Carter & Mankoff, 2005).

Diary studies can also be characterized by their technology. Paper and pencil diaries, included preformatted pages, are the most common form of technology used, although they may be supplemented by devices such as pagers in ESM. Currently, other technologies are beginning to be used, such as cell phones (Palen & Salzman, 2002; Carter & Mankoff, 2005) and handheld computers or personal digital assistants (PDAs) (Stone, et al., 1998). According to Bolger, et al. (2003), handhelds and PDAs have many advantages for diary studies, including their ability to allow for signalling; their provision of time-stamps; their capacity for flexibility in the presentation of questions; their advantages in terms of data entry, management, and accuracy; and their ability to take into account the participant's schedule. The primary disadvantages of handhelds are cost and training participants on how to use them, although both of these issues are becoming less of a concern. For example, in late 2005, Palm released a new PDA model with relatively high storage capacity and a color screen for less than 100 USD. A more serious limitation may be the necessity for creating and programming the diary for a handheld. However, a freeware diary program for handheld devices (Experience Sampling Program, or ESP), sponsored by a US National Science Foundation grant and developed by Barrett & Feldman-Barrett², is available.

A study by Green, et al., (2003) found no differences in data obtained using pencil and paper diaries and using PDAs. In their study, 21 pairs of participants used paper forms one week and a PDA the other week for daily diary entries. There were high rates of compliance from both paper and pencil and PDA users and little difference in the results reported on paper or via PDA.

2.1 Diary studies strengths

The primary strength of a diary study methodology is that it allows for the collection of data *in situ* from real people in real situations. Investigators are able to collect a large amount of very specific data about events or psychological states of interest, over time, without having to actually be present to observe or inquire about the activity or state. As Newman (2004) states, the data are not as detailed as video recordings, but the information collected is more than adequate for identifying recurring activities and structures. Data can be qualitative or quantitative, depending on the goals of the study, and can be analyzed appropriately.

Another strength of diary studies is their propensity for serendipitous discovery. While the investigator is looking for very specific data, participants will also report on happenings that are unexpected, and this can lead to deeper insights into whatever is being studied. As Palen & Salzman (2002) put it: "Participants' diary reports sometimes hinted at issues that deserved much deeper investigation and empirical treatment. Because they were spurred by real events, the reports sometimes raised issues that did not emerge in the interviews because participants forgot about them or because we didn't know to ask about them. (p. 90)"

2.2 Diary studies weaknesses

Practitioners of the diary study method have also noted that there are risks associated with this method. Participants in diary studies are typically asked to do much more than a respondent to a survey or a subject in a laboratory study. Instead of study participation of an hour or less, diary study participants are asked to be actively involved for days or weeks. They sometimes tire of the effort and lose interest (Palen and Salzman, 2002; Bolger, et al., 2003). Adequate compensation is one way to keep their interest, but compensation schemes need to be thought through carefully to maximize their impact. For example, for some research designs, piece rate compensation schemes may be more appropriate than providing everyone with the same fixed amount of compensation, regardless of their rates of compliance. Diary study participants must also be trained, sometimes extensively, in the

² <http://www.experience-sampling.org/esp/>

proper method for completing paper or electronic forms and in properly using whatever equipment may be issued to them.

Also, as part of their attempts to be good participants, they may sometimes try to guess what the researcher is interested in and complete the diary accordingly (Reiman, 1993). They may not record data for events or psychological states they come to believe are outside the scope of the study. Of course, this threat to internal validity is not limited to diary studies. Finally, and on a related note, the mere act of participating in the diary study may affect participants' experience or responses. That they are assiduously keeping a diary may alter what they do or how they feel, as they may not want to engage in behaviors they would not want to report or have feelings they would not want researchers to know about. While this latter issue is probably more likely in diary studies of sensitive activities, such as those related to sexual behavior, it is possible that the mere act of keeping a diary could affect participant behavior in information systems related research as well.

3 EXPERIENCE WITH DIARY STUDIES METHODOLOGY

This section contains a brief overview of a diary study conducted in the summer of 2005 (George & Robb, 2006) in order to provide some insight into how a diary study might be used as the basis for a study of e-society. Participants in this study were given personal digital assistants (PDAs) to use for keeping records of their communication behavior for one week. For each communication event that met certain criteria, specified below, participants answered a series of closed-ended questions. Although the topic of interest in this study was communication, especially deceptive communication, a diary study could be used to investigate many topics related to e-society where the researcher was interested in the frequency of certain events in participants' daily lives. As discussed earlier, a wide range of technologies are available to support various research questions, and these technologies support open-ended questions as easily as they support closed-ended questions. For example, while PDAs might not be the best technology to use for studying media illiteracy, they would work well for studies focused on recording barriers to technology access (What kind of barrier? How often was it encountered?) or for recording perceptions of e-society risks and dangers. Small handheld devices were ideally suited for the diary study to be discussed in more detail below.

The diary study reported on here was a replication of an earlier study of media choice and deceptive behavior (Hancock, et al., 2004). The Hancock study used a diary study methodology, whereby participants kept track of their communication behavior for seven days. It was itself a replication of a diary study that was published in 1996 (DePaulo, et al., 1996). All three studies sought to determine the frequency with which people lie as a part of daily discourse, a research question well-fitted to a diary study methodology. As such, all three studies pursued the first of the three research goals identified by Bolger and colleagues (2003) for diary studies: "obtaining reliable person-level information." While all three studies asked participants to note the communication mode used for daily communications, the latter two studies were specifically focused on the relationship between deception and computer-mediated communication. The primary research question for these last two studies was: "Relative to the basic setting of Face-to-Face (FtF) conversations, are speakers more or less likely to lie on the phone, in an email, or during an instant messaging exchange? (Hancock, et al., 2004, p. 129)."

In their study, DePaulo and colleagues (1996) required that participants, over the course of a week, record their communication interactions in diaries. They drew participants from two populations, the general community and college students. From the results of their study, the researchers concluded that lying is a fact of daily life: The participants in their studies lied in 20% (community members) to 33% (university students) of their social interactions. DePaulo and colleagues also found that, while most of the social interactions were conducted face-to-face, proportionately more lies occurred on the telephone than in face-to-face communications. As was the case in the DePaulo studies, Hancock and his colleagues (2004) had participants keep journals of their communication interactions over the course of a week. They found that lies were recorded in 26% of social interactions, echoing the

findings from the earlier study. As was the case for DePaulo, et al., participants used the telephone proportionately more for lying than they used other communication media for lying.

As was the case in the previous studies, participants in the George and Robb (2006) study kept diaries of their communication interactions over a seven-day period. Like the earlier studies, this study stipulated that participants record only interactions that lasted longer than ten minutes. The exception to that rule was when the interaction included a lie. Participants were instructed to record all social interactions in which a lie occurred, regardless of whether or not the interaction reached the 10 minute criterion. All three of these studies, then, were event-based instead of time-based.

Unlike the two previous studies, which provided paper forms for participants to complete about their social interactions, the George and Robb study provided participants with PDAs for data entry. Participants answered a series of questions about each social interaction that lasted longer than 10 minutes and about each lie they told. The questions participants answered came from the Social Interaction and Deception (SID) questionnaire, created by Hancock and Ritchie.

The SID questionnaire asks participants to record the same information about all interactions that met the criteria for being recorded. This information includes the length of the interaction, the communication media used, the number and gender of interaction partners, how well the participant knew the partners, the intimacy and quality of the interaction, how well liked the partners were, how long the participant had known the partners, and whether or not the participant lied. If the participant had not lied, the entry was complete. If the participant had lied, then he or she was asked to answer several more questions. These questions and their possible responses are listed in Table 1.

Table 1: Questions asked about lying behavior

QUESTION	POSSIBLE RESPONSES
To whom did you lie?	Stranger, family, significant other, friend, superior, acquaintance
Number of people lied to.	Males (0, 1, 2, 3, 4+); Females (0, 1, 2, 3, 4+)
What was the lie about?	Feelings, achievements, actions, explanations, facts
Why did you lie?	Self benefit, Other benefit
How did you lie?	Outright, exaggeration, subtle
Who were you lying about?	Myself, target of the lie, another person, an object
How planned was the lie?	Nine point scale from 1 (spontaneous) to 9 (planned)
How serious was the lie?	Nine point scale from 1 (trivial) to 9 (very serious)
How well do you think your partner(s) believed the lie?	Nine point scale from 1 (not at all) to 9 (completely)
How comfortable were you BEFORE the lie?	Nine point scale from 1 (uncomfortable) to 9 (comfortable)
How comfortable were you DURING the lie?	Nine point scale from 1 (uncomfortable) to 9 (comfortable)
How comfortable were you AFTER the lie?	Nine point scale from 1 (uncomfortable) to 9 (comfortable)
How would the TARGET(S) have felt if you had told the truth?	Nine point scale from 1 (much worse) to 9 (much better)
How would YOU have felt if you had told the truth?	Nine point scale from 1 (much worse) to 9 (much better)
How important was it not to get caught?	Nine point scale from 1 (not at all) to 9 (very)

Students for the study were recruited from an introduction to MIS course for non-majors in a large southeastern university in the US. Twenty-five students agreed to take part in the study. Twelve were females and 13 were males. Student initially met with the researchers for a 45-minute interactive orientation, focusing on proper use of a PDA (most had not used one before) and definitions and examples of the activities they were to record. Deception was defined according to the original diary study of deception by DePaulo and colleagues: "A lie occurs any time you intentionally try to mislead someone" (p. 981). Students determined on their own if they had lied or not, based on the definition and on examples presented during the orientation, and recorded the behavior accordingly. At the end of one week of recording details about their communication interactions on their PDAs, students met again with the researchers to return the PDAs and to receive their compensation for their efforts. Students were paid 50 USD for their participation. They also received extra credit in their course.

Those who completed the study were entered into a lottery, and the winner was awarded a 100 USD prize.

Similar to the earlier studies, George and Robb found a large proportion of communication events were deceptive. Twenty-five percent of events recorded by participants in their study contained lies. The authors also found that face-to-face was the most common mode of communication and that, proportionately, participants lied more on the phone than face-to-face. Details about the study and its findings can be found in George and Robb (2006).

3.1 Issues

As we conducted our study, we ran across several issues that should be of interest to anyone contemplating following a diary study methodology for a study of e-society. Some of these issues may be more pertinent than others for a given study, as each diary study design is likely to be very specific to the research questions asked and the study context. The issues we faced included the source of the questionnaire, the overall cost of the study, differences in the number of events reported in our study compared to the study we were replicating, and an issue related to how events to be recorded were defined. Certainly the first two issues, of instrument design and cost, will be pertinent to any diary-based study of e-society, regardless of the research question.

As we were conducting a replication of a study, and as we knew that the authors of that study had already converted their SID questionnaire to run on PDAs, we only had to ask the authors for access to their software to conduct our study. The SID questionnaire was converted using NSBasic by Jeff Hancock and Thompson Ritchie. Both the questionnaire file and an NSBasic runtime file had to be uploaded to each PDA, which was simple to do during the synchronization routine. Once data collection was complete, data were downloaded from each PDA in the same way. The data were then converted to Microsoft Excel format using the PDBconverter application, which was available as freeware on the web. Although this method was simple for us and worked quite well, it is obviously limited to situations similar to ours, where the PDA-ready questionnaire is already available and its authors are willing to share it. The only downside we faced was the necessity of going back to Hancock and Ritchie for small changes, such as substituting our names and phone numbers for theirs on the questionnaire's information screen.

Using proprietary questionnaires already coded for PDA use is, of course, only one way to design and implement a research instrument. Using the Experience Sampling Program (ESP), mentioned previously, is another alternative for PDA instrument design. ESP is relatively easy to use, well-documented, and free. However, given the start-up costs involved in purchasing PDAs, a paper and pencil approach is cheaper, and there is no programming involved in creating the instruments, making them easier to design as well.

Cost refers to both the monetary costs and training investments. As far as such studies go, the overall monetary cost was relatively small. We bought 30 Palm Zire PDAs at 100 USD each. Each of the 25 participants was paid 50 USD for their help, and a 100 USD lottery prize was awarded to one of the participants. The total cost was roughly 4350 USD, and the funds came from a research grant. As for training, we prepared and then delivered the 45-minute orientation session explained previously. For our study, given these expenses and given that the questionnaire already existed, our costs were relatively low. Starting such a study from scratch, however, could raise the cost considerably.

Unlike the Green, et al. (2003), study mentioned earlier, we did find differences between data collection with PDAs and data collection with paper and pencil, even though our data collection effort itself did not use paper and pencil. We can make a comparison between the two modes, however, because the study we replicated, Hancock, et al. (2004), did use paper and pencil versions of the same instrument and because both studies used similar subject pools – undergraduate students. The amount of time covered in each study was the same at seven days. Hancock, et al., had 28 participants, while George and Robb had 25. Also, both studies found the same incidence of deception: 26% of events in

the Hancock study vs. 25% in George and Robb. The key difference, however, was in the number of communication events recorded. The George and Robb study had about one-third of the total number of communication events (Hancock et al.: 1198 vs. George & Robb: 413) and lies (Hancock et al.: 310 vs. George & Robb: 104) recorded by their participants, compared to the Hancock study. Why was this so? The key difference between the studies was the technology used for diary data entry. One could argue that PDAs should make it easier to enter data about communication events compared to paper and pencil. A participant could carry the PDA around at all times and make an entry immediately after an event occurred. Proximity and ease-of-use should enable more complete data entry, and hence, there should be more data from PDA users, compared to paper diary users. We found just the opposite. Another possible explanation is that in paper-based studies, where participants are given a stack of forms to complete before the study starts, perhaps the number of blank forms influences the number of events reported, similar to Reiman's (1993) argument about participants wanting to please the researcher. If a participant is given 70 forms to complete for a week, perhaps he or she thinks that 10 events per day should be reported. With a PDA, there is no numeric anchor, derived from the number of forms allocated, provided to indicate to a participant how many events are worthy of recording. One of the identified weaknesses of diary studies is the need to train participants in how to properly record events, and sometimes the training needed can be extensive. Another possible explanation for the relatively low number of PDA-user responses may be that the training session was inadequate and that the students needed more training than was provided. There are other plausible explanations as well, one of which is discussed under serendipitous findings.

The final issue discussed here deals with definitions. In order for participants to record communication events and lies, they needed to have both terms defined. As our study was a replication, we were bound by definitions that had been provided in the earlier study. And as that study was also a replication, it was further bound by a previous study. The original study, by DePaulo and colleagues (1996), defined a communication event worthy of recording as lasting 10 minutes or more. However, there were no durational restrictions on lies. While only communication events that lasted longer than 10 minutes were to be recorded, all lies, regardless of the duration of the communication event that produced them, were also to be recorded. The operationalization of these definitions results in an overrepresentation of lies. The 10-minute definition for communication events also distorts reporting of e-mail traffic. Given that e-mail is asynchronous, participants were instructed to only report on e-mail messages that took 10 or more minutes to compose, unless the e-mail contained a lie. E-mail communication is most likely underreported, then. The perhaps unforeseen ramifications of less than careful definition of key constructs and their operationalization is an issue for most research designs, however, and not just for diary studies.

3.2 Serendipitous findings

An identified strength of diary studies is their propensity for serendipitous findings. Unexpected and serendipitous findings were one of the outcomes of our diary study. Although we were not looking to investigate changes in technology use over time, that is one of the unexpected things we found we were able to comment on. When we talk about use over time, the time interval we are talking about is not the week during which participants kept diaries. Rather, we are talking about the time interval of 1996 to 2006, the time between the original diary study conducted by DePaulo and colleagues and our study (or the time between their publication dates). We also have the Hancock study between the two. This is similar to the cross-study comparisons made possible in the Home-on-Line project, where earlier diary studies of television viewing could be compared to recent studies of Internet use (Gershuny, 2002). Given that the Hancock study is a replication of DePaulo, and our study is a replication of Hancock, the findings across studies are strictly comparable. Comparing all three studies, we found that there has been an interesting change between 1996 and 2006 in how people communicate.

Table 2 shows the proportions of communication events, with and without lies, across media for each of the three studies. Text refers to anything written in the first study, but it refers to e-mail and instant messaging in the latter two. Figure 1 shows graphically the proportional use of media for honest communications, across these three studies, while Figure 2 shows the patterns for dishonest communications. An examination of these data shows many things, but one of the most interesting observations concerns changing patterns of media use from 1996 to 2006, in particular the shift to phone use. From 1996 to the next data point in 2004, there is a marked decrease in the proportion of communication occurring face-to-face, whether for honest or dishonest communication. There is also a marked increase in both written and phone use in that time period. By 2006, just a few months later, the increase in the proportion of communication conducted on the telephone is even more marked, especially when looking at deceptive communication.

Study	WITH NO LIES				WITH LIES			
	FTF	Phone	Text	Total	FTF	Phone	Text	Total
DePaulo	91.83	6.70	1.46	100.0	85.08	13.63	1.29	100.0
Hancock	62.98	12.86	24.16	100.0	66.45	21.71	11.84	100.0
Current	62.46	28.48	9.06	100.0	48.08	42.31	9.61	100.0

Table 2: Comparing media use and lying behavior across diary studies as proportions of total social interactions recorded.

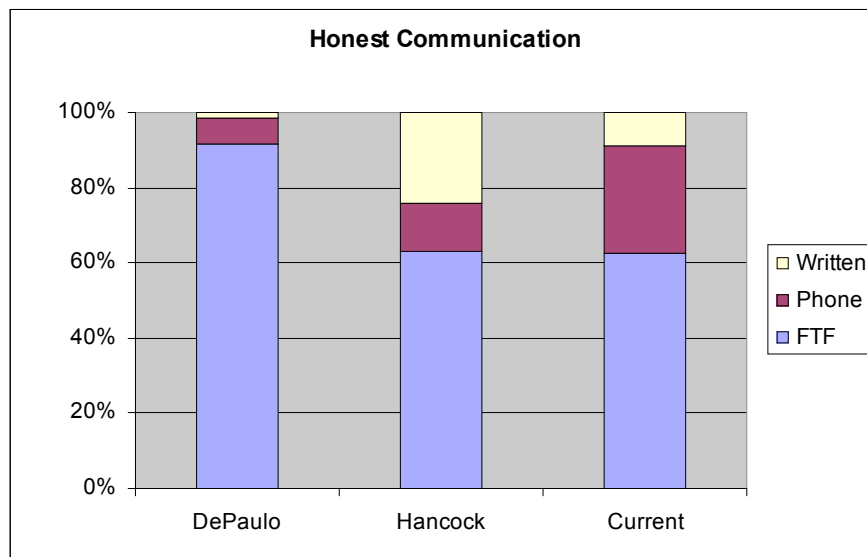


Figure 1: The proportional use of different media for honest communication across three studies.

What explains these shifts in communication mode use? It seems clear to us that the data reflect the emergence and diffusion of cell phones. In many ways, the telephone that DePaulo's study participants used is not the same telephone used in the 2004 and 2006 studies. DePaulo's participants had to seek out a phone in a building or a pay phone to make their calls. Participants in the latter two studies had only to pull the phones out of their pockets or backpacks. And while it may not intuitively seem as if cell phone use had changed as much as the data indicate between 2004 and 2006, there are data that provide support for the increase. While 53% of US households owned cell phones in the spring of 2004, the proportion of households with cell phones had increased to 65% by the spring of 2005, more than the proportion of at-home Internet users in the US (63%) (Enpocket, 2004; 2005). Had we not had data from three separate but comparable diary studies, we would not have been able to see these patterns of change.

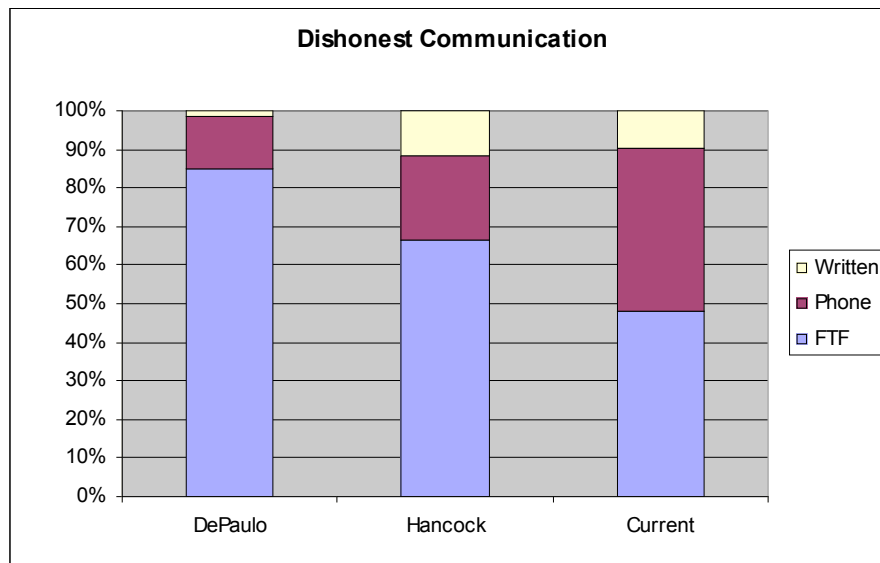


Figure 2: The proportional use of different media for dishonest communication across three studies.

Another serendipitous finding came when subjects were debriefed at the end of the study. At the time, the data had not been examined, as participants were only then returning their PDAs. Still, we were struck by one of the participant's comments, that in taking part in the study, she became aware of a surprising aspect of her communication behavior: The majority of her communication exchanges were short, too short to be recorded for the study. A plausible explanation for the difference in the number of recorded events in this study vs. the Hancock study is the brevity of communication events among college students today, where instant messaging and text messaging via cell phones seemingly have become the norm for communication for that age group (Grintner & Eldridge, 2003).

4 LESSONS LEARNED & SUGGESTIONS FOR THE FUTURE

There are several things we learned about conducting diary studies from our investigation of media use and deceptive communication. The first lesson came from definitional issues and changes in communication behavior that affected our data and its interpretation. Closely related to this is what we learned about strict replication. The last two points we make are about technology, PDAs and cell phones.

Definitional issues and changing patterns of communication mode use conspired to distort our data. As explained above, the 10-minute rule for choosing which communication events to record, and the fact that the rule did not apply to deception, resulted in an overrepresentation of lies and an underrepresentation of e-mail exchanges. (The same distortions characterize the findings from the DePaulo, et al., and the Hancock, et al., studies as well.) Changing communication behavior among our participant pool, i.e., increasing frequency of short messages, likely resulted in an underrepresentation of communication events in total. We would not have recognized these issues had we not conducted our study. However, a follow up study was completed just days before this paper was revised for the conference, and in that study, the duration limit was dropped to 5-minutes. Twenty-four participants in the second study recorded a total of 695 events in one week, 75% more than were recorded by 25 participants in this, the initial study. Although the 10-minute rule was most likely not the sole cause of the underrepresentation of communication events, shortening the duration from 10 to 5 minutes did lead to a large increase in the number of events reported.

The 10-minute rule, of course, came from the prior studies we replicated. There is certainly a scientific need for replication of past studies, and doing so allows for the comparison of data across multiple

studies and time periods, as we discussed in the prior section of the paper. However, strict replication may limit data collection efforts. There seems to be no doubt that the 10-minute rule for communication events was instigated by DePaulo and colleagues because of the overhead associated with paper forms, where participants used the forms to record the events *and* answer multiple questions about them. When considering replication generally and of diary studies in particular, investigators need to think about the constraints that come with strict replication and its implications.

Bolger, et al. (2003) listed several strengths of using handheld computers and PDAs in diary studies. We did not take advantage of some of these strengths in this study: We did not use the PDAs' capacity for signalling or for providing time-stamps or their flexibility in question presentation. Our study was event-driven, not time-based, so signalling and time-stamps were not relevant. We used a structured closed-ended questionnaire, so we did not take advantage of the ability to flexibly present questions. However, we did utilize the two other strengths of PDA use that Bolger and colleagues mentioned, their advantages for data entry, management, and accuracy; and their ability to take into account the participant's schedule. Data entry for participants was very easy, and from our perspective, data management was easy as well. Downloading the data and converting them to spreadsheet format was a straightforward task. Data accuracy was improved through the direct downloading of data, with no need for manual data entry and the attendant transcription errors. PDA use also allowed data entry to easily fit each participant's schedule, as the device could be easily transported for instant data entry, immediately following each communication event. In short, using PDAs for our study worked extremely well. We would highly recommend PDA use for anyone contemplating conducting a diary study of e-society life.

Finally, we see great potential for cell phones as means to make diary entries, as was done in Palen and Salzman (2002) and Carter and Mankoff (2005). Today's cell phones seem to be versatile devices with which to conduct diary studies. They allow not only for voice and text but also for taking and sending photos, and such multifunction phones are becoming more and more common. Using cell phones can also lower the cost of the study if participants are willing to use their own phones. Current cell phones also have the capacity to store dozens of short messages that could be saved for researchers to study later (for example, the Motorola V226 has over 4 megabytes of internal storage for messages and photos).

5 CONCLUSION

Given what we learned about diary studies by conducting such a study, how can we address the research question of whether and how diary studies can be used to investigate life in an e-society? The answer ultimately depends on the research topic, but we maintain that any e-society study that is focused on *in situ* behavior could be a candidate for a diary study design. For example, topics such as access, inclusion and exclusion, and privacy and surveillance all lend themselves to diary study methods if the research interest is on the frequency of events or on how individuals perceive events and how they themselves are affected. Despite its limitations, we believe PDA use in our study was successful, as it facilitated data entry, management, and accuracy, and it allowed participants to enter data about their activities on their schedules. Our study was PDA-based, and it was also event-driven and utilized student participants and closed-ended questionnaires, but these were design choices made from the large number of design alternatives possible for diary studies. Studies of access, for example, might be better designed using open-ended questions with responses recorded in small paper notebooks. Diary studies are flexible in that they can be designed to fit a range of durations, available technologies, and sample sizes, but they need to be designed carefully. Mistakes cannot be easily corrected while the study is in progress. In our study, setting the event duration threshold to 10-minutes affected data collection, but definitions and their operationalization affect data collection in any study. Yet the design of diary studies should not be so structured that mistakes are prevented at the expense of serendipity. In short, well designed diary studies can be used to effectively study e-society. The how of such diary study use depends on the circumstances of the specific study.

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