

# Diaries

## 6.1 INTRODUCTION

A diary is a document created by an individual who maintains regular recordings about events in their life, at the time that those events occur (Alaszewski, 2006). These recordings can be anything from a simple record of activities (such as a schedule) to an explanation of those activities to personal reflections on the meaning of those activities. When you are asking people to record information that is fluid and changes over time, such as their mood, or about multiple events that occur within the day, diaries are generally more accurate than other research methods (Alaszewski, 2006). Many people keep a diary and do not even realize it. Informal diaries are kept online and are known as blogs. Many people now send out tweets using “Twitter” or status updates using “Facebook” and both of these, where individuals record what they are doing, as they are doing it, are in fact a form of diary (although not primarily used for any research purposes).

The diary method used in human-computer interaction (HCI) has been adopted from other fields, primarily sociology and history (Hyldegard, 2006). For instance, diaries in history have been used to understand the feelings, experiences, and stories of both famous and unknown figures. Personal diaries of world leaders give insight to historians, while personal diaries of unknown individuals allow a documentation of the lives of those who are often left out of the official record of history (Alaszewski, 2006). In sociology, diaries are used to understand what individuals experience but otherwise seems ordinary and unremarkable to those individuals, and might be hard to understand by outsiders (Alaszewski, 2006). Other fields, such as medicine, also frequently use the diary method for research. While the focus of much experimental research in medicine is on measuring objective data that can be observed, other data which is not objective, such as the individual's feelings of pain or fatigue, can best be understood through the use of a diary (Alaszewski, 2006).

One form of diary is a time diary. A time diary focuses on how individuals utilize their time in different activities. The major difference between a general diary and a time diary is that general diary entries may be on an infrequent or nontemporal basis, whereas time diaries have a time focus. Individuals are asked to record entries on a regular basis, record entries when events occur and note time information, or a combination thereof. Because much of the research in HCI focuses on how long we spend in some software application, how much time we spend on a website, or how

much time we lose due to frustrations or task switching, time diaries are often the prevailing type of diary used in HCI research. The sidebar on “time diaries to study user frustration” provides an example.

### TIME DIARIES TO STUDY USER FRUSTRATION

Time diaries have been used in researching the presence of frustration among users interacting with computers. A series of research studies examined what frustrates users while using computers, how they respond to those frustrations, and how it impacts on the users' time. One study focused on 111 university students and their friends; one study focused on 50 workplace users; and a third on 100 blind users on the web (Ceaparu et al., 2004; Lazar et al., 2006, 2007).

The methodology was essentially the same for all three studies: users were asked to fill out a time diary of their computer usage over a given amount of time (such as a few hours). At the beginning and end of their usage session on the computer, the users were asked to record their mood by answering a series of questions. The users were requested to fill out a “frustration experience form” each time during the session that they felt frustrated, with no minimum or maximum number of forms. Throughout the process, the time of day was recorded by users, which helped both to validate the quality of the data and to ascertain how much time was lost due to these frustration experiences.

There are a number of different findings from these studies relating to causes of frustration and how users responded to the frustrations. One of the most interesting findings was how much time was lost due to frustrating situations. In the study of the student users, 38%–43% of the time spent on the computer was lost due to frustrating experiences. In the study of workplace users, 42.7% of time on the computer was lost due to frustrating experiences. In the study of blind users, 30.4% of time on the computer was lost due to frustrating experiences.

Below is the Frustration experience form (time diary) from Ceaparu et al. (2004).

#### Frustrating Experience

Please fill out this form for each frustrating experience that you encounter while using your computer during the reporting session. This should include both major problems such as computer or application crashes, and minor issues such as a program not responding the way that you need it to. Anything which frustrates you should be recorded.

1. What were you trying to do?
2. On a scale of 1 (not very important) to 9 (very important), how important was this task to you?  
 Not very important    1   2   3   4   5   6   7   8   9   Very Important
3. What software or program did the problem occur in? If the problem was the computer system, please check the program that you were using when it occurred (check all that apply).

- |   |   |
|---|---|
| <input type="checkbox"/> e-mail                     | <input type="checkbox"/> spreadsheet programs (e.g., Excel)       |
| <input type="checkbox"/> chat and instant messaging | <input type="checkbox"/> graphic design                           |
| <input type="checkbox"/> web browsing               | <input type="checkbox"/> programming tools                        |
| <input type="checkbox"/> other Internet use         | <input type="checkbox"/> database programs                        |
| <input type="checkbox"/> word processing            | <input type="checkbox"/> presentation software (e.g., PowerPoint) |
| <input type="checkbox"/> file browsers              | <input type="checkbox"/> other _____                              |

4. Please write a brief description of the experience:

\_\_\_\_\_

5. How did you solve this problem?

- I knew how to solve it because it has happened before
- I figured out a way to fix it myself without help
- I asked someone for help. Number of people asked
- I consulted online help or the system/application tutorial
- I consulted a manual or book
- I rebooted
- I ignored the problem or found an alternative solution
- I was unable to solve it
- I tried again
- I restarted the program

6. Please provide a short step-by-step description of the process you used to resolve this incident.

\_\_\_\_\_

7. How often does this problem happen?  more than once a day  one time a day  several times a week  once a week  several times a month  once a month  several times a year  first time it happened

8. On a scale of 1 (not very frustrating) to 9 (very frustrating), how frustrating was this problem for you?

Not very frustrating    1   2   3   4   5   6   7   8   9    Very frustrating

9. Of the following, did you feel:  Angry at the computer  angry at yourself  helpless/resigned  determined to fix it  other

10. How many minutes did it take you to solve this problem?

\_\_\_\_\_

11. Other than the amount of time it took you to solve the problem, how many minutes did you lose because of this problem? (If this has happened before, please account only for the current time lost). \_\_\_\_\_

Please explain:

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## 6.2 WHY DO WE USE DIARIES IN HCI RESEARCH?

Diaries fill the gaps in HCI research methods between observation in naturalistic settings, observation in a fixed lab, and surveys (Hyldegard, 2006). Many say that controlled studies in controlled settings (such as usability labs) are ideal and others say that observing users in their natural settings (such as homes or workplaces) is ideal. However, in many cases, it is not feasible to either bring users into a fixed setting or visit the users in their natural setting. In addition, having observers present in either setting can sometimes change the actions of the users (Carter and Mankoff, 2005). Diaries are especially good at studying usage patterns that cross multiple technologies, multiple locations, and multiple environments (Hayashi and Hong, 2011). For instance, to study how people utilize passwords across multiple systems, devices, networks, and locations, at both home and work, a diary study was used, with 20 participants, who recorded 1500 password events over a 2-week period (Hayashi and Hong, 2011). Of the various research methods described in this book, very few of the methods could have accurately collected data from so many different technical and physical environments.

All research methods have strengths and weaknesses, and by using two or three different research methods, you can often get a much better understanding of phenomena than you would with only one research method. For instance, Kientz et al. developed a technical solution (called FETCH) to help blind people track everyday items, such as keys, iPod, remote controls, and sunglasses. A small Bluetooth tag was added to these items to help in tracking. While a laboratory study was conducted first, a controlled laboratory study clearly would not be sufficient to determine how this approach to finding items could be used in someone's daily life. After the laboratory study discovered some needed improvements in the interface, a diary study was used in which participants would track when they lost items that they needed and how long it took them to find the item. In the first 2-week phase of the diary study, the participants did not use FETCH. During the second 2-week phase, the participants used the FETCH system and recorded when they lost items and how long it took to find them (Kientz et al., 2006). The diary study was then followed up with interviews with the participants. The use of the diary in conjunction with other methods strengthened the findings of this research project. However, while ideal, it is sometimes not possible to use two or three different research methods, due to time, cost, or participant availability.

It might seem that surveys are an appropriate solution compared to diaries, as they allow users to record data in their own settings and time, and surveys reach a geographically distributed set of users. However, surveys can lead to biased data in behavioral research in some situations, and diaries offer some advantages over surveys in certain research situations. In many cases, diaries are used in conjunction with other methods; when this is possible, it is ideal, as adding one research method often ameliorates the shortcomings of another method. Diaries allow for collecting of more detailed research than surveys, which often use predefined questions and allow little flexibility for respondents. Alaszewski said it best, “While survey

research is good at describing what people do, it is rather less effective at explaining or understanding why they do it” (Alaszewski, 2006, p. 36). Surveys ask users to recall information. This may be appropriate if you are asking users to recall information that does not change over time, such as their date of birth, their income, or other demographic data. Any data that is fluid, occurs only at a specific time, and changes, such as mood, feeling, perception, time, or response, needs a very short-time period between the occurrence of the event and the recording of the event. Surveys can skew this type of data because, when users are asked to recall their mood, their feeling, their response, or the time that an event took, their response to a survey can be biased or incorrect. In some cases, users might simply forget the details of what occurred. In other cases, an individual user's personality might bias the response. If you ask different people to recall a similar challenging event in their life, some will recall it with optimism and remember the event as being not so bad. Others, who are pessimistic, may look back and remember the event as being worse than it actually was. Differences in personality can skew the recollection. For instance, an 80-year-old friend of one of the authors recalled that when he owned a food store in the 1950s, he once had a robbery where a man held the employees up with a gun and forced them to go into a meat locker for hours. The next comment from the man was “You know, it was a hot day in July, so actually, a few hours in the cooler wasn't too bad!” His personality made him look back on what was most likely a traumatic event and remember a joke. A diary allows for a very small gap between the occurrence of the event and the recording of the event. Ideally, this gap is as close to zero as possible.

Diaries are a very good method for recording measurements that cannot be accurately collected by experimental or observational means, or may result in increased overall validity when used in conjunction with these other methods. For example, diaries were utilized in studying why older individuals (50+) decide to contribute to open source software projects for the first time (Davidson et al., 2014). Direct observation or experimentation would not be useful approaches to understand the motivations and benefits that the participants experienced from their first forays into open source contributions. Over a 2-month period, participants received daily reminder emails, to fill out diary entries, asking about their contributions to open source software, their motivations for doing so, the benefits that they received, and any barriers stopping them from continuing to contribute (Davidson et al., 2014).

While research methods such as experimental design focus on objectively measuring human performance and automated data collection methods focus on studying data that computers can collect unobtrusively, surveys and time diaries ask users about themselves. How did they perceive a certain experience with the computer or device? How did they feel? How did they respond? How much time did it take them? How did it impact on their mood? When did they use it? How did it impact on their feelings of self-efficacy? The diary elicits this information in a way that neither outside observation nor automated data collection can. For instance, how do you determine when a user intended to perform an action, but

did not do so? (Carter and Mankoff, 2005) Neither observation nor automated data collection would be able to record that.

Despite all of the benefits of using diaries for HCI research, there are some potential disadvantages. If you are asking for participants to provide insights as a part of a diary entry, for some individuals, they may not be introspective or aware enough to do that. While time recording may be more accurate using a diary as compared to a survey, automated methods of data collection, when available, may still be more accurate. It can also be challenging sometimes, to get participants to record a sufficient number of diary entries. Furthermore, if a diary study requires a high number of diary entries, or very personal information, participants may not want to take part in the study, or again, may record diary entries relatively infrequently. A summary of the strengths and weaknesses of diaries appears in Table 6.1.

**Table 6.1** Strengths and Weaknesses of Diaries

Advantages	Disadvantages
Good for understanding how individuals utilize technology in nonworkplace, noncontrolled, or on-the-go settings	Participants are sometimes not introspective and not aware of the specifics of what they are doing; they may therefore have trouble recording it in a diary entry
Good for understanding the “why” of user interaction with a technology or any technology phenomenon	Participants may not follow through and record a sufficient number of entries
More accurate time recording than in a survey	Time recording may be less accurate than in a controlled laboratory setting or automated data collection
Good for collecting data that is fluid, and changes over time (such as time, mood, perception, or response)	Generally harder to recruit participants for a diary study than for a less intrusive study, such as a survey
The limited gap between an event happening and it being recorded can help limit the impact of individual personality on interpretation of what occurred	Since data is both qualitative and quantitative, data analysis may take a long time
Good for collecting user-defined data (e.g., when a user intended to perform an action but did not do so)	Hard to strike a balance between a frequent-enough series of diary entries and infringement on daily activities (user participation may then trail off)

Diaries can investigate the use of technology that exists at multiple stages:

- Technology that does not exist yet but could (where researchers investigate communication or information usage patterns, separate from the technology).
- Technology that exists but needs to be improved (how people use existing technology).
- Prototypes of new technology that need to be evaluated.

Diaries are excellent for recording the existence and quantity of incidents that are user defined, and where there is little previous data documented on the topic. For instance, one study examined how often users feel that they have learned something while using a computer. The moment when the user realizes that they have learned something new about the computer interface, dubbed a “eureka moment,” was recorded using a diary. Over a period of 5 days, 10 individuals recorded 69 eureka moments, but two of the individuals reported more than 50% of the moments (Rieman, 1993). In another study, “rendezvousing” (face-to-face meetings with friends and family) was studied using a diary method. It was determined that the 34 participants reported a total of 415 rendezvous incidents over a 2-week period (an average of six per day) (Colbert, 2001). Documenting in a diary the time involved, both for a specific incident and throughout the day, can help strengthen the validity of the data.

Diaries are very good at examining situations where users do not stay in one place during the time period of interest (i.e., users are on the go). Diaries are also good for studying the use of a technological device in a real-world setting, where a controlled setting would not be able to provide ecological validity. For instance, you could not examine the use of a global positioning system (GPS) device by studying how people use it within a laboratory setting. In the rendezvous study, diaries were used to examine how people “meet up,” with the goal of understanding how technology could help support them in their meetings (Colbert, 2001). Clearly, this is a phenomenon that could not be studied in the laboratory and interviewing people or surveying them after-the-fact could lead to biased or incorrect data. Diaries are also good at examining situations that involve both computer usage and noncomputer usage. For instance, a time diary study was used to examine work-related reading, where the goal was to use an understanding of how people read at work, to inform the design of digital readers or electronic books. For the 15 participants in that diary study, an average of 82% of their work time was spent reading or writing documents (Adler et al., 1998).

Diaries are a research method used heavily in sociology. For instance, long-running studies of how people use their time have used a time diary, which requires users to account for all their time within specific guidelines (such as all time during the work day, all time while awake, or all time within a 24-hour period). While humans generally have problems remembering details of events that have occurred in the recent past, they are especially prone to inaccurately remembering details about time. For instance, in a number of national surveys, people have indicated that they did activities for more than the 168 hours within that week, which is impossible (Robinson and Godbey, 1997).

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## 6.3 PARTICIPANTS FOR A DIARY STUDY

To develop a diary for appropriate use within a research study, there are a number of steps involved. Like any other type of research method, prior planning and testing



are a requirement to ensure a valid outcome. When deciding to do a diary study, one of the first questions is who will take part in the diary study? While survey methods sometimes call for strict random sampling, this is not realistic for a diary study and it is generally not feasible to get 500 or 1000 users to record diaries. However, strict representation is not as important for diaries as it is for large-scale surveys or experimental design. Many research projects start out with a hypothesis that needs to be tested with statistics. However, diaries should be used when the goal is not to test a hypothesis, but rather, to learn more about situations or behaviors that are not well-understood (Alaszewski, 2006).

In survey research and experimental research, the goal generally is to recruit large numbers of individuals. However, with diary research, it is generally more important to connect with individuals who can provide useful insight (Alaszewski, 2006). Often, an initial set of users can provide access to other users that they know who are also willing to take part in the diary study, a technique called snowball sampling. An introduction from a trusted source (such as a well-known organization or individual) to potential diarists can help in recruiting potential diarists. It is important to make sure that potential diarists are representative of the user population of interest. Not only must the potential diarists meet certain demographic rules (e.g., women over 70 years old) but they must also have an appropriate level of computer experience and a willingness to take part. In the past, computer users, who were often primarily technically oriented people, might not have been as open about their lives. However, as technology has spread throughout the entire population, and as social networking sites (e.g., Facebook, Twitter, and Instagram) and blogging have become popular, many more individuals are likely to feel comfortable with the process of keeping a diary. The challenge may not be in recruiting people who are comfortable with and capable of keeping a diary, but rather making sure that you can recruit users that meet the demographic qualifications necessary. Potential diarists must not only meet demographic requirements but also possess three qualities (modified from Alaszewski (2006)):

- an understanding of the purposes of maintaining the diary;
- the motivation to keep a regular and accurate record; and
- competence in using the technology that is the subject of the diary and the method used to record the diary.

The diary study must be structured in a way that yields useful data without imposing an unreasonable burden on the lives of the diarists. For instance, keeping the diary should not in any way negatively impact on the diarists' employment, health, or relationships with others. A payment of some form (either money or a product) should be offered to the diarists for their participation. Sometimes, when diaries are used to understand new technology, the diarist is allowed to keep, free of charge, the technology about which they have been recording diary entries. Of course, as in any type of research, the participants need to be informed of their rights and their



participation in the research should remain anonymous (see [Chapter 15](#) for more information on human subjects protection).

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## 6.4 WHAT TYPE OF DIARY?

There are a number of different methodological decisions to make when using diaries in HCI research: What type of diary? How will the diary be recorded (paper or electronic)? For what period will the users be asked to keep the diary? Diaries are typically kept for a period of 1 or 2 weeks ([Rieman, 1993](#)). Any longer than that and participation tends to drop off.

At a high level, diaries can be split into two types of purpose: feedback and elicitation ([Carter and Mankoff, 2005](#)). A feedback diary is one in which the data from the diary itself provides the feedback to the researchers. The feedback diary is the data collection method; the diary is not meant as a springboard to anything else. In an elicitation diary, the data recorded in the diary is used for prompting, when interviews take place at a later point, and the users are encouraged to expand upon each data point (see [Chapter 8](#) for more information on interviews). Feedback diaries usually focus on the events that interest the researcher, whereas elicitation diaries usually focus on events that interest the user. Feedback diaries tend to have instructions for users that they should make a diary entry when a certain event or threshold occurs. Elicitation diaries tend to encourage users to make diary entries based more on events that have meaning to the user. Feedback diaries can be more accurate (since users record events on a regular basis as they occur) and more objective but elicitation diaries can provide a view that is more representative of what the user is feeling ([Carter and Mankoff, 2005](#)). In a similar fashion to a survey, with an elicitation diary users must recall in a later interview what has occurred and this can lead to bias. However, the data points recorded by the user in the elicitation diary can provide some level of validation, which does not exist in a survey.

### 6.4.1 FEEDBACK DIARY

Feedback diaries come in many different formats, but probably the most important research question in a feedback diary is how often a diary entry is made. For instance, what event, time, or threshold triggers the need for the user to make a diary entry? Users could be asked to make a diary recording when an event occurs, such as when they feel frustrated with an interface, or when they complete a certain task. Users could be asked to make a diary recording at a set time every day (say, 9 p.m.), or during a specified time period (say, from noon to 6 p.m.). Users could be interrupted throughout the day at random times, to get a random sample of the user's daily life ([Carter and Mankoff, 2005](#)). Historically, an individual in this type of time diary study wears a beeper and must record what they are doing whenever the

beeper goes off (at random times) (Robinson and Godbey, 1997), although smartphones are often now used for this purpose.

Just as surveys can be very structured or very unstructured, diaries can have different levels of structure. For instance, diaries can be set up like a structured survey, with Likert scales (e.g., “on a scale of 1–7, with 1 being strongly disagree and 7 being strongly agree”), multiple-choice questions, and closed-ended questions. If the diary has a time focus, it can be set up where individuals must record all events within their day in 15-minute increments. Very structured diaries could include predefined categories, checkboxes, counts of how often things occurred such as events, and time stamps. On the other hand, a time diary could be set up in such a manner that it encourages general reflection (“how are you feeling right now about your computer?”) (Hyldegard, 2006). Other common questions in an unstructured diary could include “how do you think an activity could be improved?” or “what is notable?” (Palen and Salzman, 2002). The most unstructured diaries would be similar to blogs, where users are not actually being solicited to take part in a study, but they are just recording their general thoughts on a topic. While blogs are not solicited or structured by researchers and may have issues with validity, there are many blogs on the web where users record their feelings about new technologies. It might be useful for you to examine any blogs that document user experience with the technology that is of interest to you as a researcher.

### 6.4.2 ELICITATION DIARY

The goal of an elicitation diary is to have users record only basic information about the important events occurring in their day. These data points are used as prompts to encourage users to expand the explanation during an interview at a later time. Typically, the data points recorded in elicitation diaries are very quick and simple. In many cases, for elicitation diaries, users simply record pictures, short audio clips, short snippets of text, or a combination (Brandt et al., 2007; Carter and Mankoff, 2005). By using digital cameras and smartphones, the number of diary entries might be higher. The trade-off is that a user taking many different photos and being asked to recall why they took all of those photos may not be able to remember why they made those diary entries (Carter and Mankoff, 2005). After the recordings are made, users are later asked to expand upon these recordings. For instance, in one study related to the development of a new handheld document scanner, 22 users were asked to record their diaries over 7 days by taking photos using a digital camera. Half of the users were asked to take a digital photo any time they felt that there was a paper document that they wanted to capture electronically and half of them were asked to take a digital photo any time there was any information that they wanted to capture electronically (e.g., audio or video). The pictures were then used during a series of semistructured interviews to prompt users to expand upon the photos that they took. Over the 7 days, the 22 users made 381 diary entries (Brown et al.,

2000). In another diary study, related to the information-seeking needs of mobile device users, the participants were asked to send in a short text message, identifying when they had an information need. These short text messages were not the main diary entry but they were used to remind the participants of what had occurred and, at the end of each day, the participants were requested to go to the project website and answer a series of questions (including “where were you?”, “what were you doing?”, and “what was your information need?”) about that specific occurrence (Sohn et al., 2008). This is a great example of the elicitation approach to diaries.

### 6.4.3 HYBRID FEEDBACK AND ELICITATION DIARY

Like any other type of research method, the approaches used are modified to meet the needs of a specific research study. For instance, in one study, examining how students use transportation, aspects of both feedback and elicitation diaries were used (Carter and Mankoff, 2005). For a 2-week period, the users were asked to use their cell phones to call a specific phone number every time they made a transit decision. At that phone number, they were asked a series of questions about their choice. These aspects were similar to a feedback diary. At the same time, the location of the user at the time of each diary recording was noted, using the built-in GPS features of the phone. At a later time, during an interview, the users were presented with the recordings that they made via cell phone and the GPS information of their location and were prompted to expand their thoughts on that specific decision. These aspects were clearly similar to an elicitation diary.

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## 6.5 DATA COLLECTION FOR THE DIARY STUDY

It is important for researchers to decide how the diaries will be recorded. Will the diaries be recorded on paper, in electronic format, text, voice, video, or pictures? Historically, diaries have been recorded on paper and, if that is the case, enough paper must be provided and appropriate columns and fields should be designated in a structured format. Within the field of HCI, it seems more natural to use technology as a tool to record diary entries (Ceaparu et al., 2004). Increasingly, portable electronic devices are being used for diary entries. This makes diary recording easy and natural, especially for younger users who may be very comfortable using tablets, smartphones, and other portable devices. In addition, when a smartphone or other portable device is used, it does not appear to others that a user is taking part in a study but, rather, that they are just doing a daily activity. This removes any potential stigma of taking part in a research study. This is similar to how many applications for people with cognitive impairments are implemented using standard mobile devices, because when a user with a cognitive impairment uses such a device, they look like any other individual, not “odd” or out of place in any way (Lazar, 2007). Also, digital devices can be utilized by participants for signifying when an event occurs for which a diary

entry would be appropriate, even if the participant is unable to make an entry at that time, and the participants can then be reminded to make the diary entry as soon as possible (Chong et al., 2014).

The crucial factor in choosing the media should be the type of media that will be most natural for the diarists in their everyday life. For instance, if participants will be performing the tasks of interest while sitting at their computer, it might make sense to use word processing, spreadsheets, or web-based forms (see the Diary Study of Task Switching sidebar). However, if participants will be recording diary entries about the use of mobile devices, you would expect these entries to occur while the participants are on-the-go (see the Recording Entries on the Go sidebar).

### DIARY STUDY OF TASK SWITCHING

Czerwinski et al. (2004) did a diary study of task switching between different projects (and related interruptions) during a week. They were trying to examine how interruptions impact on task switching, with the end goal of improving how user interfaces support users recovering from interruptions. They used a diary study, which they felt was most appropriate since there were no existing empirical studies of tools for dealing with task switching and recovery. In addition, diary studies, because they take place in the users' natural settings and tasks, have high ecological validity.

Eleven users took part; all were professionals who multitasked among at least three major projects or tasks. Before the diaries started, users filled out a baseline survey with demographic information and perceptions about computers. The diaries were recorded using an Excel spreadsheet, where the researchers had labeled columns for each parameter that they wanted to track. For instance, the researchers were interested in learning how users defined tasks, at what level of granularity. The diaries also tracked the difficulty of switching tasks and the amount of time spent on the tasks.

Due to the qualitative nature of the data, two researchers tested and validated the rich coding scheme. Using the coding scheme, first frequency counts and descriptive statistics were carried out on the diary data, followed by regression analysis. Among the significant findings were that users reported an average of 50 task shifts over the week, and that long-term projects, which involved multiple documents and involved more revisits, were very hard to return to, once interrupted.

A time diary form from Czerwinski et al. (2004) appears on the next page.



**RECORDING DIARY ENTRIES ON THE GO**

Palen and Salzman (2002) carried out two studies, which used diaries to learn about the usage of new mobile phone users. They wanted to know how the mobile phones were used in various situations on a daily basis. If you want users to make diary entries in real time, it does not make sense to ask the diarists to record entries about mobile phone use on paper or desktop/laptop computers, since the diarists would then be likely to make entries at a later time (which would subject the diary entries to recall bias).

It was decided that voicemail entries would be used to record the diary entries. However, another challenge is that there could be complications stemming from the fact that the subject of the diary (the cell phone) might also be the method of making the diary entries. So participants were given the option to record voicemail messages using any type of phone that they wanted—a landline, their current mobile phone, or a different mobile phone. A phone number with voicemail was dedicated to the project, so that participants would not have to use any features on their mobile phone to record, just make a standard outgoing call. This aspect limited the complications of using the mobile phone to record data about the mobile phone.

The goal of the first study was to learn more about the usability of the features in the phone handset. In this portion of the research, 19 users participated and they were paid \$1 per day for calling in. The goal was not to collect rigorous, qualitative data, but rather to get a better understanding of when they used their phones in a new environment, used new features, or contacted the phone service provider. Participants at first started phoning in their diary entries from landlines and then gradually switched to using their mobile phones. The second study had 18 participants, and the researchers used a much more structured approach, where they asked specific questions. In the second study, participants reported things such as confusion about services and signal coverage, and even the ergonomics of the phone (some asked if rubber grippers could be added so that the phone would not slip).

**6.6 LETTING PARTICIPANTS KNOW WHEN TO RECORD A DIARY ENTRY**

Regardless of whether the diary format is paper or electronic, participants should be given information about the goal of the study, the types of activities that are of interest, when to make diary recordings (at a given time every day or when a certain type of incident occurs), and definitions of terminology. Definitions of terminology are especially important, as many individuals may use different terms for the same events or similar terms for different events. For instance, if someone using a personal computer records a “crash,” what does that mean? Does it mean that the application crashed but the operating system was OK? Did the operating system

crash? Or was it a hard drive crash? It is necessary to provide participants with a list of terms and how they should be used, along with specific details of what should be recorded.

It is also very important to define for participants when they should make a diary recording. Just saying, “when you feel like it” is not sufficient as, many times, this will not provide enough motivation or clarity. Often, diarists do not immediately sense the importance of their entries and, especially with diaries that are relatively unstructured, one of the big challenges is convincing participants that what they are doing is important. They may feel that there is nothing to report, that what's going on is mundane. At the same time, the number of diary entries should not be linked directly to payment for participation. For instance, if participants are paid, \$2 for each diary entry, there is a good chance that they will attempt to make many diary entries. In the Time Diaries to Study User Frustration sidebar, if the method had been modified so that users were paid \$5 every time that they filled out a frustration experience report, the chances are good that users would get frustrated very often and fill out many reports, regardless of how they were feeling; this could bias the data so that it is unrepresentative. Any payment should be for regular participation but should not be linked directly to the number of entries. Participants should get paid for taking part in the study, regardless of the number of entries. Each diary entry should be triggered by an event, a time, or a sense of importance, not by financial compensation.

Throughout the period of the study (and 2 weeks is often an appropriate length of time), it might be necessary to encourage participants to keep making diary entries. If diary reports are turned in during the study period (not only at the end), you may be able to monitor the diary reports and give feedback to users who are not providing useful data. For instance, in a diary study of the information-seeking needs of mobile device users (Sohn et al., 2008), the participants were sent five text messages a day, reminding them to send in text messages which served as basic diary entries (and which were then followed up later in the day). It is always a good idea to give feedback to diary participants, not on their specific entries (which might bias the data) but on the existence of their diary entries, on a regular basis. Another interesting study reported on the use of smartwatches in the service of reminding participants when to record a diary entry. For a diary relating to tracking food items eaten, whenever the smartwatch detected hand gestures that typically represented hand-to-mouth eating, the smartwatch sent a message to a smartphone app, reminding the participant to record what they were eating (Ye et al., 2016).

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## 6.7 ANALYSIS OF DIARIES

Once the diaries are collected, the next step is to analyze the diary entries or reports. Depending on the media used to collect the diary entries (such as paper), it may be necessary first to transfer the diary entries to an electronic format. Hopefully, if any handwriting was done in paper diaries, the handwriting is legible and not open to potential debate!



Some data collected in the diary will be relatively easy to analyze, if it is in quantitative format. Those types of data points can be entered in a spreadsheet and traditional statistical tests and measurements can be used (see [Chapter 4](#) for more information on statistics). However, it is expected that much of the data in a diary will be of a qualitative nature. Since diaries are often used for more exploratory research, where little is known, it is expected that much of the diary data will be in qualitative format, in text described by the diarist. This descriptive text can then be subjected to some form of content analysis (see [Chapter 11](#)), in which researchers develop coding categories and code text according to the meaning of the descriptive text ([Alaszewski, 2006](#)). Content analysis can help in understanding the meaning of the text, allowing for a comparison between diary entries.

Assuming that the diary is somewhat structured in nature, coding and analysis should not be overwhelmingly challenging, although researchers analyzing unsolicited unstructured diaries (such as blogs) may find it very challenging to code diary entries. An example of a diary report that collects both qualitative and quantitative data is in the sidebar on task switching, earlier in this chapter. Follow-up interviews with participants who keep an elicitation diary may involve the participants themselves interpreting the data recorded. In many cases, even if the diary is not an elicitation diary, the researchers can contact the participants to ask for clarification of diary entries.

Finally, after data analysis is performed, it is always a good idea to note how, in the future, your approach to data collection through diaries might be modified and improved.

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## 6.8 SUMMARY

Diaries have a long history as a research tool in sociology and history, but have only recently been adopted as a research tool in HCI. Diaries are very useful in a number of different research situations. For instance, diaries are appropriate where little is known about the usage patterns of a new technology, and there is not enough background research for an experimental study. Diaries are useful where technology is being used on the go and observation or experimental design would not be appropriate. Diaries are also useful where the research questions lead to data points that cannot easily be observed or measured (such as feelings of frustration). Finally, diaries are useful in triangulation: using multiple research methods to explore the same phenomenon from different points of view. Diaries can help with the understanding of why something happened, not only in documenting that it did happen.

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## DISCUSSION QUESTIONS

1. What is the major difference between diaries in general and time diaries?
2. What bias often present in survey responses do diaries sometimes eliminate?

3. Why are diaries good for collecting data on user-defined events?
4. What aspects of hand-held or mobile devices make them appropriate for diary studies?
5. Why is strict random sampling not necessary in diary studies?
6. What is the main difference between feedback diaries and elicitation diaries?
7. Why is it important to clearly define appropriate definitions of terminology for diary participants?
8. Why do you not want to pay participants for each diary entry?
9. What is generally considered to be the longest appropriate time period for a diary study?

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## RESEARCH DESIGN EXERCISE

Imagine designing a research study to learn more about the use of genealogy (the study of family history) websites, applications, and databases. Not much is previously known about the user habits for this type of work. What types of participants might be appropriate for a research study? What characteristics might they have? Why might a diary study be superior to a survey or observation study? Specifically, provide information on how a feedback diary and an elicitation diary might be implemented for this study. If the diary was relatively structured, what types of questions should be asked? Would time be an important consideration in this type of diary? Would random sampling of time be appropriate?

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