

8. Experience Sampling

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Abstract

Experience sampling refers to the repeated sampling of momentary experiences in the individual's natural environment. The methodological advantages of this approach include the minimization of retrospective response biases and the maximization of the validity of the assessment. The conceptual benefits it offers include insights into short-term processes and into the daily-life contexts of the phenomena under study. Making use of the benefits of experience sampling while taking its methodological challenges into consideration allows researchers to address important research questions in the social and behavioral sciences with great precision and clarity. Despite this, experience sampling information is rarely found in the data infrastructure publicly available to researchers. This situation is in stark contrast to the way this methodology is thriving today in research-producing datasets that are not publicly available, for instance, in many psychological investigations. After a discussion of the benefits and challenges of experience sampling, this report outlines its potential uses in social science and economic research and characterizes the status quo in experience-sampling applications in the currently available datasets, focusing primarily on household surveys conducted after 2001. Recommendations are offered for an intensified use of experience sampling in large-scale data collections and how this might be facilitated in the future.

Keywords: experience sampling in the social and behavioural sciences

1. What is experience sampling?

Experience sampling refers to the capturing of experiences – such as events, behaviors, feelings, or thoughts – at the moment of, or close to, their occurrence, and within the context of a person's everyday life. The distinctive characteristic that sets this methodology apart from other assessment approaches is the *repeated* sampling of *momentary* experiences in the individual's *natural* environment (as opposed to, for example, single-time retrospective reconstructions of past experiences in questionnaires or interviews). Many labels, such as event sampling, real-time data capture, time-situated method, ambulatory assessment, diary method, or ecological-momentary assessment, have been used to refer to this methodology. In this report, I use the term *experience sampling* coined by Mihaly Csikszentmihalyi and colleagues in the 1970s, which has since been widely adopted.

The core method in experience sampling, and hence the primary emphasis of this report, is the acquisition of repeated self-reports of momentary experiences or of experiences that occurred during short preceding time intervals (typically covering no more than 24 hours). Assessment schedules in experience sampling research include (a) *interval-contingent sampling*

(assessments at fixed points in time, such as before going to bed at night), (b) *signal-contingent sampling* (assessments triggered by signals that typically occur at varying time intervals throughout the day and that are given by electronic assessment devices, such as handheld computers), (c) *event-contingent sampling* (assessments triggered by the occurrence of pre-specified events, such as expenditures), and (d) any combinations of the above. Which assessment schedule is most appropriate in a given study context depends on the specific research question at hand, the prevalence of the particular experience under study, and on feasibility considerations.

Although self-report is the core assessment method in experience sampling and the primary focus of this report, it should be noted that other assessment techniques originating from diverse scientific disciplines can be used as complementary assessment strategies to capture the multiple facets of naturally unfolding experiences and their contexts. These techniques include the ambulatory monitoring of physiological processes or physical activities (see the advisory report on bio-markers in this publication), the recording of behavioral information (e.g., performance in cognitive tasks), the recording of ambient environmental parameters (e.g., sound recordings, photographs of the environment), or the recording of the individual's geographical locations (e.g., geo-tracking, see report on geographical data).

This report opens with a discussion of the benefits and challenges of experience sampling, followed by an outline of its potential uses in social science and economic research. I will then characterize the current situation by looking at experience sampling applications in available datasets, focusing primarily on household surveys conducted after 2001. Based on this assessment, I will draw some conclusions about the future development of experience sampling and its contribution to the data infrastructure and offer some suggestions for how this methodology can address present and future research needs in the social and behavioral sciences.

2. The benefits and challenges of experience sampling methodology

When compared to retrospective self-report – the most widely used assessment approach in social and economic data surveys – experience sampling offers compelling benefits, both from a methodological and a conceptual perspective. At the same time, it is accompanied by some significant challenges, including being a more resource-intensive methodology. Hence, careful consideration of both its benefits and challenges is necessary in order to take full advantage of this powerful methodology.

There are important *methodological* advantages in experience sampling that are brought about by the immediacy of the measurement and the fact that it takes place in the participants' natural environments. It is well known that human memory imposes limits on the validity of what people can report retrospectively. In most questionnaires or interviews, respondents have to rely on partial recall and inference strategies when asked to report on their past behavior or experiences. There is ample empirical evidence that this results in retrospective memory biases and aggregation effects that impair the validity of the information assessed, sometimes profoundly. Experience sampling provides a promising alternative by obtaining reports of experiences at the moment of, or close to, their occurrence. Furthermore, the fact that this information is collected within the natural context of the participants' day-to-day lives further enhances the validity of the assessment, offering unique opportunities to understand experiences and behaviors in their ecological context (Schwarz 2007). Today, experience sampling assessment is typically implemented with the help of electronic assessment devices such as handheld computers, which provide the added methodological benefit of allowing close monitoring of participant response adherence to the measurement scheme.

The prevailing emphasis in most available data collections in the social and economic sciences to date is on differences *between* individuals at given points in time. A fundamental dimension of many aspects in human life – their inherently fluctuating nature as reflected in short-term *within*-person variations – has not yet received much attention, even though the importance of within-person processes for understanding many social and behavioral phenomena has been acknowledged in theory. Hence, a compelling *conceptual* benefit of experience sampling results from the fact that assessments are repeated with short time intervals between them. This makes short-term processes and fluctuations – which cannot be studied with the traditional fixed annual assessment schedules – accessible to scientific investigation. Another conceptual benefit of experience sampling is that it provides insight into the role of everyday contexts for the target phenomena under study, such as the respective roles played by the individual's educational, work, or social environments.

Despite these methodological and conceptual benefits, there are significant challenges that need to be considered when implementing the experience sampling method. Of these challenges, three stand out as particularly critical. First, experience sampling is resource-intensive. Because motivation plays such a significant role in determining whether a participant will successfully complete an experience sampling study or not, close contact with the participants throughout the entire study and adequate remuneration are indispensable. Second, the burden for the participants (e.g., the necessary time commitment) is comparatively large. This creates difficulties in terms of both

representativeness and attrition of the sample. The demanding nature of experience sampling studies could lead certain types of individuals to be over- or underrepresented in the sample from the beginning, or to drop out during the study interval. Finally, repeated measuring of a given phenomenon can cause reactivity effects. That is, it is possible that the phenomenon under study may change as a result of measurement or reporting. Although reactivity is a challenge for all social and behavioral research, it can be even more relevant in experience sampling research because the repeated assessments may lead people to pay unusual attention to their experiences and behaviors.

In short, experience sampling carries immense methodological and conceptual advantages. Nonetheless, it also presents a number of challenges that need to be considered, which I will discuss in detail in the concluding section of this report. When adequately applied, however, experience sampling indisputably represents a powerful tool with which to tackle new questions and investigate research questions in greater depth. In the following section I will describe the ways that experience sampling can be applied to social science and economic research.

3. Potential uses of experience sampling in social science and economic research

Generally speaking, experience sampling can provide fine-grained and ecologically valid information on

- the *Who, What, Where, When, or How* of experiences and behaviors as they occur in daily life and in natural environments,
- the naturally occurring *variation* and *co-variation* of experiences, behaviors, events, and contextual characteristics over time (both *within* and *between* individuals), and
- the within-person *variability* of experiences and behaviors (i.e., short-term fluctuations or changes) that, depending on the research domain under study, can be indicative either of people's flexibility or adaptability, or of their instability and vulnerability.

Obviously, these are questions that are of immense relevance and importance for a large variety of domains in social, behavioral, and economic research. There are a vast number of potential applications that could provide new insight into diverse phenomena. These include the investigation of life transitions (e.g., divorce, unemployment, childbirth, entering the workforce, or

retirement), social interactions, investment or buying behaviors, health behaviors and health-care use and effectiveness, well-being and life satisfaction, family life, work life, availability, use and effectiveness of the educational system, major life events and stressors, as well as investigations of many other research domains. Despite the wide spectrum of potential applications, experience sampling information is still rare in the data infrastructure that is publicly available to researchers in the social and behavioral sciences. This stands in stark contrast to the growing application of this methodology in research activities which produce datasets that are not publicly available, as is the case in many psychological investigations. The following section provides an analysis of the current state of experience sampling applications in the social and behavioral sciences.

4. Status quo of experience sampling in the data infrastructure

The purpose of the following analysis is to characterize the status of experience sampling information in the available data infrastructure. The first part of this analysis addresses the present use of experience sampling in household surveys. It illustrates the scarcity of experience sampling information in the datasets that are accessible to the public and interested researchers. The second part of this analysis addresses the status of experience sampling in psychological research. The purpose of this section is to illustrate how the methodology is actively involved in the production of datasets, but these are available only to a small number of scientists connected to the original research. The concluding section of this report will build on this analysis of the status quo to formulate some recommendations for future research needs and challenges.

4.1 Experience sampling in household surveys with ongoing data collection since 2001

To identify contemporary household surveys employing experience sampling methodology, I conducted a search using the keywords "experience sampling," "diary/diaries," and "ambulatory assessment" in the following databases:

- Data Catalogue of the GESIS Data Archive¹

¹ <http://www.gesis.org/Datenservice/Suche/Daten/index.htm>

- Survey Databank of the German Youth Institute (*Surveydatenbank des Deutschen Jugendinstituts*)²
- National Statistics' Database of Longitudinal Studies³
- Data Catalogue of the Economic and Social Data Service⁴

Table 1 lists household surveys that apply experience sampling based on the results of this search strategy and that also demonstrate ongoing data collection since 2001 (up until June 20, 2008). The table shows that only a few household panels currently integrate experience sampling. All of the identified applications of this methodology in household surveys used experience sampling in the form of diaries; that is, in the form of interval-contingent, short-term retrospective assessments. Table 1 also shows that the methodology is applicable in large-scale data collections and well-suited for the investigation of a wide array of phenomena. This is further demonstrated by the fact that the German Federal Statistical Office in collaboration with the Statistical Offices of the *Länder* successfully obtains household expenditure diaries in the German Income and Consumption Survey (EVS, *Einkommens- und Verbrauchsstichprobe*).

None of the most prominent international prospective household panels – the US Panel Study of Income Dynamics (PSID), the German Socio-Economic Panel (SOEP, *Sozio-oekonomisches Panel*), the British Household Panel Study (BHPS, to be succeeded by the UK HLS), and the Multidisciplinary Facility for Measurement and Experimentation in the Social Sciences (MESS, Netherlands) – have yet employed experience sampling methodology. Nonetheless there are clear signs of a growing awareness of, and interest in the powerful potential of this methodology. The study proposal of the Dutch household panel MESS, for example, highlights experience sampling as a potential method for future assessment waves. Furthermore, the German Socio-Economic Panel has recently developed a mobile-phone based experience sampling technology in cooperation with Max Planck Institute for Human Development (Berlin) that makes the application of signal-contingent experience sampling possible in heterogeneous and widely distributed samples. The feasibility of this technology has already been demonstrated in a first model study involving a sample of $N=378$ participants ranging in age from 14 to 83 years. Participants were provided with mobile phones that they carried with them while pursuing their daily routines. Testing software was installed on the mobile phones that caused the phones to ring at certain points throughout the day and signaled the participant to complete an assessment instrument that referred to his or her mo-

mentary experiences. Participant responses were then immediately uploaded via the Internet to a central server. The server interface was also used to set up the study design, to manage the data collection, and to monitor participant response compliance.

Table 1. Experience Sampling in Household Panels with Ongoing Data Collection since 2001

Country	Panel	Experience sampling	Data accessibility
UK	Expenditure and Food Survey Start: 2001–2002 Most recent data: 2005–2006 Sample size: 6,164 households in Great Britain, and 527 in Northern Ireland Design: repeated cross-sectional	Diaries of personal expenditures, homegrown and wild food brought into the home. Kept by each adult for two weeks; simplified diaries kept by children aged 7 to 15 years for two weeks.	Derived variables from the diary are included in the dataset, as the raw diary data are not released to the public for confidentiality reasons (access contingent upon registration).
UK	Home On-Line Survey (HoL) 1998–2001 (finished) Sample size: 999 households, all household members older than 9	Seven end-of day diaries (comprehensive activity diaries).	Access contingent upon registration.
UK	Scottish Household Survey Start: 1999 Most recent data: 2007 Sample size: 27,000 in 2003–2004 (diaries) Design: repeated cross-sectional	One travel diary provided on day prior to interview by one randomly selected adult of the household.	Access contingent upon registration.
Denmark	Time Use of Households: A Scheduling of Danes Daily Use of Time Started: 1987 Most recent data: 2001 Sample size: 4,000 Design: longitudinal (2 occasions)	Diaries kept by respondents and their partners for two days, one randomly selected weekday, and one randomly selected weekend day (activities, social partners).	Application to Danish National Institute of Social Research.
Ireland	Household Budget Survey Started: 1951 Most recent data: 2004–2005 Sample size: 6,884 households in 2004–2005 Design: repeated cross-sectional	Detailed diary of household expenditure over a two-week period.	From 1987 on request to Irish Social Science Data Archive.

2 <http://db.dji.de/surveys/index.php?m=msa,0>

3 <http://www.iser.essex.ac.uk/uisc/keeptrack/index.php>

4 <http://www.esds.ac.uk/search/searchStart.asp>

4.2 Experience sampling in psychological research

The relatively rare use of experience sampling in large-scale data collections such as household surveys – surveys that are designed to contribute to a broadly accessible data infrastructure – stands in stark contrast to the way the methodology has been taken up in research activities designed to produce smaller datasets and available to a limited number of researchers. One example, which is discussed in this section, can be found in the field of psychological research. Other examples of fields where experience sampling is frequently used – in time use studies and transportation research – are the focus of other advisory reports in this publication so they are not addressed here.

The methodological and conceptual strengths of experience sampling are well-recognized in psychological research. This has led to a recent upsurge in the use of experience sampling methodology for psychological investigations. Hundreds of papers on experience sampling investigations have been published since 2001. As of 20 June 2008, for example, and taking into account only publications that have appeared between 2001 and 2008, the database PsycINFO yielded 355 hits for the keyword “experience sampling,” 175 hits for the keyword “diary method,” and 188 hits for the keyword “ambulatory assessment.” Other indications of the dynamic growth of experience sampling methodology in this area is the recent publication of several monographs on experience sampling methodology and special issues dedicated to this theme in international psychology journals (e.g., Ebner-Priemer et al. in press; Hektner et al. 2007; Stone et al. 2007; Westmeyer 2007); and the recent foundation of the “Society of Ambulatory Assessment” in 2008⁵).

Although experience sampling in psychological research is most often applied in small samples (i.e., $N < 200$) that are queried only once, experience sampling has also been successfully included as an assessment method in comparatively larger and longitudinal research projects, particularly those conducted in the US. Examples of these include:

- the “National Survey of Midlife Development in the USA” (MIDUS, $N = 7,189$) in which experience sampling in the form of eight subsequent telephone interviews on daily life was administered in a subproject entitled, “National Study of Daily Experiences” (NSDE, $N = 1,483$);
- the “Normative Aging Study” (NAS, $N = 2,280$) in which experience sampling in the form of eight consecutive daily diaries on stressful events, memory failures, etc. was administered in a subsample of $N = 333$ participants; and,

⁵ <http://www.ambulatory-assessment.org/>

- the “Alfred P. Sloan Study of Youth and Social Development” in which signal-contingent sampling of momentary experiences was repeatedly administered in a sample of $N = 877$ adolescents.

Taken together, the recent increase in the use of experience sampling methodology in psychological research underscores the methodological and conceptual strengths of this approach and demonstrates its applicability to a variety of populations. However, these uses in psychological research have not yet contributed to an enrichment of a wider data infrastructure available to a community of interested researchers at large. Rather, access to experience sampling datasets in psychology typically remains limited to a narrow group of researchers within the network of those involved in the conceptualization of the study and the collection of the data. Release of those data to the research community is not yet common practice in psychological research.

5. Recommendations for future developments and challenges

To summarize, experience sampling is a promising research tool that has profound methodological and conceptual benefits compared to standard survey methodologies of retrospective or general self-reports. It has the potential to provide important and ecologically valid insights into a large array of research domains in the social and behavioral sciences. Although experience sampling currently occupies a lively position in psychological research, only a few applications of experience sampling are available in data collections that feed into the publicly available data infrastructure. There are, however, indications of a growing awareness of the potential of experience sampling in the international research landscape.

A broad conclusion that can be drawn from these analyses is that making use of the benefits of experience sampling, while taking its methodological challenges into consideration, will contribute to the creation of a data infrastructure that makes it possible to address current and future research questions with greater precision and clarity. In the following section I offer six concluding recommendations focused on facilitating the intensified use of experience sampling in large-scale data collections now and into the future.

- (1) *Strengthen multi-method approach in large-scale surveys.* Experience sampling is a potent methodology that can supplement standard survey methodology such as global or long-term retrospective self-reports. Its methodological advantages (e.g., minimization of response biases and

maximization of ecological validity) allow for the investigation of existing research questions in great depth. Its conceptual advantages (e.g., accessibility of short-term fluctuations and change within and between individuals, the respective role of contextual characteristics) generate opportunities for tackling new research questions.

- (2) *Consider a 'study within a study' solution in large-scale data collections.* Experience sampling is resource-intensive. Theory-driven applications in selected subsamples of participants will therefore increase the feasibility of experience sampling in large-scale data collections.
- (3) *Make use of technological advances in experience sampling applications.* Technological advances can be used to increase the feasibility of experience sampling in large-scale and heterogeneous samples and also to decrease the burden of experience sampling for the participants. Particularly promising for large-scale data collections is the use of mobile technology. Among its advantages are (a) the potential to use the participants' own mobile phones as assessment devices, (b) the central control of study content and assessment schedules via web-interfaces in server-client systems, (c) the immediate upload of data to central servers allows the monitoring of participant response compliance, (d) the relative unobtrusiveness and feasibility of measurement completion in daily life contexts (provided assessment instruments are of adequate length), and (e) the easy combination with follow-up interviews or other assessment strategies stemming from diverse scientific areas (e.g., for ambulatory bio-monitoring see the advisory report on bio-markers in this publication; for location-tracking, see the report on geographical data).
- (4) *Address the methodological challenges of experience sampling.* Study designs should adopt appropriate measures to address the methodological challenges of experience sampling. Control group designs are necessary to assess potential reactivity effects, to note possible changes in the phenomenon under study caused by its measurement. Careful sample recruitment strategies are needed to minimize potential self-selection biases that would result in limited sample representativeness. Sample attrition, or participant drop-out, can be minimized by maintaining close contact to the participants during the study interval and by implementing reasonable study characteristics, such as those pertaining to the number of measurement occasions and the length of the assessment instruments.
- (5) *Increase the accessibility of experience sampling datasets.* To increase the availability of experience sampling datasets in the data infrastructure of the social and behavioral sciences, it is essential to foster the release of datasets to the larger research community. One possible form this

could take is to make research funding grants contingent upon the researcher consenting to release the obtained dataset to the research community after a reasonable amount of time (e.g., after 7–10 years).

- (6) *Advance research on experience sampling methodology.* Methodological research will support the greater implementation of experience sampling methodology in survey designs. One way to promote research on experience sampling methodology is to include it as a research topic in the Priority Programme on Survey Methodology of the German Research Foundation (DFG, *Deutsche Forschungsgemeinschaft*).

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