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Online panel research

History, concepts, applications and a look at the future

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1.1 Introduction

Online panels have become a prominent way to collect survey data. They are used in many fields including market research (Comley, 2007; Göritz, 2010; Postoaca, 2006), social research (Tortora, 2008), psychological research (Göritz, 2007), election studies (Clarke, Sanders, Stewart, & Whiteley, 2008), and medical research (Couper, 2007).

Panel-based online survey research has grown steadily over the last decade. ESOMAR has estimated that global expenditures on online research as a percentage of total expenditures on quantitative research grew from 19% in 2006 to 29% in 2011.¹ Inside Research (2012), using

¹ Authors' computation of ESOMAR Global market research reports, 2006–2012.

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data from 37 market research companies and their subsidiaries, estimated that clients spent about \$1.5 billion on online research in the United States during 2006 versus more than \$2 billion during 2012. In Europe, expenditures were \$490 million in 2006 and a little more than \$1 billion in 2012.

1.2 Internet penetration and online panels

In principle, one might expect the validity of research using online panels is a function of the Internet penetration in the country being studied. The higher the household Internet penetration, the greater the chance that a panel may reflect the socio-demographic characteristics of the entire population. When Internet penetration is less than 100%, people who cannot access the Internet are presumably *not missing at random*. It seems likely that such individuals have socio-demographic, attitudinal, and other characteristics that distinguish them from the population of individuals who do have Internet access (Ragnedda & Muschert, 2013). In the United States, Internet access is positively associated with being male, being younger, having a higher income and more education, being Caucasian or Asian, and not being Hispanic (Horrigan, 2010). Similar patterns were found in the Netherlands (Bethlehem & Biffignardi, 2012).

In the mid-1990s in the United States, Internet access at the household level was about 20% and increased to 50% by 2001 (U.S. Department of Commerce & National Telecommunications and Information Administration, 2010). By 2011, it had reached 72% (National Telecommunication and Information Administration, 2013). As Comley (2007) has pointed out, the excitement over cost savings and fast turnaround in the United States was stronger than were concerns about sample representativeness and the ability to generalize the results to a larger population. In Europe, the average household Internet penetration among 27 countries in 2012 was 76% (Seybert, 2012).² However, increasing Internet penetration does not necessarily mean that coverage bias has been decreasing. As the non-Internet population becomes smaller, it may become more different from the Internet population than when it was larger. So these figures do not necessarily assure increasing accuracy of online surveys. Further, measuring Internet penetration has become more challenging (Horrigan, 2010).³

1.3 Definitions and terminology

The meaning of the word “panel” in “online panel” is different from the traditional meaning of that word in the survey research world (Görizt, Reinhold, & Batinic, 2002). According to the traditional definition, “panel surveys measure the same variables with identical individuals at several points in time” (Hansen, 2008, p. 330). The main goal of a panel in this usage is to study change over time in what would be called a “longitudinal panel.” In contrast, an online panel is a form of *access panel*, defined in the international standard, ISO 20252 “Market, opinion and social research – Vocabulary and Service Requirements,” as “a sample database of potential respondents who declare that they will cooperate for future data collection if selected” (International Organization for Standardization, 2012, p. 1). These panels sometimes include a very large number of people (often one million or more) who are sampled on numerous occasions

² This is just a straight (unweighted) average among 27 countries considered in the Eurostat survey.

³ Measuring Internet penetration has become more challenging as more people use mobile devices to access the Internet. For example, in the United States, a growing portion of the population goes online only or primarily via their smartphone (Horrigan, 2010).



and asked to complete a questionnaire for a myriad of generally unrelated studies. Originally, these panels were called *discontinuous access panels* whose “prescreened respondents report over time on a variety of topics” (Sudman & Wansink, 2002, p. 2).⁴ Panel members can be re-sampled (and routinely are) to take part in another study with varying levels of frequency.

1.3.1 Types of online panels

There are a number of different types of online panels. The most important distinction is between probability and nonprobability panels (described below). In the latter type, there is considerable variation in how panels are recruited, how panel members are sampled, how they are interviewed, the types of people on the panel, and the kinds of data typically collected.

Some panel companies “sell” potential respondent sample to researchers but do not host surveys. In these cases, panel members selected for a study receive a survey invitation from the panel company directing them to another web site where the survey is hosted. Through the use of links built into the survey questionnaire, the panel provider can track which members started the survey, which were screened out, which aborted during the survey, and which completed the survey. In this model, a panelist’s experience with a survey is different every time in terms of the questionnaire’s look and feel.

In contrast, other panel companies host and program all the questionnaires. Panel members therefore complete questionnaires that are consistent in terms of their layout, look and feel.

Finally, some panel companies use both approaches, depending on the preference of each client.

1.3.2 Panel composition

Panels also differ in terms of the types of members. In terms of membership, there are generally four types of online panels (see also Baker et al., 2010, p. 8):

- general population panel;
- specialty panel;
- proprietary panel;
- election panel.

General population panels are the most common. These panels tend to be very large and are recruited to include the diversity of the general population, sometimes including people in hard-to-reach subpopulations. A general population panel typically is used as a frame, from which samples are drawn based on the requirements of individual studies. Examples of studies using general population panels are found in Chapters 5, 6, 8, 10, and 11 in this volume.

Specialty panels are designed to permit study of subpopulations defined by demographics and/or behavioral characteristics. Examples include Hispanics, car owners, small business owners, and medical professionals. One form of a specialty panel is a *B2B panel*, the goal of which is to include diverse professionals working in specific companies. Individuals are selected based on their roles in the company and the company’s *firmographics*, meaning characteristics such as size, industry, number of employees, and annual revenues (Vaygelt, 2006).

⁴ Sudman and Wansink (2002) described the precursors of online panels, which involved regular data collection from individuals via paper questionnaire, face-to-face interviews, or telephone interview.

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Specialty panels typically are built through a combination of recruiting from sources believed to have large numbers of people who fit the panel's specification and by screening a general population panel.

Proprietary panels are a subclass of specialty panels in which the members participate in research for a particular company. These panels are also called *client panels* (Poynter, 2010, p. 9), *community panels*, and, more recently, *insight communities* (Visioncritical University, 2013). They provide the opportunity for a company to establish a long-term relationship with a group of consumers – typically customers of products or services offered by the company – in a setting that allows for a mix of qualitative and quantitative research, of which surveying panels' members is just one method of research.

In *election panels*, people eligible to vote are recruited, and then the panel is subsampled during the months before (and perhaps after) an election to study attitude formation and change (Clarke et al., 2008). These panels resemble more traditional longitudinal panels, because each member is surveyed at each wave before and after the election. An example of an election panel is described in Chapter 4, and election panels are studied in Chapters 14 and 15.

Finally, some online panels rely on passive data collection rather than surveys. *Internet audience ratings panels* (Napoli, 2011) track a panelist's browsing behavior via software installed on the panelist's computer or by using other technologies, such as a router,⁵ to record the sites he or she visits, the amount of time spent on each site, and the actions taken on that site. This type of panel is discussed in detail in Chapter 17.

1.4 A brief history of online panels

1.4.1 Early days of online panels

As described above, online panels are essentially access panels moved online. Göritz et al. defined an online panel as a "pool of registered persons who have agreed to take part in online studies on a regular basis" (Göritz, Reinhold, & Batinic, 2002, p. 27). They are the natural evolution of the consumer panels (Delmas & Levy, 1998) in market research, used for decades as a sample source for mail, phone, and face-to-face surveys (Sudman & Wansink, 2002).

The attraction of online panels is threefold: (1) fast data collection; (2) promised lower cost per interview than most some other methods; and (3) sampling efficiency due to extensive profiling. Panel companies typically invest substantial resources to recruit and maintain their panels so that the entire data collection process for clients can be streamlined and data can be turned around in a matter of weeks, if not days.

It is difficult to pinpoint exactly when the first online panels were launched. The idea of having respondents participate in computer-assisted self-interviewing goes back to the mid-1980s, when British Videotext and France Telecom Minitel terminals were used to conduct survey interviews (Saris, 1998). In the Netherlands, the probability-based Dutch Telepanel was launched in 1986 with about 1000 households. A PC and modem were placed in each randomly-selected household, and every weekend, a new questionnaire was downloaded to the PC. The system selected the household member to be interviewed, and after the survey was completed, the system dialed the central computer to upload the data (Saris, 1998).

⁵ A router is a physical device that handles Internet traffic.

The next wave of online panels were implemented in the mid-1990s (Postoaca, 2006), primarily in the United States, but with a few other early adopters in Europe, such as those in the Netherlands (Comley, 2007; Faasse, 2005).

Comley (2007) listed a number of reasons why online panel research took off as quickly as it did, at least in the United States:

1. Many US research buyers already were using panels who mailed in completed paper questionnaires, so the switch to online was easy to accept.
2. The main US online panels were created during the dot com boom, when investments in online businesses of all kinds were at their peak.
3. Research buyers in the US were especially interested in lowering their data collection costs.
4. Response rates for US random-digit dialing (RDD) surveys were declining.
5. The cost and turnaround time of RDD, face-to-face, and mail surveys were increasingly viewed as problematic by many clients.

1.4.2 Consolidation of online panels

The period from the mid-1990s until about 2005 was one of explosive growth of online panels, especially in the United States and Europe. That was followed by a period of consolidation, driven by two complementary forces. The first was the need to build much larger panels that could more effectively service the growing demand for online survey respondents. The second was the internationalization of market research. As US companies increasingly looked to expand into global markets, their research needs shifted to emphasize, first, the European Union (EU) and Japan, followed by emerging markets, especially the so-called BRIC countries (Brazil, Russia, India, and China). Examples include Survey Sampling International's acquisition of Bloomer Access Panels in 2005, Greenfield Online's acquisition of CIAO that same year, and the subsequent acquisition of Greenfield Online, first by Microsoft in 2008, and then by Toluna in 2009.

1.4.3 River sampling

A competing methodology, called *river sampling*, offered a different attraction to researchers. In 1995, Digital Marketing Insights created Opinion Place, giving researchers access to the roughly 24 million users of America Online (AOL). The goal of Opinion Place was not to build a panel but rather to invite people using the Internet to interrupt their activities and complete one of dozens or more waiting surveys. Rather than relying on previously provided personal data (such as demographics) to assign respondents to a specific survey, respondents were profiled at the time of recruitment and routed to a particular questionnaire.

The argument for river sampling was that it provided researchers access to a much larger and more diverse pool of respondents than that of even a very large online panel (PR Newswire Association, 2000). This broader pool also made it possible to screen a very large number of individuals for membership in low incidence subgroups. One weakness of river sampling was that it was very difficult to predict how long it might take for a study to achieve the desired number of completed interviews.

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In 2006, Greenfield Online introduced a similar product called “Real-Time Sampling.” Greenfield expanded the potential pool even more by creating relationships with hundreds of high-traffic sites across the Internet which displayed survey invitations (Research Live, 2006).

At the same time, the demand for greater diversity in online samples, increased targeting of lower incidence populations, and client requirements for “category exclusions” drove panel companies to supplement their panels through contracting with competitors. Alternatively, agencies routinely doing research with difficult-to-reach populations developed relationships with multiple suppliers. One immediate complication was the potential for individuals who belonged to more than one panel to be sampled more than once for the same survey, creating the need to develop methods for de-duplicating the sample.

1.5 Development and maintenance of online panels

1.5.1 Recruiting

A key distinction among panel providers is in terms of panel recruitment methodology. In addition to probability-based and nonprobability online panels (see Couper, 2000; Lozar Manfreda & Vehovar, 2008; Sikkel & Hoogendoorn, 2008) are invitation panels, as we explain below.

1.5.2 Nonprobability panels

The recruitment methods for nonprobability panels are numerous and varied, but with virtually all of them, anyone who is aware of an open invitation to join can volunteer to become a panel member. That is, people select themselves into the panel, rather than the researcher selecting specific individuals from a sampling frame that contains all members of a target population. It is impossible to know in advance who will see the invitation or how many times a given individual might encounter it. As a result, it is impossible for the panel recruiter to know the probability of selection of each member of the panel. Because none of these methods are probability-based, researchers have no scientific basis for calculating standard statistics such as confidence intervals. Of course, if a subset of members of a panel were randomly selected from the panel for a particular survey, the researcher would be justified in generalizing to the panel but not to any known population outside of the panel.

Companies that created nonprobability panels tend to be secretive about the specifics of their recruiting methods, perhaps believing that their methods provide them a competitive advantage (Baker et al., 2010). For this reason, there are few published sources to rely on when describing recruitment methods (Baker et al., 2010; Comley, 2007; Postoaca, 2006). The following list is based on the above references plus our personal experiences dealing with online panel providers and reviewing their web sites.

Online recruitment has been done by using the following methods:

- Placing banner ads on various web sites, often chosen to target specific types of people. Interested visitors click to go to the panel company’s web site, where they enroll.
- Invitations to join a panel distributed via newsgroups or mailing lists.
- Search engine advertisements (Nunan & Knox, 2011). Panel vendors bid on keywords (such as “survey money” or “online survey”). When a person uses one of the keywords as a search term, he or she is shown an ad inviting him or her to join a panel.

- Ads on social networking sites.
- Co-registration agreements integrating online panel enrollment with other online services. For example, when registering with a portal, e-commerce site, news site, or other special interest site, a person may also enroll in an online panel.
- Affiliate hubs, also called online panel consolidators, allow panel members to join one or more online panels simultaneously.
- Member-get-a-member campaigns (snowballing), which use current panel members to recruit their friends and family by offering an incentive.
- Recruiting at the end of an online survey, especially when the participants have been recruited via river sampling.

Offline methods also are used to solicit online panel members, though they tend to be more expensive than online methods. They include piggybacking at the end of an existing offline survey (e.g., mail, face-to-face, or phone) or directly recruiting via offline methods such as face-to-face, mail, or telephone.

1.5.3 Probability-based panels

Probability-based online panels recruit panel members using established sampling methodologies such as random-digit dialing (RDD), address-based sampling (ABS), and area probability sampling. Regardless of the specific sampling method used, a key requirement is that all members of the population of interest have a known, non-zero probability of receiving an invitation to join. No one is allowed to join the panel unless he or she is first selected in a probability sample. Panel members cannot refer friends, family, or colleagues to join the panel.

Recruitment begins with the selection of a probability sample. Potential panel members may be initially contacted via a letter or by an interviewer. For example, the LISS panel in the Netherlands first sent an advance letter along with a panel brochure to sampled households. When an address could be matched with a telephone number, an interviewer attempted to contact the household via telephone. When no telephone number was available, a field interviewer made an in-person visit (Scherpenzeel & Das, 2010; Scherpenzeel, 2011). In the United States, GfK Custom Research (formerly Knowledge Networks and before that, InterSurvey) uses an ABS frame (DiSogra, Callegaro, & Hendarwan, 2010) and sends a mail recruitment package to sampled households. The package contains instructions on how to join the panel either via mail, telephone, or online (Knowledge Networks, 2011). EKOS (2011) in Canada and Gallup in the United States used RDD samples to recruit panels (Tortora, 2008). Finally, face-to-face recruitment of an area probability sample was used to create the Face-to-Face Recruited Internet Survey Platform (FFRISP) in the United States (Krosnick et al., 2009).

To assure representativeness, probability-based panels need a mechanism to survey households that do not have convenient Internet access. For example, GfK Custom Research/Knowledge Networks and the LISS panel offered these households a free computer and Internet connection. Other companies, such as EKOS and Gallup, survey their offline members via phone and/or mail (DiSogra & Callegaro, 2010; Rookey, Hanway, & Dillman, 2008). A third strategy is to offer Internet and non-Internet households the same device. For example, FFRISP members were given a laptop, whereas the French panel Elipps⁶ provided

⁶ <http://www.elipss.fr/elipss/recruitment/>.

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a tablet. This strategy standardizes the visual design of the questionnaire because every panel member can answer the survey with the same device.

1.5.4 Invitation-only panels

One set of online panels includes those whose members are invited from lists (invitation-only panel), such as members of airline frequent flier programs or hotel rewards programs. Firms building such panels do not permit volunteers to join; only invited individuals may do so. If the invited individuals are all members of a list or are a random subset, then the obtained panel is a probability sample of the list. If researchers then wish to generalize results to members of the list, there is a scientific justification for doing so. But generalization to other populations would not be justified on theoretical grounds.

1.5.5 Joining the panel

It has become a best practice to use a *double opt-in* process when people join an online panel. As defined by ISO 26362:2009 “Access Panels in Market Opinion and Social Research,” double opt-in requires “explicit consent at two separate points to become a panel member.” The double opt-in process typically requires that the potential panel member first indicates their intent to join by providing some basic information (e.g., name and email address) on the panel’s join page. He or she is then sent an email with a unique link. After clicking on this link, the potential panel member completes an enrollment survey that may also include an extensive profiling questionnaire. During this process, the potential member is often asked to read material describing how the company will use his or her personal information, how cookies are used, and other general information about membership and rewards. Some companies consider this sufficient to meet the double opt-in requirement. Others require still another step, during which the member is profiled.

1.5.6 Profile stage

The profile stage entails answering a series of questions on various topics. The data obtained through profiling are useful at the sampling stage, when the characteristics of members are used to select samples that reduce the amount of screening required in a client’s survey. Therefore, panel companies attempt to obtain a completed profile from every new member. Profile data are refreshed regularly, depending on how often specific items in the profile are likely to change. Some panels allow respondents to update their profile data at any time, while others invite panelists to a profile updating survey on a regular basis. Sometimes, the profile survey is “chained” to the end of a survey done on behalf of a client. Thus, profiling can be an on-going process rather than a one-off event.

Among the most important profile data are the demographic characteristics of each member. It has become something of a standard in online research for clients to specify samples that fill common demographic quotas in terms of age, sex, ethnicity, and region. Without full demographic information on its members, a panel company cannot meet that kind of specification. During the demographic profiling stage, many companies also collect information such as the mailing address and phone numbers to be used for respondent verification (see Chapter 19) and manage communications with members. These demographic variables can also be used as benchmarks to adjust for attrition in subsequent surveys. Once a potential panel member has completed the demographic profile survey, he or she is officially a panel member.

Thematic profiling on topics such as shopping habits, political preferences, voting behavior, religious belief, health and disease states, media consumption, and technology use and ownership also is common. Thematic profiling allows the panel company to create targeted samples without having to screen the entire panel to find a specific group of people for a particular survey (Callegaro & DiSogra, 2008).

When a client requests a study of a specified target population (e.g., respondents with a particular medical condition), the provider can draw a sample of respondents based on profile survey data. This strategy is called *targeted sampling* (Sikkel & Hoogendoorn, 2008) or *pre-screening* (Callegaro & DiSogra, 2008).

The ability to reach a specific target of the population was recognized early as a major appeal of online panel. In market research, niche marketing is the result of greater segmentation, so companies want to find out the opinions of every segmented, specific group of customers, users, or potential customers.

The data obtained through profiling can be useful at the analysis stage in helping to understand nonresponse bias within the panel on specific surveys. But there is little reported indication that panel companies or researchers take advantage of this on a regular basis.

1.5.7 Incentives

Incentives are employed in surveys for many reasons, with the two most often cited being increased participation and data quality improvement (Lavrakas et al., 2012). Incentives can be classified along different dimensions (Göriz, in press; Lavrakas et al., 2012). First, with regard to timing, there are prepaid (noncontingent) and postpaid (contingent) incentives. As their names suggest, prepaid incentives are given to potential respondents before their participation, whereas postpaid (i.e., promised) incentives are delivered only after the respondent has complied with the survey request.

A review of the literature as well as our personal experience suggests that prepaid incentives are rarely used in online panels, perhaps because they are logistically more challenging, and because they are perceived to be more expensive, since everyone sampled is paid the incentive. However, the research literature on survey incentives is very consistent over the past 80 years, continually showing that prepaid incentives are more effective in increasing response rates than postpaid/contingent incentives of similar value. Almost all that research is with “first-time” respondents who have had no prior experiences with the researchers – experiences which may have helped build trust and feelings of reciprocity. Thus, in the case of panel members who have extensive prior experience with the panel company, promised (contingent) incentives may have a greater impact on cooperation than the literature would suggest.

A second dimension is whether everybody or only some respondents get an incentive. Here, we distinguish between per-capita versus lottery incentives (in the United States, usually called “sweepstakes”). With per-capita incentives, every panelist who completes the survey gets the incentive. In our experience, panel companies rarely do this. With a lottery incentive, panel members essentially get a “ticket” for that monthly draw each time they complete a survey, thereby increasing their chance of winning by completing multiple surveys within a given month.

A third dimension is the character of the incentive, most often either monetary (cash, checks, electronic payments, gift cards, etc.) or points that can be accrued and redeemed for goods or services. The literature is consistent in showing that “cash is king,” but almost all these findings come from studies with first-time respondents, so this “best practice” may not generalize to online panels.

1.5.8 Panel attrition, maintenance, and the concept of active panel membership

As Callegaro and DiSogra (2008) explained, panel membership changes constantly. Most panels continuously recruit new panel members. At the same time, panels continually suffer from attrition of four kinds:

- voluntary
- passive
- mortality
- panel-induced

Voluntary attrition. Voluntary attrition is the proactive action of panel members to contact the company and ask to be removed from the panel. This occurs for various reasons, including fatigue, growing concerns about privacy, and lack of satisfaction with the rewards earned. This form of attrition is relatively infrequent.

Passive attrition. More frequently, panel members simply stop answering surveys, or they change their email addresses without notifying the company. These members are also referred as “sleepers,” as they are not active, but some of them can be “awakened” with specific initiatives (Scherpenzeel & Das, 2010). This form of attrition is relatively common.

Mortality attrition. This occurs when a panel member dies or is no longer physically or mentally capable of answering surveys. This is relatively uncommon.

Panel-induced attrition. Lastly, the panel company can decide to “retire” or force panel members out of the panel. For example, Nielsen calls this “forced turnover.”⁷ Some panels have a limit on panel tenure. Others have rules that place limits on noncompliance. For example, the Gallup panel has a five-strikes rule: panel members are dropped from the panel if they do not answer five consecutive surveys to which they were invited (McCutcheon, Rao, & Kaminska, Chapter 5 in this volume).

Panel attrition can be measured in terms of size and type. In terms of size, the simple ratio of the number of panelists who have left the panel within a certain period of time, whatever the reason, indicates whether the extent of attrition is small, medium, or large. In terms of the type of attrition, *differential panel attrition* occurs when a nonrandom subset of panelists leave the panel. These two types of attrition are independent of one another. For example, overall panel attrition might be high, but differential attrition low. The opposite also can be the case.

Panel attrition can be measured at two points in time: (1) at a time reference point (e.g., monthly); and (2) at a wave reference point when looking at longitudinal designs (Callegaro & DiSogra, 2008). In the first case, the magnitude of the attrition can be measured by looking at a specific cohort of respondents and following them month after month. The monthly attrition for that cohort will be equal to the number of active panel members at Time t minus the number of active panel members at Time $t + 1$, divided by the number of active panel members at Time t . In the second case, for longitudinal designs, the formula will be the same, but substituting wave with time.

How a panel manages its attrition can affect how well the panel performs. For example, aggressive panel management practices that purge less active members may increase the participation rate of each survey (Callegaro & DiSogra, 2008). But this comes at the price of

⁷ <http://www.agbnielsen.net/glossary/glossaryQ.asp?type=alpha&jump=none#alphaF>.

reducing the active panel size and increasing the risk of bias, because more active panel members may respond differently than less active panel members (Miller, 2010).

Attrition is particularly problematic in longitudinal studies. The reduction in available sample size can lower the power of statistical analysis, and differential attrition will lower data quality. Attrition can be tackled by the panel provider with specific initiatives that are intended to reduce it (Kruse et al., 2010). Examples of such initiatives are re-recruitment of members who have left the panel and an incentive program to retain members in the panel for longer periods of time.

As the foregoing suggests, attrition can significantly impact the quality of survey-based estimates, depending on the causes of the attrition. The best case is that attrition is *missing completely at random* (MCAR), that is, unrelated (uncorrelated) to the variables measured in a particular survey. Sample size may be reduced, but that does not necessarily lead to biased estimates. However, when data are simply *missing at random* (MAR), and nonparticipation is related to variables that have been measured in earlier surveys, there is an increased risk of bias. Fortunately, these variables then can be used in weighting adjustment techniques that reduce or remove any resulting bias. Finally, attrition can result in data being *not missing at random* (NMAR), meaning that attrition is correlated with and possibly caused by variables that are only measured in the current survey.

Once a panel is built, maintenance methods are often similar across probability and non-probability online panel types (Callegaro & DiSogra, 2008). The effort that goes into maintaining an online panel is significant. Knowing how many active panel members are available and their characteristics is a key statistic for an online panel. The definition of what constitutes an *active panel member* varies considerably from company to company. This variability is apparent in the answers that different online panel companies give to Questions 20 and 21 of the ESOMAR “28 Questions to Help Buyers of Online Panels” (2012) online panel companies make decisions about which services are best for their own needs. Section 3.3 of ISO 26362: 2009 (2009) defines an active panel member as a “panel member who has participated in at least one survey if requested, has updated his/her profile data or has registered to join the access panel, within the last 12 months” (p. 2).



1.5.9 Sampling for specific studies

Few publicly-available documents describe how different panels draw and balance their samples. However, our experience suggests two extremes, depending on the specifications provided by the client. At one extreme are targeted samples, for which clients describe the characteristics of sample members in ways that match variables in the panel member profiles constructed by the panel company. At the other end are more general population surveys, for which there is little or no match between the desired sample characteristics and the panel company’s profile data. In this case, a very large sample is often needed, so that respondents can be screened to yield the desired distribution of characteristics among people who complete the survey. Most studies probably fall between these two extremes.

Viewed through the lens of traditional sampling techniques, we can distinguish three primary methods:

- *Simple random sample* or *stratified random sample*. This method is similar to, if not the same as, traditional sampling methods that have been used in survey research for the past 60 years. Using a complete list of active panel members and extra variables describing each of them, it is straightforward to draw a simple or stratified random sample.

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- *Quota sampling.* Quota sampling is currently the most commonly used method for selecting a sample from nonprobability online panels (Rivers, 2007). It entails setting up quotas or maximum numbers of respondents in key subgroups, usually demographically defined, but sometimes behaviorally defined as well. Quotas are enforced during questionnaire completion, rather than during the sample draw. Once a quota is filled, new respondents who might qualify for that cell are screened out and typically are politely informed that their responses are not needed.
- *Sample matching.* A number of panel companies used more complex sampling methods designed to maximize sample representativeness. For example, YouGov (former Polimetrix) developed a sample matching method (Rivers, 2006, 2007) that starts with an enumeration of the target population using pseudo-frames constructed from high quality probability-based surveys (e.g., American Community Survey or Current Population Survey) and commercially-available databases, such as lists of registered voters (when the topic is election polling). A random sample is drawn from the pseudo-frame and matched to panel members who share the same characteristics. Multiple panel members are then selected for each line in the pseudo-frame to increase the likelihood of getting a response. This method is used simultaneously for all open studies sharing the same sample specifications. If a panel member reaches a study and another closest match already completed it, he/she is rerouted in real time to the second best match study, so s/he is not turned away.

The *Propensity Score Select* or *SmartSelect* by Toluna (Terhanian & Bremer, 2012) is another method that relies on sample matching. It starts by conducting two parallel surveys with a set of shared questions related to the survey topic or believed to distinguish people who are online compared to those who are not. The specific set of questions asked is important and must be carefully chosen. One survey uses a probability sample and a traditional method (e.g., telephone, face-to-face), and the other is done online using the Toluna panel. The first group is the external target population, and the second group is the “accessible” population. The results are used in a logistic regression to estimate the probability that a Toluna panel member belongs to the target population rather than the accessible population. For future surveys, the online panel members are asked these key set of questions. The process can be used with multiple panel sources and river samples as the propensity is computed in real time. Once the distribution of the propensity scores is determined, it can be used to select respondents for future surveys on the same topic. The methodology is also combined with traditional quotas when inviting panel members to a new survey.

Sample matching and *SmartSelect* methodologies have not been extensively tested, and very few investigations of them are available in the literature. For example, sample matching has been used in pre-election polling (YouGov, 2011). To the best of our knowledge, these methods also have not been tested independently, so it is not known how well they work in surveys on a variety of topics, or single surveys that are used to produce estimates on a broad range of topics.

Some sample matching techniques *vet* or prescreen respondents (Terhanian & Bremer, 2012) prior to sample selection. For example, Global Market Insight’s (GMI) *Pinnacle* methodology (Eggers & Drake, 2011; GMI, 2012) is based on profiling respondents using 60 demographic, psychographic, and behavioral questions from the US General Social Survey (GSS). The GSS is a high quality, probability-based, high response rate long-standing survey

considered a gold standard for the attitudes and beliefs of the US population. Samples are then drawn from the panel so that the distribution of characteristics matches that of a GSS sample.

Marketing Inc.'s *Grand Mean Project* also uses a vetting approach, in which participating panels profile their members according to buying behavior, socio-graphics, media, and market segments (Gittelman & Trimarchi, 2010; Gittelman, Trimarchi, & Fawson, 2011). The resulting data are used to create a series of segmentation profiles. The *Grand Mean* is an average of the percentage of members per profiles across panels within the same country. Each single online panel can compare their segments to the grand mean and use this information to sample its panel members. Another use of the grand mean is to track changes in panel composition over time.

Other vetting approaches are tailored to exclude people who may complete the same survey more than once, or who show low engagement with the survey through behaviors such as speeding and straight-lining. These approaches work by using multiple sample sources at the same time, respondent verification using third party databases, and digital fingerprinting to identify respondents who take the survey multiple times. Examples of the above strategies are MarketTools' *TrueSample* (MarketTools, 2009) and Imperium's suite of products (Relevant ID, Verity, Capture, etc.) (<http://www.imperium.com/>).

1.5.10 Adjustments to improve representativeness

Researchers generally conduct surveys so that they can make statistical inferences to a larger population. Within the probability-sampling paradigm, valid inference is only possible if a sample has been selected properly. "Properly selected" means that every person in the target population has a known non-zero probability of being selected. When these conditions are met, the sample can be described as being representative of the target population. In these cases, researchers can compute unbiased estimates and measures of the accuracy of those estimates (Horvitz & Thompson, 1952).

By definition, nonprobability panels do not satisfy these conditions. In particular, when they purport to represent the general population of some geo-political area, they typically suffer from high noncoverage and considerable coverage error. Some of that coverage error is due to the less than 100% household Internet penetration, but more often, it is due to the fact that panels are comprised of volunteers who have self-selected into the panel, rather than being selected from a frame that contains the full population. Probabilities of selection are unknown, so the panel cannot be described as representative. Proponents of nonprobability panels generally have come to accept this proposition but also argue that the bias in samples drawn from these panels can be reduced through the use of auxiliary variables that make the results representative. These adjustments can be made in sample selection, in analysis, or both. The sample matching techniques described above are one such method.

Weighting adjustments are another. They are intended to reduce bias and improve the accuracy of survey estimates by using auxiliary information to make post-survey adjustments. Auxiliary information is defined as a set of variables that have been measured in the survey, and for which information on their population distribution (or complete sample distribution) is available.

By comparing the distribution of a variable from the survey with an auxiliary variable that measures the same characteristic in the target population, researchers can assess whether the sample is representative of the population with respect to that particular variable. If the distributions differ considerably, researchers may conclude that the sample is biased and can

attempt to reduce or eliminate the bias(es) through weighting. Estimates of population characteristics are then computed by using the weighted values instead of the unweighted values. Overviews of weighting procedures have been offered by Bethlehem and Biffignandi (2012) and Särndal and Lundström (2005).

The two most common methods to weight online panels are post-stratification and propensity score weighting. A more detailed discussion of these methods can be found in the introduction to Part IV on adjustment techniques in this volume. With post-stratification, the sample typically is divided into a number of strata. All cases within a stratum are assigned the same weight, and this weight is such that the sample percentage of people in a stratum is equal to the population percentage of people in that stratum. In other words, the sample is made to look like the population it is meant to represent on the variables that are used by the researchers to do these adjustments.

Other weighting techniques make use of response propensities. Harris Interactive first introduced propensity weighting for nonprobability panels in the late 1990s (Terhanian, Smith, Bremer, & Thomas, 2001). Other applications of propensity score weighting on nonprobability panels were described by Lee and Valliant (2009). First, the (unknown) response probabilities are estimated. Next, the estimated probabilities (propensities) can be used in several ways. One way is to adapt the original selection probabilities by multiplying them by the estimated response probabilities. Another way is to use the estimated response probabilities as stratification variables and to apply post-stratification. For more information about the use of response probabilities, see Bethlehem, Cobben, and Schouten (2011).

As with probability samples, there is no guarantee that weighting will be successful in reducing or eliminating bias in estimates due to under-coverage, the sampling design used, nonresponse, or self-selection. The bias is only reduced if the weighting model contains the proper auxiliary variables. Such variables should satisfy four conditions:

- They must have been measured in the survey.
- Their population distributions must be known.
- They must be correlated with all the measures of interest.
- They must be correlated with the response probabilities.

Unfortunately, such variables are often unknown to the researchers, or if known, are not available, or there is only a weak correlation. Instead, researchers typically use the “usual suspects,” such as demographics like sex, age, race, education, etc., because they are readily available for both the sample and the population, and they correlate significantly (albeit weakly) with the key measures being surveyed and the response behavior.

When relevant auxiliary variables are not available, one might consider conducting a reference survey to create them. This reference survey is based on a probability sample, where data collection takes place with a mode leading to high response rates and little bias. Such a survey can be used to produce accurate estimates of population distributions of auxiliary variables. These estimated distributions can be used as benchmarks in weighting adjustment techniques. The reference survey approach has been applied by several market research organizations (see e.g., Börsch-Supan et al., 2007; Duffy et al., 2005; Terhanian & Bremer, 2012) and discussed in the academic literature by Valliant and Dever (2011).

An interesting aspect of the reference survey approach is that any variable can be used for adjustment weighting as long as it is measured both in the reference survey and in the

web panel. For example, some market research organizations use “webographics” or “psychographic” variables that divide the population into mentality groups (see Schonlau et al., 2004; 2007, for more details about the use of such variables). Yet despite the advantages that reference surveys offer, researchers are often ignorant about what are the key auxiliary variables they should be measuring.

When a reference survey is conducted to create relevant auxiliary variables, it should be realized that the reference survey only estimates their population distribution. This introduces an extra source of variation. Therefore, the variance of the weighting adjusted estimates is increased. The increase in variance depends on the sample size of the reference survey: the smaller the sample size, the larger the variance. So using a reference survey can reduce bias, but at the cost of an increased variance. Depending on the derived weights, this approach also can reduce the effective sample size.

1.6 Types of studies for which online panels are used

Online panels allow for *cross-sectional* and *longitudinal* research. In the cross-sectional case, panel members participate in a variety of surveys on different topics, but they are not interviewed on the same topic repeatedly. Cross-sectional surveys can be done once, or the same survey can be conducted multiple times but with different respondents. A classic example is a tracking study designed to collect repeated measures, often related to customer satisfaction, advertising effectiveness, perceptions of a company’s brand, or likely voting intentions. The same questionnaire is administered on a regular basis, but with different respondents every time.

Online panels can be also utilized for longitudinal purposes, where the same panelists are interviewed at different points in time on the same topic (Göriz, 2007). This type of design is the closest to the traditional concept of household panels, where the same people are followed over the years and interviewed on the same topics to document change. Every measurement occasion is called a survey *wave*. Re-asking the same question at different points in time can be used to study the reliability of items (test-retest), and this information can be used to increase the overall data quality (Sikkel & Hoogendoorn, 2008). At the same time, it is possible to use a longitudinal design with a cross-sectional component, where specific or thematic questions are asked only once.

As discussed above, it is common for online panels to run thematic surveys on a diversity of topics on the whole panel in a census fashion – a.k.a. profile surveys. In principle, at least, one advantage of profile surveys is that they can eliminate the need to ask the profile questions (e.g., demographics that do not change over time) over and over in each client study, making the entire questionnaire shorter. This also can reduce respondent burden and avoid annoying panel members with the same repeated questions. Previously collected data can also help making questionnaire routing more efficient. Unfortunately, few clients take advantage of these efficiencies, believing that profile data is not sufficiently reliable.

1.7 Industry standards, professional associations’ guidelines, and advisory groups

Especially in the last decade, industry and professional associations worldwide have sought to guide their members on the proper and effective use of samples from online panels. We provide

a brief overview of these efforts below. We urge the reader to become familiar with these various activities and undertakings, especially as they may differ from country to country.

In 2009, the International Organization for Standardization (ISO) issued ISO 26362 “Access Panels in Market, Opinion, and Social Research,” a service standard primarily focused on nonprobability online panels. The goal of this standard was to apply the quality framework of ISO 20252 (originally issued in 2006) to panels. ISO 26362 presents a terminology and a series of requirements and practices that companies should follow when recruiting, managing, and providing samples from an online panel. The more recent version of ISO 20252 (2012) incorporates many of the principles from ISO 26362, especially in Section 4.5.1.4, which focuses on nonprobability samples. Panel companies can be certified under these standards by agreeing to a series of external audits that verify their compliance.

Another global organization, ESOMAR, has produced two guidance documents. Their “Guideline for Online Research” (2011) offers guidance on the full range of online research methods, including online panels. A second document, “28 Questions to Help Research Buyers of Online Samples” (2012), is the third in a series “designed to provide a standard set of questions a buyer can ask to determine whether a sample provider’s practices and samples fit with their research objectives” (ESOMAR, 2011).

A number of both industry and professional associations at the country and regional levels endorse global standards, refer to them, or have their own specific quality standard documents that incorporate many of the same principles. For example, EFAMRO, the European Federation of Market, Social and Opinion Research Agency Trade Associations, has endorsed ISO 20632 and ISO 20252. Other national professional associations have specific documents. The Canadian Market Research and Intelligence Association (MRIA) has their “10 Questions to Ask Your Online Survey Provider” (2013). In Italy, Assirm, inspired by ISO 20252, has specific rules for online panels. In Australia, the Association of Market and Social Research Organizations (AMSRO) has developed a certification process for its members called Quality Standards for Online Access Panels (QSOAP) (AMSRO, 2011). This was partly an interim process until ISO 26362 was issued in December 2009. From 2010 on, AMSRO decided not to accept any more applications for the QSOAP but instead to endorse ISO 26362. In the United Kingdom, the Market Research Society has issued a document called “Guidelines for Online Research” (MRS, 2012) where there are specific sections dedicated to online panels. Still in the United Kingdom, the British Standard Institution (BSI) produced the second edition of its study *Quality in Market Research: From Theory to Practice* (Harding & Jackson, 2012). In this book, a very broad approach to quality in market research is taken from every angle: market research as a science, its professionals and members, the clients, the legislation, and the interviewers. Other Chapters discuss ISO 9001, ISO 26362 and ISO 20252.

There also are guidelines written by advisory groups. For example, the Canadian Advisory Panel on Online Public Opinion Survey Quality (2008) has developed standards and guidelines for probability and nonprobability online research that focus on areas such as pre-field planning, preparation and documentation, sampling, data collection, use of multiple panels, success rate (response rates for web surveys), data management and processing, data analysis/reporting, and survey documentation.

The Advertising Research Foundation (ARF) in the United States has established their Research Quality Council (RQC) (<http://www.thearf.org/orqc-initiative.php>). This group has organized funding and resources for two major research initiatives known as Foundations of Quality (FOQ) 1 and 2 (<http://thearf.org/foq2.php>). These initiatives fund quality studies and produce reports such as the 17 online panel comparison study (Walker, Pettit, &

Rubinson, 2009) described in Chapter 2. In 2011, the ARF commissioned a report called “Online Survey Research: Findings, Best practices, and Future Research” (ARF, 2011; Vannette, 2011) as a prelude to the launch of FOQ 2. The report is a literature review that “represents what we believe is the most comprehensive and representative aggregation of knowledge about online survey research compiled to date” (Vannette, 2011, p. 4). The ARF has since designed an experimental study aimed at improving our understanding of a broad range of online panel practices. Data collection is now complete, and analysis is ongoing.

The American Association for Public Opinion Research (AAPOR) has issued three documents that specifically address online panels. In the “Final Dispositions of Case Codes and Outcome Rates for Surveys” (2011), methods for computing standard quality metrics for probability and nonprobability online panels are detailed. The second document is the result of a task force on online panels (Baker et al., 2010). The charge of the task force was

reviewing the current empirical findings related to opt-in online panels utilized for data collection and developing recommendations for AAPOR members ... Provide key information and recommendations about whether and when opt-in panels might be best utilized and how best to judge their quality.

(p. 712)



The most recent effort is the work of another AAPOR task force on nonprobability sampling (Baker et al., 2013). As its name suggests, this report is primarily focused on the range of nonprobability sampling methods used across disciplines, some of which may be especially useful to researchers relying on online panels.

1.8 Data quality issues

Despite the rapid growth of online panels and their emergence as a major methodology worldwide, concerns about data quality persist. A full investigation of this issue is the primary theme of this volume. For example, Chapter 2 in this volume: “A critical review of studies investigating the quality of data obtained with online panels” discusses the major studies to date comparing the quality of online panels with other survey data and benchmarks. It also discusses topics such as multiple panel membership and the “life” of online panel members. The issue of professional respondents is discussed in Chapter 10, “Professional respondents in nonprobability online panels” where a review of the major studies on the topic is highlighted before presenting new original data on professional respondents. Finally, the issue of respondents’ identity and validation is discussed in Chapter 19, “Validating respondents’ identity in online panels.”

1.9 Looking ahead to the future of online panels

As we noted at the outset, approximately one-third of quantitative market research is now done using online surveys, the majority of which relies on online panels. Online panels are here to stay, and given the increasing cost of such traditional methods as face-to-face and telephone surveys, the use of online panels is likely to continue to grow.

From a scientific perspective, probability-based online panels generally are preferable to those that rely on nonprobability methods. Best practices for building and maintaining

probability-based panels are established and well known (e.g., Scherpenzeel & Das, 2010; Scherpenzeel, 2011). However, they also are expensive to build and maintain, and often too small to support the low incidence and small area geographic studies that are a significant part of the attraction of online panel research. For these and other reasons, they are likely to continue to represent a small proportion of the overall online panel business. As Internet penetration reaches very high coverage and devices to browse the web become financially more accessible to the general population, especially for those in the lowest economic tiers, the cost to build and maintain a probability-based online panel will decrease. For example, in Europe, new probability-based panels are being built or under consideration (Das, 2012).

That said, nonprobability panels continue to face some very serious challenges. First among them is data quality. This volume investigates online panel data quality from a wide range of perspectives, but arguably the biggest challenge that panels face is developing more robust methods for sampling and weighting to improve representativeness, resulting in more accurate estimates, and making reliable statistical inference possible. There are some promising developments, especially in sample selection, but a good deal more work is needed to fully validate these approaches and articulate their assumptions in ways that lead researchers to adopt them with confidence. At present, the advantages of cost, speed, and reach do not always go hand in hand with high data quality. We look forward to more research being done on online panel quality, especially on sampling and weighting methods, and hope this volume can serve as a basis for conceptualizing it.

At the same times, at least in the United States, the traditional panel model is rapidly falling into obsolescence, as the demand for online respondents grows, clients and researchers alike look for greater diversity in their online samples, and interest in studying low incidence populations increases. Using a model called *multi-sourcing* or *dynamic sourcing*, providers of online samples are increasingly relying on a range of sources that expands beyond their proprietary panels to the panels of competitors, social networking sites, and the placement of general survey invitations on a variety of web sites across the Internet, much like river sampling. These respondents often do not receive invitations to a specific survey on a specific topic. Instead they receive a general invitation to do a survey that directs them to a web site where they are screened and then routed to a waiting survey for which they already have qualified, at least partially. The software that controls this process is called a *router*. Its goal is to ensure that anyone willing to do a survey online gets one. As of this writing, there is a good deal of variation in how these router systems are designed, how they operate, and what impacts, if any, they have on the data. And, of course, many of the metrics that we are accustomed to using to evaluate samples become difficult to compute. Nonetheless, online sample providers are moving in this direction quickly. In all probability, it will become the dominant paradigm in the next few years. The impact, if any, on data quality is unknown. If nothing else, it standardizes the sample selection process, at least within a specific provider, and that may be good thing. But whether it ultimately leads to improved data quality in online research remains to be seen.

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