



## **Comparison Study of Early Adopter Attitudes and Online Behavior in Probability and Non-Probability Web Panels<sup>1</sup>**

Date: March 20, 2009

Authors: J. Michael Dennis, Larry Osborn, and Karen Semans

Contact Author: J. Michael Dennis, [mdennis@knowledgenetworks.com](mailto:mdennis@knowledgenetworks.com)

### **Background**

It can be argued that consumers have more complete information when shopping for a new car than researchers have in selecting a web panel provider. While there are clearly more makes and models of cars than there are web panels, there is a paucity of information to help the researcher determine which panels are the most accurate and reliable. The car industry over time has had to compete on their autos' features, quality, and prices, with necessary information being disclosed by the manufacturers that allow independent third parties to rate the cars on all these dimensions. Consumers can even test drive cars before purchasing them; it's pretty hard to test drive a web panel. This is why methodological research evaluating web panels is vital.

Evaluating web panels at first appears deceptively simple because there are only two types of web panels. First, there are *Non-Volunteer Access Panels (NVAP)*, in which potential panel members are chosen by the research company using a statistically valid sampling method and using a known published sampling frame for that recruitment to establish panel representativeness. Examples of statistically valid sample frames are list-assisted random digit dialing (RDD) samples and the United States Postal Services (USPS) Delivery Sequence File of residential addresses. KnowledgePanel® typifies the NVAP model.<sup>2</sup> In contrast, the second type of web panel, the *Volunteer Access Panel (VAP)*, is made of respondents that can join from any venue, including email, spam, web or print ads, or by word of mouth. VAPs are sometimes called "opt-in" or "non-probability" web panels.

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<sup>1</sup> Reference: Dennis, J. Michael, Larry Osborn, and Karen Semans. March 2009. "Comparison Study of Early Adopter Attitudes and Online Behavior in Probability and Non-Probability Web Panels." Paper published at <http://www.knowledgenetworks.com/ganp/reviewer-info.html>.

<sup>2</sup> For more information about KnowledgePanel methodology, please visit <http://www.knowledgenetworks.com/ganp/reviewer-info.html>.

## Past Research

There hasn't been much research published to date comparing the accuracy of the two types of panels. Krosnick and Chang (2009) conducted an extensive experiment based on the event of the Presidential election of 2000. Their two-wave longitudinal study is a comparison of survey data collected from Knowledge Networks' web panel (then called "InterSurvey"), the Harris Interactive web panel (non-probability), and a university-based RDD telephone center. Some of their findings are similar to those reached in this paper. In the words of Chang and Krosnick (2009), "these data support a series of conclusions:

- (1) The probability samples were more representative of the nation's population than was the non-probability sample, even after weighting.
- (2) The non-probability sample was biased toward individuals who were highly knowledgeable about and interested in the topic of the survey.
- (3) Self-reports provided via the Internet were more accurate descriptions of the respondents than were self-reports provided via telephone, as manifested by higher concurrent and predictive validity, higher reliability, less satisficing, and less social desirability bias.
- (4) The practice gained by participants in the KN panel enhanced the accuracy of their self-reports, but such practice did not enhance the accuracy of reports by members of the non-probability Internet sample.
- (5) The tendency of non-probability sample members to choose to participate in surveys on topics of great interest to them made their self-reports more accurate on average than the self-reports obtained from the less selective KN respondents."

In a presentation at the national American Association for Public Opinion Research (AAPOR) meeting in 2005, Krosnick (2005) also reported on research from a comparison study of RDD, KnowledgePanel®, and six non-probability opt-in panels. For this comparison study, objective benchmark statistics were collected for calculating error rates. Across all the measures, the KnowledgePanel® data were the most accurate (2.2 mean percentage point error). The error rates for the opt-in panels varied between 3.9 and 9.4 percentage points.

Little other empirical research on the differences between panel types exists. As a result of the scarcity of empirical comparisons of the two types of panels, it is common for researchers to emphasize differences in the approaches' theoretical underpinnings. On these grounds, the probability panels are often regarded as superior as they stand on the shoulders of the giants of the scientific method based on random selection. The probability web panel is an extension of the randomizing sampling method based on area-probability samples and RDD sampling that, respectively, have dominated federally sponsored survey research since at least the 1960s and in the 1980s and 1990s. The advent of the non-probability web panel is a reaction to the higher costs of basing web

panel recruitment on a statistically valid sample frame and the high costs of building web panels large enough to support small area estimates or subpopulation surveys.

### **Research Questions**

Consumer research is often attempting to identify individuals who will be the “early adopters” of a new product or service; these are the kinds of people who bought the Betamax video recorder before VHS became the standard, or were first in line when the iPhone came on the market. If a survey sample consists of too many “early adopters,” the survey might provide inflated and erroneous measures of willingness to purchase a new product or service, leading to bad business decisions.

Our research question emerged as follows:

Does using a representative online probability panel versus a non-probability panel make a difference in the survey measurement of attitudes and behaviors related to “early adoption?”

Specifically, how do the two types of panels compare in terms of:

- Self-images of early adoption of a new product;
- Number of online interviews completed recently;
- Use of online social networks; and
- Duration of use of the internet at home.

### **Sample Sources**

The study design involves a comparison of four U.S. online panels, two based on probability sampling and two that are not.

The two probability-based online panels are:

- KnowledgePanel®; and
- The 2007-2009 American National Elections Studies Web Panel.

These two panels were selected for our study because they are the only two NVAP web panels that meet these criteria: probability-based sampling; inclusion of non-Internet households, enabling them for web surveys; general population coverage of age 18 and over for national representative surveys of at least 1,200 interviews.

KnowledgePanel® is the only online panel representative of the U.S. adult population that uses probability-based sampling and provides laptops and internet service to those who did not have them at the time of recruitment.

The American National Election Studies (ANES) web panel was built and maintained by Knowledge Networks under a contract with Stanford University. The ANES web panel was funded by the National Science Foundation. Similar to the process used for KnowledgePanel®, Knowledge Networks provided MSN TV 2® devices and Internet service to the non-Internet households. For the first time, the traditional pre- and post-assessment of a U.S. general election was conducted online. Since its inception in 1948, the NES survey data have become the gold standard for science research on the elections.<sup>3</sup>

We also selected two non-probability panels for the study. The panels are unnamed in our research and were selected randomly from a list of well-known opt-in panel firms. The goal of the blind random selection is to assure fairness in the selection process; in addition, we sought to have the results, within reason, be projectable to the VAP type of web panels. The identities of the two opt-in panel firms were not disclosed to the researchers conducting the study, and the results are not reported by the identities of the two opt-in panel companies. Knowledge Networks purchased the samples from the firms providing a simple sample specification.<sup>4</sup>

### **Questionnaire & Survey Administration**

The survey items were designed to measure “early adopter” attitudes and behaviors. All respondents from the four panels were administered the same questions using the same questionnaire format and the same survey system used by Knowledge Networks. The data collection occurred simultaneously for all four survey samples online in September-October 2008, providing a comparison database on which all the analyses for this paper were made.

The actual questions used for this research are in Attachment A.

The sample sizes, within-survey completion rates, and field period dates are reported below.

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<sup>3</sup> For more information about the ANES and the ANES web panel, please go to [www.electionstudies.org](http://www.electionstudies.org).

<sup>4</sup> Specifically, we asked the firms to sell us email sample according to the following specification: 1,200 US gen pop interviews; interviews to be spread out over the course of 4 weeks; 30-minute survey.

## Number of Interviews, Survey Completion Rates, and Field Period Dates

	ANES Web Panel	KnowledgePanel®	Opt-In Panel A	Opt-In Panel B
<b>N Interviews</b>	1,397	1,210	1,221	1,223
<b>Survey Completion Rate</b>	65.8%	63.7%	4.6%	4.7%
<b>Field Period</b>	8/11/08– 9/2/08	8/22/08–9/12/08	8/21/08– 9/11/08	8/21/08– 9/11/08

### Statistical Weighting

Each data set corresponding to each web panel was weighted to the same U.S. Census population benchmarks for the key demographics of age, gender, race-ethnicity, educational attainment, and Census Region. The two probability samples from KnowledgePanel® and the ANES were also weighted to take into account their probability of selection in the U.S. population and an additional post-stratification weighting variable, Internet/non-Internet household, was also applied as these two panels do have sample coverage of the non-Internet household population. All the cross-tabulations presented in this study are based on these weighted data.

### Study Results

In general, the results from the two probability samples tend to be close to each other; while the same is true for the two non-probability samples. The fundamental difference in sampling methodology, when controlled in the experiment by the survey instrumentation and method of survey administration, produced very similar results within panel types but very different results between the panel types.

Below are selected specific findings based on the data. All the statistical differences reported between the probability and non-probability samples are statistically significant ( $p < 0.05$ ).

1. Non-probability panels have low survey completion rates compared to probability samples, leading to increased risk of non-response bias. A difference of 13 times is notable.
2. Non-probability panelists are more likely to have taken a large number of surveys recently. One in four opt-in panelists had participated in 20 or more surveys in the past four weeks.

3. Non-probability panelists spend a lot more time online at home than the probability panelists. About two and half times as many opt-in panelists said they spend 10 or more hours a week online at home than the probability-recruited respondents. Consistent with this finding, about 50% more non-probability panelists reported that they were “very comfortable” using computers.
4. Non-probability panelists are more likely to report attitudes and behaviors in ways that indicate that they are “early adopters” of new products and concepts. In one opt-in panel, a majority (54%) agreed with the statement: “I often try new brands because I like variety,” compared to only 34% from a probability-based panel.
5. The probability-based panels reported the correct population estimate of adult Facebook users, 13% in the summer of 2008, while the opt-in panels reported usage at almost twice that level.<sup>5</sup>
6. The above differences in the survey results occurred despite the use of statistical weights that helped improve the sample representativeness of the opt-in panel survey data for the purpose of this analysis. Therefore, the differences that are occurring between probability and non-probability panels are not correctable by post-stratification weighting and reflect real differences in attitudes and behaviors. Attachment B displays the weighted frequencies for the sample demographics for the four sets of interviews.

Below are selected results demonstrating these patterns.

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<sup>5</sup>Facebook the company reports that over 32 million U.S. adults use its service (13% of the U.S. adult population). See Matt Dickman, 2009, “The Face of Facebook,” posted to <http://technomarketer.typepad.com> . The data are from the Facebook advertising targeting system as of August 15, 2008.

### Selected Study Results

	ANES Web Panel	Knowledge-Panel®	Opt-In Panel A	Opt-In Panel B
Survey Completion Rate	65.8%	63.7%	4.6%	4.7%
Took 20 or more online surveys in past 4 weeks	0.3%	2.0%	25.1%	24.8%
Very Comfortable using computers	40.7%	36.5%	62.7%	60.3%
<b>Strongly Agrees/Agrees:</b> I try new products before others	26.4%	24.0%	44.2%	41.6%
<b>Strongly Agrees/Agrees:</b> I often try new brands because I like variety	36.6%	34.1%	52%	54.2%
<b>Strongly Agrees/Agrees:</b> I like to tell others about new brands or technology	51.8%	45.0%	60.2%	62.1%
Use Facebook	15.4%	12.8%	23.6%	20.1%
Spends more than 10 hours a week on Internet at home (besides e-mail)	17.0%	16.9%	38.4%	43.7%

Additional cross-tabulations are displayed in Attachment C.

### Some Conclusions

The results from the opt-in panels are inconsistent with the conclusions reached in Francis S. Bourne’s seminal essay “The Adoption Process” where he indicates five new product adoption groups, as well as contrary to common sense about the prevalence of “early adopters” in society (see Bourne, 2001). Applying Bourne’s model to the survey data from the question “first to try new products” would yield a 16% share of early adopters according to the non-probability samples. We know that this rate is substantially higher than observed in the roll-out of new products in the marketplace and

higher than assumed in any known adoption-curve metrics. In contrast, the far lower and more realistic early-adopter share seen in the probability samples is supportable.

The factors responsible for the differences in results are in part found in the survey data themselves. First, there is the high percentage of the interviews completed by a small share of the opt-in panel respondent pool; one in four opt-in panel respondents has participated in 20 or more online surveys in the past four weeks. Excessive survey participation can lead to changes in attitudes, awareness, and behaviors related to new products and concepts (i.e., panel conditioning). Second, the survey completion rates are very low for opt-in panels. It is possible that the one in twenty opt-in invited cases that chose to participate in the survey are disproportionately “early adopters.” The higher level of comfort with computers reported by the opt-in panelists compared with the probability sample panelists further supports this hypothesis. Finally, the opt-in panelists tend to use the internet a lot more than the panelists from the probability samples, plausibly increasing their awareness of and taste for new products and services.

With each additional comparison study, the evidence is mounting that there are linkages between the design of the opt-in panels and the lower accuracy of their survey data; similarly, the accuracy of the probability samples is a reflection of their theoretical commitment to random selection and full-population sample coverage. Researchers would do well to bear in mind the decreased accuracy of opt-in panel data, and the subsequent likelihood of being able to make sound public policy and business decisions based on those data, when determining which type of panel will best meet their survey needs.

## References

Bourne, Francis S. 2001. "The Adoption Process," reprinted in Michael J. Baker (ed.), Marketing: Critical Perspectives on Business and Management.

Chang, LinChiat, and Jon A. Krosnick. Forthcoming in 2009. "National surveys via RDD telephone interviewing vs. the internet: Comparing sample representativeness and response quality." Public Opinion Quarterly.

Krosnick, J. 2005. "Comparing the Results of Probability and Non-Probability Sample Surveys." Paper presented at the American Association for Public Opinion Research Annual Meeting, Miami, Florida.

**ATTACHMENT A: SURVEY QUESTIONS USED FOR THE 2008 EARLY ADOPTERS STUDY**

**[GRID]**

**CU39COMF.** In general, how comfortable do you feel...

- Using computers
- Using email
- Using the Internet (other than for email)

Rating Scale:

Very uncomfortable, Somewhat uncomfortable, Neither comfortable nor uncomfortable, Somewhat comfortable, Very comfortable

**QE1.** Which of these social networking websites, if any, do you use?

- Facebook .....1
- Friendster .....2
- MySpace .....3
- Twitter .....4
- Something else, please  
specify: \_\_\_\_\_ .....5
- None of these .....6

**[NUMBER BOX; RANGE 0=20]**

**QE2.** How many online surveys, not including this one but including any others conducted by Knowledge Networks, have you completed in the past 4 weeks?

\_\_\_\_\_ [RANGE 0-20]

**[GRIDS]**

QE3. Please tell us how much you agree or disagree with each of the following statements.

1. I usually try new products before other people do
2. I often try new brands because I like variety and get bored with the same old thing
3. When I shop I look for what is new
4. I like to be the first among my friends and family to try something new
5. I like to tell others about new brands or technology

Strongly agree

Agree

Disagree .....

Strongly disagree .....

**Attachment B: Demographic Composition of the Interviewed Cases (Weighted)  
Compared to the U.S. Census**

		<b>ANES Web Panel</b>	<b>Knowledge-Panel®</b>	<b>Opt-In Panel A</b>	<b>Opt-In Panel B</b>	<b>U.S. Census Adults<sup>6</sup></b>
<b>Age</b>	<b>18-24</b>	9.5%	8.4%	9.6%	11.1%	12.7%
	<b>25-34</b>	14.9%	21.0%	21.0%	18.1%	17.8%
	<b>35-44</b>	19.6%	24.0%	17.6%	21.2%	18.6%
	<b>45-54</b>	20.0%	13.4%	21.6%	20.1%	19.6%
	<b>55-64</b>	17.1%	17.8%	25.3%	13.1%	14.9%
	<b>65 or over</b>	19.0%	15.4%	4.9%	16.5%	16.5%
<b>Gender</b>	<b>Male</b>	47.0%	48.6%	46.7%	47.3%	48.3%
	<b>Female</b>	53.0%	51.4%	53.3%	52.7%	51.7%
<b>Race-Ethnicity</b>	<b>White</b>	83.9%	79.3%	80.0%	77.8%	81.2%
	<b>Black (African American) Only</b>	9.4%	12.5%	10.6%	11.4%	11.7%
	<b>American Indian, Alaskan Native Only</b>	0.8%	2.1%	1.0%	2.7%	0.8%
	<b>Asian/NHOPI Only</b>	1.5%	1.3%	3.6%	4.7%	4.8%
	<b>2+ Races</b>	4.3%	4.8%	2.7%	1.6%	1.3%
	<b>Less than High School Diploma</b>	10.5%	12.7%	10.3%	11.3%	14.2%
<b>Educational Attainment</b>	<b>High School Diploma or Equivalent</b>	30.6%	31.8%	32.5%	32.3%	31.0%
	<b>Some College</b>	30.3%	28.1%	28.9%	28.4%	27.9%
	<b>Bachelor's Degree or Beyond</b>	28.6%	27.4%	28.2%	28.0%	26.9%
<b>Census Region</b>	<b>Northeast</b>	18.5%	18.5%	19.2%	18.3%	18.4%
	<b>Midwest</b>	23.0%	22.1%	22.3%	22.5%	22.1%
	<b>South</b>	37.1%	36.5%	36.1%	35.6%	36.4%
	<b>West</b>	21.4%	22.8%	22.4%	23.6%	23.1%

<sup>6</sup>U.S. Bureau of the Census, Current Population Survey, June 2008.

**Attachment C: Cross-Tabulations of Selected Items  
from the 2008 Early Adopter Study<sup>7</sup>**

<b>About How Many Hours Each Week Do You Typically Use the Internet at Home (Other Than for Email)?</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A</b>	<b>Opt-In B</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Less than 1 hour</b>	24.3	30.7	8.2	6.1
<b>1 to 5 hours</b>	42.1	37.8	28.5	26.3
<b>6 to 10 hours</b>	16.7	14.6	24.9	23.8
<b>More than 10 hours</b>	17.0	16.9	38.4	43.7

<b>How Many Online Surveys, Not Including this One, Have You Completed in the Past 4 Weeks?</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A</b>	<b>Opt-In-B</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>None</b>	65.1	17.2	8.4	7.9
<b>1</b>	24.7	9.8	6.7	6.3
<b>2 to 5</b>	8.6	54.3	28.1	28.7
<b>6 to 10</b>	1.1	14.3	22.5	20.8
<b>11 to 19</b>	0.2	2.6	9.3	11.4

<sup>7</sup> All the cross-tabulations in this section of the paper are based on weighted data.

<b>In General, How Comfortable Do You Feel Using Computers?</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A</b>	<b>Opt-In-B</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Very Uncomfortable</b>	14.1	14.7	10.3	10.1
<b>Somewhat Uncomfortable</b>	14.3	12.4	4.8	3.9
<b>Neither Comfortable Nor Uncomfortable</b>	10.8	12.4	3.1	4.1
<b>Somewhat Comfortable</b>	20.0	24.0	19.0	21.5
<b>Very Comfortable</b>	40.7	36.5	62.7	60.3

<b>I Usually Try New Products Before Other People Do</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A*</b>	<b>Opt-In B*</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Strongly Agree/Agree</b>	26.4	24.0	44.2	41.6
<b>Disagree</b>	59.5	61.2	47.0	48.1
<b>Strongly Disagree</b>	14.2	14.8	8.8	10.2

<b>I Often Try New Brands because I Like Variety and Get Bored with the Same Old Thing</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A*</b>	<b>Opt-In B*</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Strongly Agree/Agree</b>	36.6	34.1	52.0	54.2
<b>Disagree</b>	50.6	51.5	42.9	39.0
<b>Strongly Disagree</b>	12.7	14.4	5.1	6.8

<b>When I Shop, I Look For What Is New</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A*</b>	<b>Opt-In B*</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Strongly Agree/Agree</b>	44.5	35.7	55.2	59.0
<b>Disagree</b>	45.1	50.8	39.0	36.3
<b>Strongly Disagree</b>	10.5	13.6	5.8	4.7

<b>I Like To Be the First Among my Friends and Family To Try Something New</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A*</b>	<b>Opt-In B*</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Strongly Agree/Agree</b>	23.8	22.2	38.1	39.6
<b>Strongly Agree</b>	3.5	4.7	9.4	10.8
<b>Agree</b>	20.3	17.5	28.7	28.8
<b>Disagree</b>	57.3	58.4	49.9	47.6
<b>Strongly Disagree</b>	18.9	19.3	12.0	12.7

<b>I Like to Tell Others About New Brands or Technology</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A</b>	<b>Opt-In B</b>
	(n = 1,397) %	(n = 1,210) %	(n = 1,221) %	(n = 1,223) %
<b>Strongly Agree/Agree</b>	51.8	45.0	60.2	62.1
<b>Strongly Agree</b>	8.1	7.4	17.2	17.7
<b>Agree</b>	43.7	37.6	43.0	44.4
<b>Disagree</b>	34.9	40.7	32.4	28.4
<b>Strongly Disagree</b>	13.3	14.3	7.4	9.5

<b>Which of These Social Networking Web Sites, if Any, Do You Use?</b>				
	<b>ANES Web Panel</b>	<b>KnowledgePanel®</b>	<b>Opt-In A</b>	<b>Opt-In-B</b>
<b>Facebook</b>	15.4%	12.8%	23.6%	20.1%
<b>Friendster</b>	0.6%	0.7%	3.1%	2.2%
<b>MySpace</b>	19.8%	20.6%	30.7%	35.5%
<b>Twitter</b>	0.8%	0.6%	0.9%	1.2%
<b>Something Else</b>	4.9%	3.6%	5.5%	5.3%
<b>None of these</b>	68.5%	72.0%	57.0%	54.6%
<b>Refused/DK</b>	1.6%	1.0%	0.4%	0.5%