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Using screen video capture software to aide and inform cognitive interviewing

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Abstract Web-based surveys are a salient tool in the repertoire of social and behavioral scientists. The increase in web-based surveys is understandable considering the distinct advantages offered, including: (a) lower costs and reduced labor time, (b) ability to directly transfer data into statistical packages (reducing coding errors), (c) customization options enabling more attractive presentation, (d) ability to reduce respondent burden by embedding skip patterns, and (e) access to larger sample sizes in different geographic regions. It is important to note, however, that administering web-based surveys also introduces distinct sources of error (e.g., coverage, sampling and non-response). Regardless of format (e.g., paper-and-pencil or web-based), specific, prescribed steps must be followed when constructing an instrument in order to reduce survey error and lend credence to the data collected before subsequent analysis is performed. One of those crucial stages integral to the pretesting process is cognitive interviewing. Cognitive interviewing is a qualitative process, encompassing two main techniques: think aloud interviewing and verbal probing. Collectively, these two methods seek to (a) produce information on what the respondent is thinking while answering the questions, (b) the cognitive processes used to answer the questions, and (c) how the respondent answers the questions. The purpose of this article is to provide a practical guide outlining how Camtasia, a screen video capture software, can aide and inform the cognitive interview process.

Keywords Cognitive interview · Web-based survey development · Camtasia · Instrument development

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1 The proliferation of web-based surveys

Similar to how automobiles eliminated the efficacy and convenience of horse-drawn carriages and oxen-drawn carts, the internet has become "replacement technology" for traditional paper-and-pencil surveys, shifting how research is conducted and increasing the amount performed (Black 2000). With the proliferation of the internet and continual advances in technology, there has been an accompanying propagation of web-based surveys (Couper 2000, 2005). As a result, web-based surveys are a salient tool in the repertoire of social and behavioral scientists (Dillman 2007; Sills and Song 2002). The increase in web-based surveys is understandable considering the distinct advantages offered, including: (a) lower costs and reduced labor time, (b) ability to directly transfer data into statistical packages (reducing coding errors), (c) customization options enabling more attractive presentation, (d) ability to reduce respondent burden by embedding skip patterns, and (e) access to larger sample sizes in different geographic regions (Alvarez and VanBeselaere 2005; Dillman 2007; Sills and Song 2002). It is important to note, however, that administering web-based surveys also introduces distinct sources of error (e.g., coverage, sampling and non-response). [Interested readers are directed to Couper (2000), Couper et al. (2007), and Best et al. (2001) for a more thorough discussion of the errors associated with web-based surveys; Chen and Goodson (2010) supply recommendations on dealing with web-based survey challenges].

In comparison to traditional paper-and-pencil surveys, previous research indicates web-based surveys contain less missing data (Boyer et al. 2002; Denscombe 2006) and produce higher completion rates (Truell et al. 2002; Yun and Trumbo 2000). Among "plugged in" samples (i.e., individuals accustomed to e-mail and internet access, such as college students), web surveys have shown to be especially effective data collection methods (Kiernan et al. 2005; McCabe et al. 2002, 2006a). Moreover, web-based surveys have shown efficacy in measuring health behaviors, exhibiting few differences from not only traditional paper-and-pencil methods, but also telephone interviews (e.g., Kypri et al. 2004; McCabe et al. 2006b; Miller et al. 2002; Parks et al. 2006). Nevertheless, it is important to note that there is no statistically significant difference in the substantive content (i.e., data supplied by respondents) of web-based and paper-and-pencil surveys (Best et al. 2001; Denscombe 2006; Kaplovitz et al. 2004; McCabe et al. 2002; Yun and Trumbo 2000). In other words, currently there is no evidence suggesting a mode effect.

2 The necessity of pretesting instruments

Regardless of format (e.g., paper-and-pencil or web-based), Barry et al. (2011) contend that specific, prescribed steps must be followed when constructing an instrument in order to reduce survey error and lend credence to the data collected before subsequent analysis is performed. One of those crucial stages integral to the pretesting process is cognitive interviewing. Overall, the purpose of cognitive interviewing is to evaluate the cognitive and motivational qualities of survey responses (Dillman 2007). Specifically, the approach seeks to identify problems related to the cognitive processes of the respondents, when answering questions posed (Jobe and Herrmann 1996). According to Dillman (2000), "cognitive interviewing [was] developed for determining whether respondents comprehend questions as intended by the survey sponsor, and whether questions can be answered accurately" (p. 142). This process assists instrument developers in answering the following evaluation questions:

- Does the respondent understand all the words?

- Is the interpretation of each question similar among all respondents?
- Does each question have a response (if closed-ended) that can be marked by every respondent?
- What is the likelihood that each respondent will read and respond to every question?
- Does the delivery mechanism (cover letter, questionnaire, survey software) create a positive impression? (Dillman 2000)

While the aforementioned evaluation questions have always been a core concern of researchers, it was not until the Cognitive Aspects of Survey Methodology (CASM) movement in the mid-80's that theories of survey response and cognitive methodologies began to emerge and inform the survey response process. Not only did these theories help provide a better understanding of the survey response process, when applied to survey design and implementation, they also helped reduce measurement error (Collins 2003). Instead of focusing on the survey process, cognitive interviewing is primarily interested in the instrument, thus supplementing CASM theories. As such, Dillman (2007) urges instrument developers to use the cognitive interviewing method as one of four steps in field testing the survey process (Collins 2003).

Cognitive interviewing is a qualitative process, encompassing two main techniques: think aloud interviewing and verbal probing. Collectively, these two methods seek to (a) produce information on what the respondent is thinking while answering the questions, (b) the cognitive processes used to answer the questions, and (c) how the respondent answers the questions (Collins 2003; Dillman 2000). The *think aloud* technique requires potential survey respondents, or individual(s) with similar demographic characteristics to the intended audience, to verbally express their thoughts (e.g., confusion, comfort level in responding, lack of applicable response options) while completing the questionnaire. All the while, respondents are being observed by, and interacting with, an interviewer. In simplest terms, the respondent is asked to tell the interviewer all their thoughts while completing the survey. *Probing* is used by the interviewer to get a better understanding of how the respondent understood/interpreted each question that resulted in a certain response (Dillman 2000). According to Collins (2003), the "*think aloud* method is usually used concurrently [while the participant is taking the survey], to collect information on what the respondent is thinking as she or he answers each survey question or completes the self-completion questionnaire, *probing* can be used either concurrently or retrospectively." (p. 235). The *think aloud* technique is respondent-driven; whereas, *probing* is interviewer-driven. Examples of standard probes used to assess interpretation, comprehension, retrieval, judgment and response processes are provided in Table 1.

Before beginning the cognitive interview process, Dillman (2000) encourages researchers to start with a practice question, in order for the respondent to learn the *think aloud* technique of responding. For instance, a sample question could include, "How many windows are in the home where you live?" If the respondent remains quiet while attempting to produce an answer, the interviewer should probe, "Can you think out loud and tell me what you are thinking right now?" Most likely, the respondent is going room by room of their home counting the windows in each bedroom, the living room, kitchen, etc. It is doubtful most respondents could immediately and accurately rattle off the number of windows in their home. The practice session should continue until the respondent begins to describe the counting process that results in a final answer. Both of these techniques (*think aloud* and *probing*) can be supplemented with retrospective interviewing, a technique allowing researchers to observe the respondent completing the questionnaire, while noting wrong responses, hesitations, skipped items, confused expressions, and other behaviors that would indicate a problem. All the aforementioned techniques are typically conducted with a small, sample of potential respondents (a dozen or

Table 1 Standard cognitive probes (Collins 2003, p. 235; Dillman 2000)

Think aloud questions/general probes	What are you thinking about when going through the survey?
	Remember to read out loud during this interview
	How did you come to the response for that question?
	What caused you to hesitate before responding to that question?
	How easy or difficult was it for you to answer that question? Why?
	Remember to tell me what you are doing on each question.
Comprehension probes	What does the term (X) mean?
	What do you mean by that?
	What do you understand about X?
	Could you describe that for me?
Retrieval probes	What time period do you have in mind when answering that question?
	What made you remember that answer?
	How did you remember that?
Judgment probes	How sure are you of that response?
	How well do you think you remember this?
Response	How did answering that question make you feel?
	Did you find a response option that best described your true response, for each question? If not, what response options are missing?

so, or until the data is saturated, or when the researcher is no longer hearing or seeing new information). While the cognitive interview process is "labor-intensive", the wealth of useful information provided for evaluating the questionnaire and making revision decisions makes these techniques "indispensable" (Dillman 2000, p. 146).

3 Improving instrument pretesting with Camtasia

The purpose of this article is to provide a practical guide for how to use Camtasia software, a screen video capture program, can aide and inform researchers' efforts to conduct cognitive interviews. Camtasia software is a technological tool that can be employed during pretesting to enhance the overall construction of web-based surveys. The software package enables screen recording and editing, and is often used to create electronic learning presentations or demonstrations (Anderson et al. 2008; TechSmith 2011; Power 2011). Moreover, the software has been used for the development of online courseware and has been applied as an unobtrusive tool in the observational analysis of internet use (Birru et al. 2004; Buhi et al. 2009; Hansen et al. 2003; Kuiper et al. 2008; Lim 2002; McGrann 2005; Smidt and Hegelheimer 2004). The software allows users to capture all computer screen movements and activities—text inputs, video output, cursor movement, screen changes, etc—while simultaneously recording audio. These features elevate Camtasia's usefulness as a data collection tool, essentially allowing the software to serve as non-biased, supplemental "field notes". As such, past research supports the use of Camtasia as a data collection tool within

qualitative interviews discussing computer-based activities (i.e. website utilization, web-based programs) (Barmby et al. 2009; Lim 2002; Qiu et al. 2007; Warwick et al. 2009). To date, however, few researchers have used Camtasia to aid in conducting *cognitive interviews*, and those that have utilized the software in this capacity, mainly employed the recording features to capture the "think aloud" component of cognitive interviewing, or to record the audio, while playbacks of captured video are reviewed with research participants (Lim 2002; Qiu et al. 2007; Willson and Given 2010).

Qiu and colleagues (2007) successfully utilized Camtasia to assist in usability testing to collect data on human computer interactions among Health Information Systems (HIS) users. Specifically, Camtasia was used to record the keyboard strokes and mouse movements of participants. In a study to assess online search behaviors of students, Willson and Given (2010) used Camtasia to "capture students' search behaviors, in particular, problems students encountered while searching and the strategies they employed to solve those problems, and to determine the resources on which the students relied…an audio recording was used to capture the search activity as well as any comments made by participants" (p. 2467). Lastly, Lim (2002) used Camtasia to conduct self-confrontation interviews, while exploring online shopping behaviors. On-screen activities were recorded to capture and record on-line shopping activity, and the interviewees viewed the recordings, while responding to a set of interview questions about their recorded actions; an audio file was created for each interview session.

The use of Camtasia in these aforementioned studies provides insight into how the software can aid in cognitive interviewing procedures. Operationally, the two verbal report procedures in cognitive interviewing—think aloud and probing—can be captured with Camtasia, while simultaneously recording video footage of screen activity along with the participants' non-verbal cues. This provides researchers with a cost-effective method for collecting data on the functionality of web-based survey questions from a variety of perspectives, including elements of cognitive psychology, sociology, and linguistics (Kerwin and Willis 2011). Moreover, the video recording capability allows researchers to also capture elements of "silent misunderstandings" (DeMaio and Rothgeb 1996) that may exist between the researcher and interviewee (Kerwin and Willis 2011). Essentially, the software captures how the individual interprets, comprehends, and responds to items by examining the amount of time spent on the item, vocal comments, non-verbal cues (i.e., expressions of frustration, lack of understanding), and screen interaction with the measure and available response options. By concurrently collecting both screen movement and audio, assessment of an individual's cognitive state is more accurate than retrospective reflections. Most importantly, the software tool allows for an assessment of audience interaction with the survey without questionable validity.

4 How to use Camtasia for cognitive interviews

To adequately capture the information-processing chain that occurs in an applied environment when an individual responds to a web-based survey (Kerwin and Willis 2011), Table 2 provides step-by-step instructions on how to use Camtasia Studio (Windows computer) and Camtasia for Mac (Apple computer) for video, audio and screen capturing during cognitive interviews. The Camtasia audio, video, and screen capture recordings serve as qualitative data, which is subsequently subjected to appropriate data analysis (i.e. classical content analysis). Researchers use the qualitative results to make recommendations regarding item wording, edits, deletions, and/or additions to the survey tool (Kerwin and Willis 2011).

Table 2 Step-by-step guide for how to use Camtasia studio for Mac and a windows computer

Using Camtasia for cognitive interviewing on an apple computer	
(1)	Download and install Camtasia for Mac at http://www.techsmith.com/download/camtaia/. The downloadable software has a 30 day free trial. Camtasia for Mac is $99.00 (Education pricing is also $99.00) and can be purchased at https://store.techsmith.com/order/camtasiamac.asp or through the App Store
(2)	Open the Camtasia for Mac software
(3)	Make sure full screen, camera, built-in microphone, and system audio are all selected in the on position
(4)	Select the record option in Camtasia for Mac
(5)	Open the web-based survey tool as the study participant would see the initial page (this should be your informed consent start page)
(6)	Administer the cognitive interview to the participant as they are completing the survey
(7)	At the completion of the survey, click on the Red Camtasia "filmstrip" button on the upper taskbar. Select stop recording. (You can also select pause recording using this same method should you ever need to take a break during the interview)
(8)	Once stop recording is selected, the video (from the screen capture and the webcam) are opened in the Camtasia for Mac editing software
(9)	The video can be saved and played back by the researcher through the software
(10)	The researcher can also export the video as a media file (i.e. a flash, mp4, avi, or quicktime file) in order to allow other investigators view/analyze the cognitive interview. This can be done by selecting the "Share" tab and choosing "Export" (for the content to be exported to a flash file) or "Advanced Export" (for the content to be exported to a mp4, avi, or quicktime file). Exporting the video in these formats would enable other members of the research team to view the cognitive interviews without needing Camtasia for Mac or Camtasia Studio installed on his/her machine
Using Camtasia studio for cognitive interviewing on a windows computer	
(1)	Download and install Camtasia Studio at http://www.techsmith.com/download/camtasia/. The downloadable software has a 30 day free trial. Camtasia Studio is $299.00 (Education pricing is $179.00) and can be purchased at https://store.techsmith.com/order/camtasiastudio.asp
(2)	Open the Camtasia Studio software
(3)	Select "Record the Screen" on the welcome screen
(4)	Select "full screen," "Webcam on," and "audio on." Additionally, make certain that system audio is checked as part of the dropdown choices of "audio on"
(5)	Select the record option in Camtasia Studio
(6)	Open the web-based survey tool as the study participant would see the initial page (this should be your informed consent start page)
(7)	Administer the cognitive interview to the participant as they are completing the survey
(8)	At the completion of the survey, click on the F10 key or select the Camtasia Studio software icon (available on the lower taskbar) and click the stop button. The F9 key will pause and resume the recording at any time should the researcher or participant need to stop and take a break for any reason
(9)	Once stop recording is selected, the video (from the screen capture and the webcam) are opened in the Camtasia Studio editing software
(10)	The video can be saved and played back by the researcher through the software
(11)	The researcher can also export the video as a media file by selecting "Produce" and saving the file. Once that has been done, the production wizard will open and allow the researcher to export the video to a CD, DVD, and various other web formats. This would allow other investigators view/analyze the cognitive interview. Exporting the video in this manner would enable other members of the research team to view the cognitive interviews without needing Camtasia Studio installed on his/her machines

Typically, one to two rounds of cognitive interviews are conducted with at least 8–12 interviewees. Recruitment of interviewees is based on suitability for the tested survey (i.e. social and demographic characteristics match those of the intended audience) (Kerwin and Willis 2011). Interviewees are stationed at a computer, with the investigator sitting nearby for concurrent (immediately after interviewer responses) and elaborate (requesting further information for a response) probing. Cognitive testing begins with the researcher describing to the interviewee the think aloud process (i.e., providing a warm-up example of thinking aloud, while processing information). Once the interviewee feels comfortable with the think aloud exercises, the investigator will begin the Camtasia recording software (see Table 2), and ask the interviewee to proceed through the survey, while verbalizing thoughts regarding each survey item. As mentioned previously, probes are used to further explore the respondents' reactions to items. Researchers continue to conduct interviews until data saturation is achieved (i.e., newly collected data does not provide new insight than what was already collected). Once the interview is completed, the researcher will save the audio/video files for the appropriate qualitative data analysis.

5 Conclusion

Researchers have relied on the use of cognitive interviewing to assess the complex cognitive processes associated with individuals' responses to survey items, and ultimately improve the quality of developed instruments. Thus, cognitive interviewing represents a crucial step in the scale development process It is important to note, however, that researchers contend cognitive interviewing has the potential to be "somewhat judgmental and even impressionistic in nature (in both conduct and analysis)" (Kerwin and Willis 2011, p. 49). To offset this limitation, the authors recommend researchers utilize Camtasia software as a means of providing objective data (audio, video, and screen capture) which can be used to inform the cognitive interview process. Moreover, the use of Camtasia ensures that a web-based survey will be pre-tested using the same format as the final administration. In sum, Camtasia use in the cognitive interviewing process represents a novel technological application that can aide survey developers in producing high-quality instruments.

References

Alvarez, R.M., VanBeselaere, C.: Web-based surveys. In: Kempf-Leonard, K. (ed.) Encyclopedia of Social Measurement, pp. 955–962. Academic, London (2005)

Anderson, R.P., Wilson, S.P., Livingston, M.B., LoCicero, A.D.: Characteristics and content of library tutorials: a review. J. Med. Libr. Assoc. **96**, 61–63 (2008)

Barmby, P., Harries, T., Higgins, S., Suggate, J.: The array representation and primary children's understanding and reasoning in multiplication. Educ. Stud. Math. **70**, 217–241 (2009)

Barry, A.E., Chaney, B.H., Stellefson, M.L., Chaney, J.D.: So you want to develop a survey: practical recommendations for scale development. Am. J. Health Stud. **26**, 97–105 (2011)

Best, S.J., Krueger, B., Hubbard, C., Smith, A.: An assessment of the generalizability of internet surveys. Soc. Sci. Comput. Rev. **19**, 131–145 (2001)

Birru, M.S., Monaco, V.M., Charles, L., Drew, H., Nijie, V., Bierria, T, Detlefson, E., Steinman, R.A.: Internet usage by low-literacy adults seeking health information: an observational analysis. J. Med. Internet Res. **6**, e25 (2004)

Black, G.: Questioning market leaders for long term investors. Wall Str. J. http://www.twst.com/ceos/hpol.html (2000). Accessed 15 June 2000
Boyer, K.K., Olson, J.R., Calantone, R.J., Jackson, E.C.: Print versus electronic surveys: a comparison of two data collection methodologies. J. Oper. Manag. **20**, 357–373 (2002)
Buhi, E.R., Daley, E.M., Fuhrmann, H.J., Smith, S.A.: An observational study of how young people search for online sexual health information. J. Am. Coll. Health **58**, 101–111 (2009)
Chen, L., Goodson, P.: Web-based survey of US health educators: challenges and lessons. Am. J. Health Behav. **34**, 3–11 (2010)
Collins, D.: Pretesting survey instruments: an overview of cognitive methods. Qual. Life Res. **12**, 229–238 (2003)
Couper, M.P.: Web surveys: a review of issues and approaches. Public Opin. Q **64**, 464–494 (2000)
Couper, M.P.: Technology trends in survey data collection. Soc. Sci. Comput. Rev. **23**, 486–501 (2005)
Couper, M.P., Kapteyn, A., Schonlau, M., Winter, J.: Noncoverage and nonresponse in an internet survey. Soc. Sci. Res. **36**, 131–148 (2007)
Denscombe, M.: Web-based questionnaires and the mode effect: an evaluation based on the completion rates and data contents of near-identical questionnaires delivered in difference modes. Soc. Sci. Comput. Rev. **24**, 246–254 (2006)
DeMaio, T.J., Rothgeb, J.M.: Cognitive interviewing techniques: in the lab and the field. In: Schwarz, N., Sudman, S. (eds.) Answering Questions: Methodology for Determining Cognitive and Communicative Processes in Survey Research, pp. 175–195. Jossey-Bass, San Francisco (1996)
Dillman, D.A.: Mail and Internet Surveys: The Tailored Design Method. Wiley, New Jersey (2000)
Dillman, D.A.: Mail and Internet Surveys: The Tailored Design Method. Wiley, New Jersey (2007)
Hansen, L.D., Derry, A.H., Resnick, J.P., Richardson, R.C.: Adolescents searching for health information on the internet: an observational study. J. Med. Internet Res. **5**, e25 (2003)
Jobe, J.B., Herrmann, D.J.: Implications of models of survey cognition for memory theory. In: Herrmann, D.J., McEvoy, C., Herzog, C., Hertel, P., Johnson, M.K. (eds.) Basic and Applied Memory Research: Practical Applications, Vol. 2., pp. 193–205. Erlbaum, New Jersey (1996)
Kaplovitz, M.D., Hadlock, T.D., Levine, R.: A comparison of web and mail survey response rates. Public Opin. Q. **68**, 94–101 (2004)
Kerwin, J., Willis, G.: Cognitive interview pretesting of a health information survey. In: Finney Rutten, L., Hesse, B., Moser, R., Kreps, G. (eds.) Building the Evidence Base in Cancer Communication: Health Information National Trends Survey (HINTS), pp. 47–60. Hampton Press, New Jersey (2011)
Kiernan, N.E., Kiernan, M., Oyler, M.A., Gilles, C.: Is a web survey as effective a a mail survey? A field experiment among computer users. Am. J. Eval. **26**, 245–252 (2005)
Kuiper, E., Volman, M., Terwel, J.: Students' use of web literacy skills and strategies: searching, reading, and evaluating web information. Inf. Res. **13**, 1–18 (2008)
Kypri, K., Gallagher, S.J., Cashell-Smith, M.L.: An internet-based survey method for college student drinking research. Drug Alcohol Depend. **76**, 45–53 (2004)
Lim, S.: The self-confrontation interview: towards an enhanced understanding of human factors in web-based interaction form improved website usability. J. Electron. Commer. Res. **3**, 162–173 (2002)
McCabe, S.E., Boyd, C.J., Couper, M.P., Crawford, S.D., D'Arcy, H.: Mode effects for collecting alcohol and other drug use data: web and US mail. J. Stud. Alcohol **63**, 755–762 (2002)
McCabe, S.E., Couper, M.P., Cranfrod, J.A., Boyd, C.J.: Comparison of web and mail surveys for studing secondary consequences associated with substance use: evidence for minimal mode effects. Addict. Behav. **31**, 162–168 (2006a)
McCabe, S.E., Diez, A., Boyd, C.J., Nelson, T.F., Weitzman, E.R.: Comparing web and mail responses in a mixed mode survey in college alcohol research. Addict. Behav. **31**, 1619–1627 (2006b)
McGrann, R.T.: Enhancing engineering computer-aided design education using lectures recorded on the PC. J. Educ. Technol. Syst. **34**, 165–175 (2005)
Miller, E.T., Neal, D.J., Roberts, L.J., Baer, J.S., Cressler, S.O., Metrik, J., Marlatt, G.A.: Test-retest reliability of alcohol measures: is there a difference between internet-based assessment and traditional methods? Psychol. Addict. Behav. **16**, 56–63 (2002)
Parks, K.A., Pardi, A.M., Bradizza, C.M.: Collecting data on alcohol use and alcohol-related victimization: a comparison of telephone and web-based survey methods. J. Stud. Alcohol Drug **67**, 318–323 (2006)
Power, J.L.: Training 2.0—library assistants in the age of information. J. Access. Serv. **8**, 69–79 (2011)
Qiu, Y., Yu, P., Hyland, P.: A multi-method approach to assessing health information systems end users' training needs. Medinfo 2007: Proceedings of the 12th World Congress on Health (Medical) Informatics; Building Sustainable Health Systems, 1352–1356 (2007). http://search.informit.com.au/browsePublication;isbn=9781586037741;res=E-LIBRARY (2007). Accessed 16 August 2011

Sills, S.J., Song, C.: Innovations in survey research: an application of web-based surveys. Soc. Sci. Comput. Rev. **20**, 22–30 (2002)
Smidt, E., Hegelheimer, V.: Effects of online academic lectures on ESL listening comprehension, incidental vocabulary acquisition, and strategy use. Comput. Assist. Lang. Learn. **17**, 517–556 (2004)
TechSmith Coporation.: Camtasia Studio 7.1. www.techsmith.com/Camtasia (2011). Accessed 16 August 2011
Truell, A.D., Bartlett, J.E., Alexander, M.W.: Response rate, speed and completeness: a comparison of internet-based and mail surveys. Behav. Res. Methods Instrum. Comput. **34**, 46–49 (2002)
Warwick, C., Rimmer, J., Blandford, A., Gow, J., Buchanan, G.: Cognitive economy and satisficing in information seeking: a longitudinal study of undergraduate information behavior. J. Am. Soc. Inf. Sci. Technol. **60**, 2402–2415 (2009)
Willson, R., Given, L.M.: The effect of spelling and retrieval system familiarity on search behavior in online public access catalogs: a mixed methods study. J. Am. Soc. Inf. Sci. Technol. **61**, 2461–2476 (2010)
Yun, G.W., Trumbo, C.W.: Comparative response to a survey executed by post, email, and web form. J. Comput.-Mediat. Commun. **6** (1) (2000). http://icmc.indiana.edu/vol6/issue1/yun.html. Accessed 18 April 2005