EVALUATION OF A COMPUTER-ASSISTED SELF-INTERVIEW (CASI) COMPONENT IN A CAPI SURVEY

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Introduction

This paper examines respondent reactions to and performance on a CASI (computer-assisted self-interview) portion of a CAPI (computer-assisted personal interview) survey. We first examine whether there are systematic differences between those who choose to do CASI themselves and those who seek the aid of the interviewer in completing these items. We then explore whether the decision to do CASI has any impact on the quality of data collected.

This study appears to be virtually unique in the respect that a record was kept of whether respondents actually completed the CASI items themselves, or had the interviewer assist them. We found that 21% of respondents used some form of interviewer assistance in completing the self-administered items. In most other studies including self-administered portions (whether computer-assisted or paper-and-pencil), there is little discussion of this issue (see for example, Jobe *et al.*, 1994; O'Reilly *et al.*, 1994; Turner, Lessler and Devore, 1992). We infer from this that one of three things may have occurred: (a) respondents were pressured into completing the items themselves, (b) interviewers assisted respondents, or (c) these cases were treated as nonresponding units. We suspect that the second option may be likely in many surveys containing self-administered components. Given that interviewer administration may defeat the purpose of self completion (increased privacy leading to more truthful reporting of highly sensitive behavior), it is important to examine the extent to which this might be happening.

The Self Portraits Study, the subject of the present paper, also differed from other self-administered surveys in two other respects. First, many self-administered modules of surveys are designed to elicit reports of highly sensitive and sometimes illegal behaviors, such as drug use and high-risk sexual practices, whereas the Self Portraits CASI questions were of a more general attitudinal nature. Second, many of the CASI applications to date have been on surveys of younger persons, a group that may be regarded as comfortable, or at least familiar, with computer technology. Self Portraits, in contrast, included older persons. Although these differences may limit the generalizability of these results to other CASI studies, they also facilitate certain analyses which might otherwise not be possible. Specifically, we can examine respondent preferences (as evidenced by their behavior) for self-completion versus interviewer-completion of CASI items.

Background and Data Collection

The Self Portraits Study was conducted in 1992 by the Survey Research Center. The study was concerned with how people of various ages view themselves as they grow older. Questions in the interview covered a wide range of topics, including health, family, paid or volunteer work, activities, and especially the way people felt about themselves and reacted to life.

The interviews included both a CAPI portion (conducted by the interviewer) and a CASI portion (intended to be conducted by the respondent), both of which were conducted in the respondent's home. The survey instrument was programmed in Autoquest. The laptop computers used were Toshiba 2000SXs, with 2 Mb RAM, 40 Mb hard drives, and monochrome LCD screens, weighing 6.9 pounds.

The sample was a two stage area probability sample of the Detroit metropolitan area including Wayne, Oakland and Macomb counties. The sample was designed to obtain interviews from persons aged 30 or older, with an oversampling of respondents from two age groups (45-64 and 65+). A single eligible adult was selected from each household. A total of 5,047 households were screened, of which 2,086 households contained persons eligible to be interviewed. A total of 1,471 completed interviews were obtained, for a response rate of 70.5%.

Information was collected from a variety of sources to evaluate the process of data collection. Most of the data analyzed here are directly from the CAPI /CASI application itself. These include embedded interviewer checkpoints on who completed the CASI questions, and background information on respondents.

In addition, at the end of each interview, respondents were asked to complete a short paper-and-pencil questionnaire on their reactions to the CAPI/CASI interview. This included questions on respondents' previous computer usage. A total of 1,255 respondent reaction questionnaires were completed and matched to their corresponding records, for a response rate of 85.3% of those interviewed.

The CAPI/CASI Instrument

The survey instrument began with a series of CAPI questions. Following this, the interviewer turned the laptop to enable the respondent to use it for the first CASI series of questions. The interviewer also placed a preformed plastic shield over the keyboard of the laptop, which had strategically placed holes cut into it. This keyboard shield presented the respondent with only those keys on the keyboard that they would need to use to complete the CASI series of questions.

The CASI questions asked the respondent about their self description. A series of descriptive words were displayed sequentially to the respondent. The respondent was asked to indicate how much the word or phrase described them. They did this by pressing a value of 1 to 5 on the keyboard and then the return key to bring up the next word in the series.

Three practice CASI questions were built into the beginning of the first CASI series. The respondent and the interviewer worked through these first three screens together to demonstrate how to use the laptop computer for CASI.

The CASI portion of the interview consisted of three series of 44 questions each. The first series asked respondents about how they would describe themselves in the present, the second about the past, and the third about how they would like to see themselves in the future. Each set of CASI questions was separated from the next by several interviewer-administered (CAPI) questions. Interviewers were instructed to encourage respondents to complete the CASI portions themselves, but did not force them to do so.

It should be noted that this series of CASI questions is not particularly sensitive. Some of the individual items could be distressing (e.g., asking an elderly person how they saw themselves in the future), or asking someone who had recently lost a spouse about their self-image as a husband or wife. Nevertheless they were asked in this manner because of the personal nature of the questions and the desire to reduce possible social desirability effects.

The relative lack of sensitivity of the CASI items has two possible implications. First, it may have made it less imperative for the respondent to self-complete these items, leading to lower rates of self-completion (versus completion by interviewers) than may be true of other self-administered or CASI surveys. Second, this may limit the generalizability of these findings to surveys eliciting responses of an extremely sensitive nature.

Analyses focus firstly on what factors influence the decision to complete the CASI items, and secondly on the impact this may have on data quality.

Who Did CASI?

One of the apparently unique features of this study is the choice given to respondents whether to complete the CASI items themselves, or with interviewer assistance, or at least the measurement of who actually did the CASI portion.

Two interviewer checkpoints were embedded in the instrument to record whether the respondent actually did the CASI items. The first followed the three practice questions before the start of the first CASI series. This reflected the successful completion of the test items by the respondent, and willingness to proceed with the series of CASI questions. This checkpoint was designed to present the CASI items in a format for delivery by the interviewer if required. The second checkpoint occurred at the end of the last CASI series, and recorded who actually completed the CASI items. This was included to detect those cases where the respondent had begun the CASI series, but then turned the task over to the interviewer. The weighted distributions of these two checkpoints showed that a relatively large proportion of respondents (16% at the first checkpoint, and 21% at the second) did not fully self-administer the CASI items. This latter group consists of 7% who had the interviewer read the questions while they entered the responses into the computer, and 14% who had the interviewer ask the questions and enter the responses.

What factors are hypothesized to impact on the choice of self-administration using CASI? Some of these relate to the physical and cognitive demands of a self-administered interview, including the need to see the words on the screen (vision) and to read them (literacy). Other factors may be more specific to CASI, and relate to respondents' knowledge and experience of, and attitudes toward, computers. Still others may relate to features of the interview situation such as interest or motivation. Although the Self Portraits Study allows us to explore some of these issues as they relate to respondent willingness to complete a CASI interview, many of the variables and concepts of interest are not measured, nor do we have reasons why some respondents chose not to do CASI. Instead we make use of a variety of proxy variables to explore these decisions regarding CASI.

One of the key drawbacks of self-administered surveys of the general population relates to issues of literacy. While this has not been a central issue in the voluminous literature on mail surveys (see, for example, Dillman, 1978), with the advent of audio-CASI as an alternative to text-based self-administered surveys (whether on paper or on computer), the literacy requirements of the latter are being raised as a serious shortcoming (see Jobe, *et al.*, 1994; O'Reilly *et al.*,

1994).

In the absence of a direct measure of literacy, we use education as a proxy. Results of the National Adult Literacy Survey (Kirsch, *et al.*, 1993, p. xiv) reveal that of the 21-23% of U.S. adults who perform at the lowest level of literacy, 62% have less than high school education. Furthermore, half of this lowest literacy group are over 65 years old, 25% are immigrants, and 19% report visual difficulties. The report also states (Kirsch, *et al.*, 1993, p. 62) that "it is clear that individuals with more limited literacy skills are less likely to be employed than those who demonstrated more advanced skills". Thus, although we have no direct measure of literacy, we can include in the analyses a number of its key socio-demographic correlates, such as education, age and employment status.

Another variable included as a proxy indicator for literacy was taken from a series of questions on activities later in the Self Portraits instrument, in which respondents were asked how often they read books or magazines for pleasure. This variable was collapsed into those who read at least some of the time, versus those who said not very often or almost never (21.1% of respondent fall into this latter group).

In addition to variables exploring the cognitive and physical demands of the interview, variables relating to the use of a computer for the self-administered questionnaire are available. A direct measure of experience with computer was obtained from respondents during the debriefing interview at the end of the survey. Additionally, variables known to be correlated with attitudes toward, experience with, and performance using computers are included in the analyses. These include age, education, gender and race/ethnicity (Couper and Burt, 1994; Kominsky, 1991). It is hypothesized that people who are less familiar with computers would be less likely to do the CASI portions themselves.

A logistic regression analysis was performed on the second CASI checkpoint, with the dependent variable dichotomized as 1=Respondent did CASI without assistance, 0=Otherwise. The data are weighted to reflect differential selection probabilities, and the standard error estimates and statistical tests were calculated using Taylor series approximation (using SUDAAN, Shah *et al.*, 1993), reflecting stratification and clustering of the sample design. The results of this analysis are presented in Table 1. We see from this that education, age and computer experience all behave as expected, with less educated, older respondents and those with less computer experience being less likely to complete the CASI items themselves. However, employment status (hypothesized to produce increased exposure to computers in the workplace) does not have a significant effect on who did CASI, nor does respondent gender (controlling on the other variables in the model). The frequency of reading (used as a weak proxy of literacy) also has little effect. Presumably, the education variable accounts for much of the effect of literacy. However, those with serious vision problems are much less likely to complete the CASI items themselves (even in the presence of the age variable), suggesting that ability to see the text on the computer screen is a key prerequisite for successful completion of CASI.

It is somewhat surprising that even after controlling for computer experience and education, race/ethnicity still has a significant effect on self-completion of the CASI items. Adding a series of dummy variables for income (not shown here) reduces the size of the race coefficient slightly, but does not eliminate the impact of this variable in the model. This suggests that race/ethnicity may be serving as a proxy for unmeasured variables (e.g., access to computers, motivation to complete the items, etc.).

A race by computer experience interaction term was added to the model in Table 1. While the interaction term is not statistically significant, the coefficients suggest that for White respondents, computer experience appears to have little effect on who did CASI, whereas lack of computer experience appears to have a larger impact for nonWhite respondents, while still not eliminating the main effect for race.

We have seen that there is systematic variation in respondents' decisions to do the CASI portion of the interview themselves, and that ability (literacy and vision) and interest (experience with computers) play a key role. In those surveys where the choice of the interviewer administering the CASI items is not given, those unwilling or unable to do a CASI interview (e.g., older respondents, those with lower education, those with no prior computer experience, those with vision impairments, etc.) may become nonrespondents. Alternatively, in other surveys, a substantial number of respondents may elect to have the interviewer administer the questions, without this information being made available to those who analyze the data.

Data Quality

Given that there are differences in the types of people who choose to complete the CASI items themselves versus having the interviewer assist them, what are the data quality implications of this decision? Two hypotheses can be posited relating to the effect of self- versus interviewer-completion on data quality. These relate to motivation and capability. Some

respondents did not complete the CASI items themselves because they did not want to; others did not because they were not able to. If either of these reasons are true, then we should expect differential data quality for the remainder of the questionnaire items, reflecting voluntary (satisficing) or involuntary (lack of knowledge) disengagement from the interview process. We thus explore differences in substantive responses and the quality of the data collected, both for the CASI items, and for the remaining (interviewer-administered) items in the questionnaire. Given that we do not have measures of the reasons behind the decision to do CASI, we are unable to distinguish between these two hypotheses. We thus treat them both as plausible explanations for differences that may be found, rather than competing hypotheses.

We also caution that causality should not be inferred from any relationships found. Respondents were not randomly assigned to conditions, but rather selected themselves. We have already seen that those who chose to do CASI themselves differ in terms of a variety of socio-demographic characteristics from those who opted to have the interviewer assist them. If systematic differences are found between these two groups, the more likely explanation is that different types of people are choosing to do CASI (as demonstrated above), rather than that the mode itself is causing differences in response.

An examination of response styles across the three series of CASI items reveals no significant differences by who did CASI. Specifically, no differences were found in acquiescence (tendency to agree) or extremeness (tendency to choose extreme responses). However, differences are found in the substantive responses to both individual and aggregated CASI items. As noted earlier, the CASI portion of the interview consisted of a series of items on the respondent self-image, the first CASI series being present image. Looking at the responses to these 44 items by who did CASI, significant effects are found for 22 of the 44 items at the $p<.05$ level, and for 12 at the $p<0.1$ level. These are considerably more than we would find by chance alone. Examining each of the items for which strong effects are found, the general trend is for those who completed to CASI items themselves to report a more positive self-image than those who had the interviewer help. Some of the selected (collapsed) items with the largest effects (all significant at $p<.01$) in their bivariate relationships with who did CASI were Healthy, Active, Caring, Hardworking, Responsible, and Competent. We examined the marginal significance levels of who did CASI in a set of multivariate logistic regressions, controlling for socio-demographic characteristics that may affect self-image (age, gender, race, education, employment status, etc.). Even after controlling for key socio-demographic correlates, we find a significant ($p<.05$) marginal impact of who did CASI for 6 of the 8 collapsed items, and for 13 of the 44 current schema items overall.

A key analytic variable created from the individual self-schema items is the number of currently held schemas (see Herzog et al 1994; Franks, 1994). This is simply a count of how many of a subset of 19 of the schemas respondents endorsed as describing themselves "extremely well" or "very well". Research suggests that the more identities one possesses (i.e., the more schemas one endorses), the better one's physical and mental health (see Franks, 1994). Analytic models focus on socio-demographic variation in the number of currently held schemas. We examined such a model predicting current scheme count, with and without a dummy variable indicating who did CASI. This variable has a significant ($p<.05$) marginal effect, suggesting that those who did CASI themselves endorse a greater number of schema (reflecting greater well-being) than those who had the interviewer assist them, controlling for other key correlates of schema counts.

While we have found systematic differences in the key dependent variables measured using CASI by whether or not the respondent completed the series unaided, we cannot conclude that these differences are necessarily the result of the decision to do CASI. A more likely explanation is that such differences are produced by self-selection, reflecting differences in characteristics between those who chose to do the CASI items themselves and those who did not, that we were unable to control for in the analyses. All we can conclude is that the respondents who chose to do CASI are different from those who chose not to do so. This has implications for nonresponse bias in those studies where those who declined to do CASI themselves are treated as nonrespondents (e.g., Jobe *et al.*, 1994). Even in studies where this is not the case, but where a substantial proportion of respondents may not have completed the most sensitive questions as intended, this has potential implications for data quality.

One of the main motivations for including self-administered items in a questionnaire is a desire to reduce the effects of social desirability, that is the underreporting of socially undesirable behavior or attitudes or the overreporting of socially desirable ones. The Self-Portraits questionnaire included a 4-item social desirability scale that allows us to examine differences between those who did CASI themselves versus those who had the interviewer assist them. The social desirability scale administered by interviewers in the latter part of the questionnaire produces a score ranging

from 0-4 with 4 indicating high social desirability. The mean social desirability score (2.16) for those who did CASI themselves is significantly ($p<.01$) lower than either for those who had partial or full interviewer assistance (means of 2.52 and 2.39 respectively). Thus, there appears to be lower levels of social desirability among those who did CASI themselves than among those who had the interviewer assist them. This is consistent with why CASI was used in the first place: to reduce overreporting of socially desirable responses. This suggests that the higher reporting of favorable self-images among those who did CASI themselves is due to self-selection rather than to social desirability effects of self- versus interviewer completion of these items.

We can also examine responses to the interviewer-administered questions in the remainder of the questionnaire in order to examine whether the decision to do CASI is reflective of a general orientation to the interview as a whole, rather than just the CASI items. As noted above, declination to self-administer the CASI items could reflect a lack of interest or engagement in the interview or an inability (whether through physical or cognitive limitations) to engage fully in the interview process. We thus expect that those who did CASI themselves should have lower levels of item missing data in the remainder of the interview, reflecting greater involvement or interest in the interview. The item missing data rate (including "don't knows" and refusal) for 133 interviewer-administered items asked of all respondents is significantly related to who did CASI. Whereas an average of 4.4% of the items are missing for those who had the interviewer complete the CASI items, only 0.77% are missing for those who full self-administered the items, and 1.65% are missing for those who had the interviewer read the questions while they keyed. A similar pattern is found when focusing only on refusal rates. These differences persist, even after controlling for other variables that may be associated both with differential self-completion of CASI and with differential rates of missing data (see Table 2). Again, we are not suggesting that CASI self-completion leads to reductions in missing data, but that the two variables share the same unmeasured causal antecedent. These may be motivational factors such as engagement in the interview, interest in the topic, or a high level of task-related commitment, and/or may reflect cognitive or physical limitations in attending to the interview task.

Conclusions

Despite the limitations of these data, this study appears to suggest that issues of literacy, motivation, etc., may impact on the successful implementation of CASI with a diverse population. We speculate that the introduction of audio-CASI may reduce problems associated with literacy and impaired vision, but may introduce problems for others (such as those with hearing difficulties). In addition, we expect that the effects of age and computer experience may persist with any type of computer-assisted self-administered survey. Most of the audio-CASI implementations to date have been on younger populations (the "walkman" generation). Furthermore, much of the computer-assisted psychological testing has been on student populations (see Zimmerman, 1993). The results described in this paper suggest caution when planning a CASI survey of the full population, particularly including older generations and those who may be less familiar with computers.

With the data at our disposal, we cannot determine whether those who completed the CASI items themselves answered more truthfully or accurately than those who had the interviewer administer the items. However, we do find differences in the substantive responses provided to these items by who did CASI, and differences in the data quality of subsequent interviewer-administered items. These results suggest that the effect of the decision to do or not to do CASI on data quality deserves further research attention.

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Table 1 Logistic Regression of Who did CASI

	Coefficient	Std. Error
Intercept	1.61**	0.56
Education		
(less than HS)	-	-
HS	0.43*	0.16
More than HS	0.70**	0.23
Age	-0.023**	0.0078
Race (1=White nonHispanic)	0.68**	0.16
Sex (1=Male)	-0.12	0.15
Work Status (1=employed)	0.22	0.24
Computer experience (1=no prior experience)	-0.53**	0.17
Frequency of reading for pleasure (1=at least sometimes)	0.13	0.17
Serious vision problems in last 12 months (1=yes)	-0.57**	0.16

Table 2 Regressions of Missing Data and Refusals in CAPI

	Missing Data		Refusals	
	Coeff.	s.e.	Coeff.	s.e.
Intercept	3.64**	(0.52)	0.34**	(0.088)
Education:				
(less than HS)	-		-	
HS	-0.90**	(0.26)	-0.15**	(0.055)
More than HS	-0.82**	(0.23)	-0.18**	(0.057)
Age	0.035**	(0.0046)	0.0071**	(0.0011)
Race (1=White nonHispanic)	-1.04**	(0.21)	-0.0091	(0.038)
Sex (1=Male)	-0.16	(0.14)	-0.051	(0.035)
Who did CASI:				
Respondent did CASI	-2.89**	(0.30)	-0.22**	(0.063)
Interviewer read, respondent entered	-2.58**	(0.31)	-0.21*	(0.095)
(Interviewer did CASI)	-		-	
R^2_{adj}	0.238		0.040	