



## Full length article

# Revealing sensitive information in personal interviews: Is self-disclosure easier with humans or avatars and under what conditions?



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## ABSTRACT

Despite the many advantages of computer-assisted data collection, it is unclear if, when, or under what conditions embodied conversational agents (i.e., ECA, virtual humans) can replace human interviewers to collect personal information in interviews, especially for topics that might be regarded as 'sensitive'. This paper presents results from an exploratory study designed to investigate how topic sensitivity affects individuals' preference to disclose to a human or an ECA interviewer. A convenience sample of 203 undergraduate business students completed a scenario-based survey that asked them to rate the sensitivity of various interview topics and indicate their preference to disclose such sensitive information to human or ECA interviewers. Open-ended questions revealed factors behind preferences for interviewer choice. Findings show a preference for ECAs when topics are highly sensitive and more likely to evoke negative self-admissions. For topics rated low in sensitivity or more likely to evoke positive self-admissions, human interviewers are preferred. Specifically, participants stated that they would feel more comfortable discussing sensitive topics with an ECA interviewer because it could not judge them. This indicates that the evaluative capability of the interviewer plays a factor in the amount of sensitive information elicited from interviewees. Overall, results contribute to an understanding of when and why ECA interviewers can effectively replace human interviewers.

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## 1. Introduction

The proliferation of computer use during the early 1990s led Nass, Steuer, and Tauber (1994) to propose the "computers are social actors" (CASA) paradigm, which suggests that people interact with computers in fundamentally social manners. As computer-mediated communication (CMC) grew and the Internet became more social, researchers discovered that people tend to disclose more sensitive information when communicating to or through a computer as opposed to traditional communication mediums (e.g., face-to-face and pencil surveys, see Richman, Kiesler, Weisband, & Drasgow, 1999, for a review). So, paradoxically, sensitive information disclosure seems to be one way that people do not treat computers the same as they treat humans. The disinhibited communication that computers elicit in social interactions presents numerous opportunities for collecting information about sensitive

topics that would otherwise go unrevealed in traditional communication.

While both human and computer interviewing techniques have been widely leveraged to obtain personal and private information from individuals, a promising alternative that combines the advantages of both is the use of embodied conversational agent (ECA) interviewers. ECAs are human-computer interfaces representing human- or cartoon-like characters that communicate using human-like verbal and non-verbal manners (Cassell, Sullivan, Prevost, & Churchill, 2000). Because ECA interviewers are non-intelligent (i.e., non-human), they offer the same protective benefits (e.g., a sense of social distance and lack of social judgment) commonly associated with computer-assisted personal interviews (CAPI) and Internet surveys. ECAs can also be designed to create more realistic social interactions and engender rapport, a benefit of using human interviewers to elicit self-disclosure. However, it is unclear if, when, or under what conditions ECA interviewers can replace human interviewers and what interviewer characteristics hinder or encourage sensitive information disclosure.

The current study was designed to qualitatively explore

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motivations behind people's preferences to disclose sensitive information in interviews with either a human or ECA interviewer. Our results provide evidence that respondents prefer to discuss sensitive topics with ECA interviewers as opposed to human interviewers because they feel less judged by a computer. These findings contribute to the need to understand more deeply why and under what conditions computer-assisted interview techniques can be utilized in research settings or practical applications where there is a need to collect information that might be regarded as "sensitive."

## 2. Background

Researchers have offered various definitions for topic sensitivity. [Oppenheim \(1992, p. 140, p. 140\)](#) identifies a topic as sensitive if "some individuals find it embarrassing and show reluctance to answer questions about it." [Lee and Renzetti \(1993, p. 5, p. 5\)](#) suggest that a sensitive topic "potentially poses for those involved a substantial threat." [Tourangeau and Yan \(2007\)](#) describe sensitive topics as those that are intrusive, raise fears about the repercussions of discussing them, and trigger social desirability concerns. Each of these varied definitions imply that sensitive topics evoke a sense of reticence and guardedness in individuals that prevent full and honest disclosure. This inhibited disclosure presents problems in a wide variety of fields, including marketing, healthcare ([Gratch, Lucas, King, & Morency, 2014; Locke et al., 1992](#)), and psychiatric counseling ([Jourard & Lasakow, 1958; Kang & Gratch, 2014](#)). Therefore, the effect that interviewer mode has on the disclosure of information of varying sensitivity is an important issue with wide impact.

Substantial evidence demonstrates that computers are often more effective at eliciting sensitive information from individuals than traditional data collection methods such as paper-based surveys and face-to-face interviews ([Lind, Schober, Conrad, & Reichert, 2013; Locke et al., 1992; Richman et al., 1999; Weisband & Kiesler, 1996](#)). Compared to face-to-face communication, computer-mediated communication (CMC) reduces social inhibitions and impression management ([Joinson, 2001, 2007](#)). With respect to eliciting sensitive information, evidence suggests that computer-assisted interviews are superior to human interviews for two basic reasons. First, computer-assisted interviews lack evaluative capability. Because computers do not respond visually or verbally to interviewee's responses, interviewees feel less apprehension about being judged or evaluated, which in turn promotes willingness to disclose ([Joinson, 2001; Kang & Gratch, 2010](#)). Second, when individuals feel judged or evaluated, they tend to engage in impression management devices that can present a drain on cognitive resources ([Kang & Gratch, 2010, 2014](#)). To the extent that computer-assisted interview methods do not trigger impression management, they free individuals' cognitive resources and allow them to focus on answering the question at hand ([O'Reilly, Hubbard, Lessler, Biemer, & Turner, 1994](#)). As a result, individuals typically provide higher quality responses, which is especially important when individuals are asked to answer emotionally complex or threatening questions. Therefore, topic sensitivity plays a role in not only the amount but also the quality of information disclosed by individuals depending on the medium.

In general, data collection modes that increase the privacy of responses and provide greater anonymity increase individuals' willingness to answer sensitive questions and reduce response error associated with sensitive topics ([Joinson & Paine, 2007; Joinson, 2007; Schaeffer, 2000](#)). For instance, [Tourangeau and Smith \(1996\)](#) compared computer-assisted personal interviewing (CAPI), computer-assisted self-administered interviewing (CASI), and audio-computer-assisted self-administered interviewing (ACASI) in

a survey about sexual behaviors and other sensitive topics (e.g., illegal drug use). Overall, individuals were more willing to make potentially embarrassing admissions when there was not a human involved in the interviewing process (i.e., CASI and ACASI). In addition, ACASI – using a recorded human voice – elicited greater admission of illegal drug use. In a later study, [Kreuter, Presser, and Tourangeau \(2008\)](#) found that Internet-based surveys prompt greater and more accurate sensitive information disclosure than computer-assisted telephone interviewing (CATI) and interactive voice response (IVR). Evidence from studies like these support the reasoning that the evaluative capability of a human activates evaluation apprehension in the respondent and substantiate benefits of using audio- and text-CASI for collecting data about sensitive topics.

Yet, others argue that personal interviews are the best way to ask sensitive questions because interviewers have an opportunity to build rapport and establish the level of trust needed for respondents to feel comfortable reporting sensitive information ([Aaker, Kumar, Leone, & Day, 2012, p. 223](#)). Humans possess greater abilities to build rapport than computers. Based on self-disclosure theory ([Jourard, 1971](#)), individuals are expected to be more honest and disclose more to someone they trust and with whom they feel comfortable. Traditionally, research has shown that a key advantage of person-administered surveys is the presence of a personal interviewer, especially one that is inviting and approachable, to encourage continuance and to probe and draw out personal reflections regarding the topic matter.

Embodied conversational agents (ECAs) communicate in realistic verbal and non-verbal manners, yet lack the full emotional and social intelligence of human beings ([Cassell et al., 2000](#)); therefore, they offer the advantages of both computer and human interviewers for eliciting sensitive information disclosure. ECAs have been referred to as embodied agents, virtual humans, and avatars – depending upon their visual characteristics and conversational abilities. Since they are computer generated, the possibilities for their appearance are endless (e.g., their appearance can be human-like or cartoon-like).

Empirical evidence suggests that people respond more positively to an ECA than to a text-only interface ([Qiu & Benbasat, 2009; Sproull, Subramani, Kiesler, Walker, & Waters, 1996](#)). On the other hand, some studies indicate that people perceive human-like qualities in ECAs even when they are cognizant that the conversational agent is a computer ([Astrid, Krämer, Gratch, & Kang, 2010; Gratch, Wang, Gerten, Fast, & Duffy, 2007a; Gratch et al., 2007b; Holtgraves, Ross, Weywadt, & Han, 2007; Kang, Gratch, Wang, & Watt, 2008](#)). Participants in a study conducted by [Kang and Gratch \(2014\)](#) reported less embarrassment if the ECA interviewer revealed sensitive information first. [Gratch et al. \(2014\)](#) deployed ECAs in medical interviews to see if they could elicit more personal information from patients than human interviewers. They manipulated both the perceived and actual control of the ECA (human or computer). Patients that were led to believe they were talking to a computer disclosed more sensitive information and reported less impression management than those patients who believed they were talking to a human. The actual control of the ECA (human or computer) had no effect on the patients' disclosure; however, the patients that interacted with ECAs controlled by humans (as opposed to computers) rated the systems as more useable. Elsewhere, empirical evidence demonstrates that ECAs (i.e., pedagogical agents) can effectively elicit private information from students ([Tombs, Bhakta, & Savin-Baden, 2014](#)). Studies have also shown that ECAs are capable of building social bonds with socially anxious individuals ([Kang & Gratch, 2009, 2010](#)), and creating a sense of rapport – an important element for eliciting sensitive disclosures – with individuals ([Gratch et al., 2007a, 2006;](#)

Huang, Morency, & Gratch, 2011).

To date, the research has largely focused on demonstrating the effects of various interviewer modes (e.g., human, ECA, audio, and text) and communication techniques (e.g., behavioral realism, reciprocity, and agency) on sensitive information disclosure. Research seeking to explain why people are willing to disclose more to computer interviewers has largely been unexploited. One exception to this trend is a recent study reported by Lind et al. (2013). These authors demarcate the influence of a face from the presence of an intelligent human. Their results provide evidence that the presence of a face inhibits sensitive information disclosure more than the evaluative capability of an intelligent human. Specifically, compared to their study's three faced interviewer conditions (i.e., human, high fidelity ECA, low fidelity ECA), participants in the faceless ACASI condition demonstrated a marginally significant decrease in socially desirable responding for five (three) of the twelve interview questions. In contrast, participants in the unintelligent computer interviewer conditions demonstrated a marginally significant decrease in socially desirable responding for only one (three) of the interview questions. These results contradict the evaluative capability reasoning proposition, namely that individuals experience less evaluation apprehension from computer interviewers simply because computers/computer interviewers do not generally respond visually or verbally to their responses.

### 3. Research questions

Increasingly, research is exploring methods to combine the advantages of both human and computer interviewers in studies that involve the need to collect sensitive information. For example, studies that involve hybrid methods (e.g., CATI or CAPI) in which an interviewer reads the questions aloud and the individual records his or her answers privately on a paper or computer (e.g., Turner, Lessler, & Devore, 1992) suggest that an optimal degree of sensitive information disclosure can be achieved in the middle of the human or computer interviewer spectrum. Embodied computers that can leverage a larger portion of the verbal and non-verbal communication spectrum provide a promising blend for the collection of sensitive information. In order to capitalize on these opportunities, it is important to understand what characteristics of human and computer interviewers result in greater sensitive information disclosure and why.

This exploratory study sought to address the following two research questions:

**Research Question 1:** How does topic sensitivity influence individuals' preference to disclose to a human or ECA interviewer?

**Research Question 2:** What interviewer characteristics affect individuals' preference for disclosing sensitive information to a human or ECA interviewer?

### 4. Research methods

To explore our research questions, we focused on the comparison of human and ECA interviewers – both of which have faces. This allowed us to determine if individuals feel more comfortable disclosing sensitive information to ECA interviewers than to human interviewers. We surveyed individuals about their perceptions and feelings about disclosing sensitive information to the two different interviewers. We decided to take this qualitative approach because of the dearth of exploratory studies seeking to explain why people disclose more to computers. In addition, self-reports to open ended questions provided direct access to people's thoughts and feelings.

We relied upon a convenience sample of undergraduate business students at a southwestern university, all of whom completed an Internet survey in exchange for extra credit points in a course.

Responses were received from 203 undergraduate business students enrolled in either an accounting or marketing course. The participants were 44% male and 56% female. The average (mean) age of individuals was 25 years old and most (76%) were single.

The survey instrument proceeded in two stages. In the first stage, individuals were asked to rate "how threatening it would be to you personally to honestly answer questions about the following topics in a personal interview" for 14 proposed topics on a 5-pt. scale, where 1 = "not at all threatening"; 5 = "extremely threatening". Topics included issues such as "questions about lying"; "questions about engaging in risky behavior"; "questions about your family's personal income"; and "questions about ethnicity". Each topic was further contextualized with brief examples to give individuals an indication as to the nature of response content that might be requested. All topics were presented in a randomized fashion to avoid order effects.

In the second stage of the survey, for each of the same 14 interview topics, the participants were asked to indicate whether they would be more likely to reveal an honest answer to "a human conversing with you in real-time via video conferencing software (such as Skype)" or to "a human-like avatar conversing with you in real-time, but is controlled completely by a computer." To explore the reasons for their interviewer preferences, in two separate open-ended questions we asked the participants to explain what it is about 1) an avatar and 2) a human that makes it easier "for you to give honest answers during an interview about" the preceding 14 topics. Finally, we asked "Would you prefer to provide honest answers to threatening questions to a male or female interviewer?" and then collected demographic information.

### 5. Findings

Data were analyzed using both quantitative and qualitative analysis procedures. We primarily relied upon quantitative analysis to address Research Question 1, which sought to determine the role of topic sensitivity in choosing to disclose to a human versus avatar interviewer for the hypothetical set of topics we presented to individuals. Qualitative analysis was used to address Research Question 2, which sought to expose individuals' underlying reasons and conditions for favoring an ECA or human interviewer, in general, when responding to questions on topics such as those we presented to individuals to rate, using open-ended probes. Results for each set of analyses are presented below.

#### 5.1. Quantitative analysis

For the quantitative analysis, means across all 14 topic areas were calculated across the sample. The overall mean scores ranged from 1.2 ("attitude about computer brands") to 2.6 ("attitude toward ethnicity") on the 1 to 5 scale, indicating individuals viewed the topics as low to moderately threatening as potential interview topics. In addition, topics that were viewed as less sensitive demonstrated less response variability across the sample. Descriptive statistics by topic appear in Table 1.

Next, Chi Square Goodness of Fit analysis sought to determine if there were significant differences in preferences for interviewer type (human or ECA) for each of the 14 topic areas across the sample. These results are displayed in Table 2, ranked in order by overall mean sensitivity.

Overall, significant differences in preferences to self-disclose to a human or ECA interviewer were observed for 9 out of the 14 topics. An ECA interviewer was preferred for the five most sensitive topics, while a human interviewer was preferred for four of the five least sensitive topics. No significant preference emerged for ECA or human interviewer for five of the topics. These five topics largely

**Table 1**  
Descriptive statistics for topic sensitivity across the sample.

Question topic	Mean	SD	Min	Max
About ethnicity	2.61	1.36	1	5
About cheating	2.55	1.21	1	5
About lying	2.40	1.11	1	5
About your or family's personal income	2.38	1.17	1	5
About irresponsible behaviors	2.36	1.09	1	5
About risky behaviors	2.00	0.99	1	5
About employer/supervisor	1.98	1.02	1	5
About computer/private information security	1.85	1.05	1	5
About homeless people	1.83	0.88	1	4
About charitable giving	1.73	0.87	1	4
About yourself (e.g. like/dislike most)	1.71	0.86	1	4
About relationship with parents	1.58	0.92	1	5
About personal responsibility global warming	1.39	0.75	1	4
About computer brands	1.16	0.48	1	4

Note. Mean scores on scale from 1 = not at all sensitive; 5 = extremely sensitive.

In general, these findings reveal that individuals were more likely to respond honestly to a computer-generated avatar interviewer for topics they personally rated as more sensitive or threatening. Only three questions regarding somewhat innocuous topics, such as “homeless people,” “global warming,” and “computer brands” were equally likely to engender honest responses regardless of interviewer-type.

## 5.2. Qualitative analysis

To address Research Question 2, which sought to discover motivations and conditions behind preferences for interviewer type, responses to the two open-ended questions regarding why they would be more likely to honestly self-disclose to a human interviewer or to an ECA interviewer were coded. After developing a coding scheme, all responses were categorized by two trained in-

**Table 2**  
Differences in preferences for human vs. avatar interviewer by topic area.

Question topic	Preferences by proportion (%)			
	Human	Avatar	$\chi^2$	$p^*$
About ethnicity	34	66	21.45	<b>&lt;0.001</b>
About cheating	29	71	34.97	<b>&lt;0.001</b>
About lying	33	67	22.79	<b>&lt;0.001</b>
About your or family's personal income	35	65	17.67	<b>&lt;0.001</b>
About irresponsible behaviors	40	60	7.72	<0.01
About risky behaviors	46	54	1.14	>0.28
About employer/supervisor	46	54	1.14	>0.28
About computer/private information security	50	50	<0.01	>0.95
About homeless people	53	47	0.61	>0.43
About charitable giving	60	40	8.53	<0.01
About yourself (e.g. like/dislike most)	54	46	1.47	>0.22
About relationship with parents	62	38	12.19	<b>&lt;0.001</b>
About personal responsibility global warming	71	29	33.31	<b>&lt;0.001</b>
About computer brands	72	28	36.68	<b>&lt;0.001</b>

\* = differences in proportions significant at  $p < 0.01$  or less;  $p < 0.001$  indicated in bold.

fell into the middle of the sensitivity range (see rank-ordered Table 2).

To further investigate the relationship between topic sensitivity and interviewer preference, the mean sensitivity scores for each topic for those preferring a human interviewer were compared to the mean sensitivity for those preferring an ECA interviewer. Independent samples *t*-test results appear in Table 3.

dependent coders. Inter-rater reliability across all coded instances exceeded 95% for the two open-ended questions, with disputed cases resolved by discussion between the two coders.

For the open-ended question, “What is it about an avatar that would make it easier for you to give honest answers during an interview about topics like those above?” four main categories emerged following a review of 235 coded instances: 1) lack of

**Table 3**  
Mean differences for topic sensitivity by preferences human vs. avatar interviewer.

Question topic	Mean sensitivity score			
	Human	Avatar	<i>t</i>	<i>p</i>
About ethnicity	2.02	2.92	4.61	<0.001*
About cheating	2.00	2.78	4.30	<0.001*
About lying	2.06	2.58	3.19	<0.001*
About your or family's personal income	1.94	2.61	4.12	<0.001*
About irresponsible behaviors	2.05	2.58	3.42	<0.001*
About risky behaviors	1.75	2.23	3.50	<0.001*
About employer/supervisor	1.66	2.26	4.41	<0.001*
About computer/private information security	1.57	2.14	4.01	<0.001*
About homeless people	1.74	1.95	1.64	0.10
About charitable giving	1.59	1.95	2.91	<0.001*
About yourself (e.g. like/dislike most)	1.53	1.92	3.16	<0.001*
About relationship with parents	1.36	1.96	4.12	<0.001*
About personal responsibility global warming	1.41	1.36	0.41	0.68
About computer brands	1.14	1.20	0.71	0.48

Note. Mean scores on scale from 1 = not at all sensitive; 5 = extremely sensitive.

\* = differences in proportions significant at  $p < 0.001$  or less.



judgment; 2) ease of providing responses due to computer interface; 3) personal comfort due to reduced negative feelings, such as anxiety, embarrassment, or guilt; and 4) protection of personal information. Two factors accounted for the majority of responses about why individuals would rather self-disclose to an ECA interviewer. Most (51%) stated “lack of judgment” followed by 29% of individuals who stated the computer interface would make it easier for them to respond, for instance, by allowing them additional time to formulate their responses or alleviating concerns about safeguarding answers. About 10% of individuals explained that they would rather provide honest answers to an ECA because it might relieve internally-felt emotions associated with their response, including anxiety, embarrassment or guilt, and another 10% noted an ECA would provide greater security or protection for divulging personal information. The coding scheme and results for analysis of this question, including verbatim examples, appear in Table 4.

For the open-ended question, “What is it about a human that would make it easier for you to give honest answers during an interview about topics like those listed above?” five primary categories emerged following a review of 199 coded instances: 1) advantages arising from the personal interaction of speaking to a human versus a computer; 2) interviewer empathy and understanding; 3) ability to explain or clarify responses; 4) receiving acknowledgement that responses are received and understood from a live interviewer as opposed to a “machine”; and 5) social pressures to respond honestly to a human versus ease of lying to a computer. Responses were somewhat evenly dispersed between personal interaction with a live interviewer (32%) and interviewer empathy (29%), followed closely by the ability to explain or clarify responses (21%). About 13% of individuals cited receiving acknowledgement of responses, and 5% reported the social pressures of a human interviewer would make them more likely to respond honestly. The coding scheme and results for analysis of this question, including verbatim examples, appear in Table 5.

Collectively, the qualitative analysis provides evidence that ECAs are preferable to human interviewers for self-disclosure involving sensitive topics because ECAs are not able to convey judgment,

either verbal or non-verbal. Yet, human interviewers were viewed as potentially more compassionate, and individuals valued the opportunities presented in a human interviewer situation that allow them to receive supportive feedback and to further clarify or justify their responses when engaging in interviews about sensitive or personal topics.

## 6. Discussion

The findings in this study indicate a general preference to disclose negative, personally sensitive information to ECA interviewers and positive, less-threatening information to human interviewers. There is no preferred interviewer type for topics perceived as mildly sensitive or threatening. Respondents prefer to disclose sensitive information to ECAs largely because computers cannot judge them and make it easier to provide responses (e.g., allow them more time to respond). On the other hand, the reasons respondents prefer to disclose to human interviewers are more diverse, but include: 1) a preference for live interaction, 2) the interviewer's ability to empathize, and 3) the ability to explain and clarify responses. Importantly, the general trend of the results suggest that as perceived topic sensitivity increases, respondents' preference to communicate to an ECA increases.

Findings from the present study provide qualitative evidence that individuals prefer discussing sensitive topics with non-judgmental interviewers. Researchers can draw upon insights derived from these findings to improve data quantity and quality of responses obtained from personal interviews. For instance, if researchers can detect or deduce the sensitivity individuals perceive in a certain topic, they can tailor the interviewer condition to maximize the individuals' comfort and disclosure. This study provides evidence for the potential effectiveness of interviewer type (ECA vs. human); however such tailoring is not limited to anthropomorphism – it could also include characteristics such as the gender of the interviewer. When dealing with an ECA, it is possible to manipulate physical, personality, and conversational characteristics of the interviewer. For example, ECAs that look similar to

**Table 4**  
Final coding scheme for preferences avatar over human interviewer (235 codings).

Category theme and description	Verbatim examples	Number of codes (n/%)
Lack of judgment, criticism, or reaction, verbal or nonverbal	<ul style="list-style-type: none"> <li>• I would not feel judged, or directly scrutinized.</li> <li>• An avatar cannot judge you.</li> <li>• It feels like you are not actually telling someone.</li> <li>• It's just a machine, and software does not judge.</li> <li>• An avatar does not have expressions where you can detect judgment.</li> <li>• Simply because a person's reaction isn't involved when you answer.</li> <li>• It is easier to express yourself to someone who has no ability to judge, react, compare, contrast, or emotionally charge your answer.</li> </ul>	120/51%
Ease of answering, process of computer responses facilitates interview procedure, gives time to formulate one's thoughts without pressure of personal interaction	<ul style="list-style-type: none"> <li>• The system is easy to understand and handle.</li> <li>• I feel as if I can be more honest when I'm not on the spot.</li> <li>• I feel I would be able to say more easily without the pressure of an actual person.</li> <li>• It feels less connected, and gives you a chance to really think about your response.</li> </ul>	68/29%
Relieve personal discomfort, alleviate negative emotions such as embarrassment, guilt, or anxiety	<ul style="list-style-type: none"> <li>• Not having to feel guilty about honest responses.</li> <li>• Emotions may be shown on my face when I feel threatened.</li> <li>• I feel like I would be more honest with an avatar [sic] when I'm not proud of my answers.</li> <li>• I would not feel the fear of becoming emotional.</li> </ul>	24/10%
Assurance of privacy, protection of personal information, anonymity	<ul style="list-style-type: none"> <li>• Makes it seem less likely to steal personal information for some reason.</li> <li>• Not having to see the person in front of you provides anonymity.</li> <li>• An avatar creates a sense of confidentiality.</li> <li>• There is a perception of security when not interacting with a human.</li> </ul>	23/10%

**Table 5**  
Final coding scheme for preferences human over avatar interviewer (199 codings).

Category theme and description	Verbatim examples	Number of codes (n/%)
Personal interaction with a “live” interviewer aids conversation, facilitates interview process	<ul style="list-style-type: none"> <li>• It's just easier to respond to a human.</li> <li>• It feels more like a conversation rather than just giving a report or being tested by the answers.</li> <li>• I can communicate easier with a human than a computer.</li> <li>• It's more of an interactive, real life conversation.</li> <li>• A human is just more personal than an avatar.</li> <li>• If you are taking time to think through answers and type them out, then you won't be as honest because you want your answers to sound good.</li> </ul>	64/32%
Interviewer empathy and understanding; ability to personally relate to interviewee's responses	<ul style="list-style-type: none"> <li>• Humans are able to sympathize with you.</li> <li>• They can relate to your situation and give feedback.</li> <li>• A human would be able to convey a sense of empathy and sympathy for certain questions.</li> <li>• Humans have compassion and understanding.</li> </ul>	57/29%
Ability to provide further details and explanation; gauge and monitor interviewer's reaction to adjust responses	<ul style="list-style-type: none"> <li>• You can fully explain answers that may seem unattractive.</li> <li>• It's easier to provide clear details.</li> <li>• You can judge how well or poorly the interview is going based on their reactions to your responses.</li> </ul>	42/21%
Receive confirmation or acknowledgement that responses are received	<ul style="list-style-type: none"> <li>• Receiving some sort of verbal or non-verbal reaction lets you know someone is there.</li> <li>• It is uncomfortable to provide answers when you don't know who if anyone is listening.</li> </ul>	25/13%
Morally correct; harder to lie straight-faced to a real person; confessional	<ul style="list-style-type: none"> <li>• A human would give you someone to confide in and get it off your chest.</li> <li>• Sometimes it feels good to tell someone.</li> <li>• Humans make you feel more accountable for your actions and invoke more honesty than a computer</li> </ul>	11/5%

individuals may positively impact disclosure (Bailenson, Iyengar, Yee, & Collins, 2008; Vugt, Bailenson, Hoorn, & Konijn, 2010).

Responses to our open-ended questions reveal a number of conditions that differentiate preferences for human versus ECA interviewers that are useful to researchers interested in use of ECAs for personal interviews. Overall, results suggest that ECAs researchers could incorporate features of human interactions to personalize the interaction and emphasize empathy and compassion. For example, a web camera would enable ECA interviewers to subtly “mimic” body and head movements of interviewees. Research has shown that such mimicry can increase the rapport an interviewee feels toward the interviewer, but mimicry's impact on sensitive information disclosure has yet to be tested. To increase their behavioral realism and elicit more information from individuals, ECAs can be programmed to ask probing questions. For example, they may say “please continue,” or “please tell me more,” or “I understand, can you provide more details to help me understand your response?” to encourage individuals to provide more details. Lengthy responses could be followed by “thanks so much for that response” as a reward and encouragement to interviewees who provide detailed responses. Such approaches need to be tested. To further enhance the anonymity and confidentiality ECAs provide, ECA interviewers could begin the interview emphasizing their role as a “personal confidant” and express empathy (e.g., “everyone has flaws”). This “everybody approach,” (e.g., “most people have a lot of debt, how about yourself?”) is a standard convention in survey research when asking questions about sensitive topics that could be incorporated into avatar introductory scripts.

The results also reveal the need to differentiate between *positive* and *negative* self-admissions when asking questions that require interviewees to reveal personal information. The literature regarding sensitive topics and sensitive questions has not fully addressed potential interactions such as personal interest, relevance, or attitude valence as factors that could differentiate willingness of participants to self-disclose personal information or attitudes, and to whom interviewees would prefer to disclose such

information. For instance, whether a person is fearful and anxious or happy and willing to disclose personal information about his or her relationship with parents may depend upon whether the relationship with parents is happy or troubled. Also, a person who does not regularly engage in risky or irresponsible behaviors may not regard questions about such topics as personally threatening. These issues are not new to researchers who investigate methodological differences in survey designs involving self-disclosure. However, these findings emphasize the importance of not assuming any topic is primarily “sensitive” or primarily “not sensitive” in sensitivity research studies, as such dichotomous distinctions may mask wide variations depending on individuals' personal experiences and emotions. What is sensitive is personal, but what is personal is not always threatening to personal interview participants, depending on interview conditions, including characteristics of the interviewer and the social distance between the interviewer and the interviewee.

Studies such as the exploratory one reported here can directly impact theory explaining why individuals, in general, disclose more sensitive information to computer interviewers than to human interviewers. Human and ACASI interviewers – two ends of the spectrum – differ in their characteristics along several dimensions (e.g., evaluative capability, non-verbal communication, and social presence). The qualitative analysis of responses to our scenario-based study suggest a number of future research studies that could be conducted using controlled experiments. Perhaps two of the most important differences between human and ACASI interviewers to consider for theory development are 1) the absence of a face and the accompanying dearth of non-verbal communication and 2) the lack of evaluative capability and decrease in evaluation apprehension that influences individuals to reveal greater sensitive information to computer interviewers. Lind et al. (2013) associate the interviewer's evaluative capability with the judgment that individuals will experience; and, therefore, conclude that individuals do not necessarily feel greater evaluation apprehension with a human interviewer, but are more influenced by the presence of a face. Perhaps the mere presence of a face, and not the evaluative

capability of the interviewer, induces evaluation apprehension. This is one possible explanation that would reconcile the findings between these two studies. Further research is needed to explore this possibility.

## 7. Limitations and future research

It is important to acknowledge that our exploratory, scenario-based study conducted with a single sample may not reflect the attitudes and behaviors of all individuals engaged in real-life interviews with either a human or an avatar interviewer. Our college-aged sample did not appear to regard any of the topics we tested as highly personal or threatening. We attribute this partly to the scenario-based nature of the study, which included short descriptions of questions for each topic, but did not actually place individuals in an interview situation with a human or avatar interviewer. It is likely that faced with an actual interview situation involving many of these topics, individuals would experience some level of discomfort, despite the sensitivity ratings reported by individuals. Also, characteristics of the sample may have limited their life experiences with some topics, such as questions about “their employer/supervisor” or “charitable giving.” Future research should include participants that reflect a more representative sample and include a broader range of age and experience. In addition, experimental studies are needed to confirm these findings. In this respect, our exploratory findings could be helpful to future researchers investigating self-disclosure using controlled laboratory experiments under varying interviewer conditions. Experimental studies such as these are difficult to conduct and subject to a wide variety of factors that might influence results, including those related to topic and characteristics of human or ECA interviewers. Exploratory findings from the present study can provide valuable input to researchers as they design experimental studies to further knowledge in this area. Also, it is rare for researchers conducting experimental studies to collect qualitative data such as those reported here. We highly recommend any future studies that are based on real experiences incorporate a means for collecting qualitative data that reflect participants’ felt experiences based on real interviews.

Future research should also explore the novelty effect. Like the Hawthorne effect, the novelty effect results in a temporary performance increase simply because of the uniqueness of the technology used. It is possible, that with time, avatar interviewers may cease to elicit greater sensitive information disclosure or cease to be preferred by interviewees when discussing sensitive topics. The novelty effect has been shown to be present in e-learning technology (Liu, Liao, & Pratt, 2009). On a more theoretical level, Wells, Campbell, Valacich, and Featherman (2010) demonstrate that perceived novelty reduces perceived risk and increases perceived benefit in the context of innovative technology adoption, thereby, playing a key positive role in technology adoption. Thus, the novelty effect may present a long-term limitation to avatar interviewing with regards to performance and cost-effectiveness of implementation. These concerns need to be explored.

## 8. Conclusion

In conclusion, this study contributes to research that demonstrates the usefulness of using ECAs to collect personal or sensitive information from personal interview participants in a less costly, more convenient, and more confidential manner. Computer-assisted technologies can never replace the human element or personal interactions that characterize personal interviews, but ECA technology can eliminate the major impediments associated with self-disclosure to human interviewers, especially for topics

that are sensitive or personally threatening. ECAs can also be programmed to incorporate aspects of the human interaction that encourage self-disclosure. This study specifically contributes to knowledge about the factors and conditions that differentiate willingness to disclose personal information to human or avatar interviewers. Use of ECA interviewers presents a promising and exciting technological advancement for conducting personal interviews. More research is needed to reveal the potentials as well as the limitations of this new technological advancement in personal interview methodology.

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