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# Trustworthy Virtual Advisors and Enjoyable Interactions: Designing for Expressiveness and Transparency

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# TRUSTWORTHY VIRTUAL ADVISORS AND ENJOYABLE INTERACTIONS: DESIGNING FOR EXPRESSIVENESS AND TRANSPARENCY

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## Abstract

*Online virtual advisors have enjoyed an increased research attention and widespread use in the last several years. In investigating the determinants of their adoption, the majority of extant research has focused on a set of utilitarian variables that address some outcomes from their use. In contrast, this study focuses on users' perceptions of these virtual advisors as interaction partners, and on beliefs users form during these interactions. Specifically, we propose and test for the effects of perceived advisor expressiveness and transparency on perceptions of their trustworthiness and interaction enjoyment. The latter two constructs are further proposed to act as antecedents to users' reuse intentions. The results of an experimental study lend support to the proposed model, and highlight the importance of designing social and trustworthy advisors and enjoyable interactions.*

*Keywords: Virtual advisors, e-commerce, information system adoption, trust.*

## 1 INTRODUCTION

Online virtual advisors are software-based tools that are utilized in electronic commerce (e-commerce) to provide advice and assistance to users (Xiao and Benbasat, 2007). Since their introduction, virtual advisors have attracted a plethora of research attention. This research has focused on identifying and examining the effects of a multitude of variables on the intentions to adopt these advisors. Of the many factors studied, extrinsic determinants that focus on the utilitarian benefits that can be obtained from the use of these advisors (e.g., perceived usefulness) have received the most consideration. In so doing, this research has focused more on investigating the effects of users' evaluations of the *outcomes* of using virtual advisors, and largely ignored the effects of their evaluations of their *experience* using these advisors.

In contrast, this study focuses on the experience of interacting with online virtual advisors, and examines the effects of a number of beliefs formed during these interactions. As such, this study focuses more on investigating the social and relational determinants to the adoption of virtual advisors rather than the utilitarian ones.

In addition to being tools that help extend users' cognitive limitations in decision-making, many online virtual advisors are designed to use full sentences, communicate through voice, and assume anthropomorphic embodiments. As a result, these artifacts are endowed with human-like characteristics that induce users' attributions of social action (Al-Natour and Benbasat, 2009). Accordingly, this study adopts the Computers are Social Actors (CASA) paradigm (Reeves and Nass, 1996), and proposes that users of online virtual advisors will view their interactions with these artifacts as social and interpersonal<sup>1</sup>. During these interactions, users will form beliefs that address characteristics of these virtual advisors, in a manner similar to that during interpersonal interaction. Of the many possible beliefs that can be formed, we focus our study on the effects of perceived transparency and expressiveness. These two variables are in turn proposed to enhance perceptions of the advisor's trustworthiness, and make the interaction with the advisor more enjoyable.

The remainder of this paper proceeds as follows: First, we present our research model and develop our hypotheses. Next, we provide a detailed description of the experiment conducted to test the proposed model. This is followed by an overview of the results obtained. Finally, we offer a discussion of the study's results and some concluding remarks.

## 2 RESEARCH MODEL AND HYPOTHESES

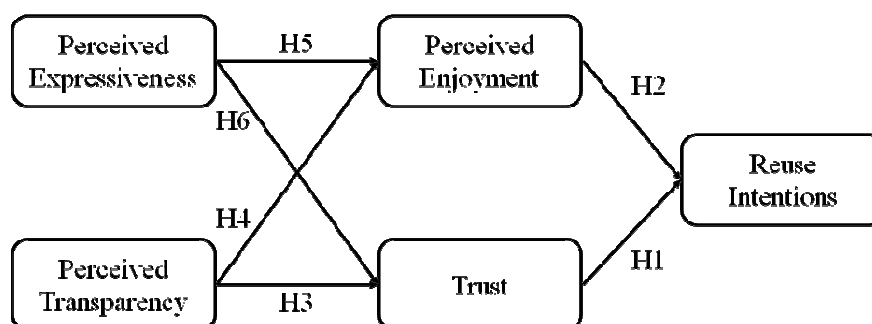


Figure 1. Research Model.

<sup>1</sup> For a detailed discussion of the CASA paradigm and other alternate views, please see Al-Natour and Benbasat (2009).

The research model is shown in Figure 1. It investigates the antecedents to the adoption of an online virtual advisor after an initial use. This is captured through reuse intentions, which refers to the behavioral intentions of using the virtual advisor in a similar context in the future (Venkatesh, 2000). The model proposes that reuse intentions are influenced by perceptions of the advisor's trustworthiness and the perceived enjoyment of the interaction with it. These two antecedents, which have been shown to be influential determinants of information system (IS) reuse intentions (e.g., trust: Wang and Benbasat, 2005; enjoyment: Van der Heijden, 2004) are in turn proposed to be affected by the perceived transparency and perceived expressiveness of the virtual advisor. Given that the effects of trust and enjoyment have been established in prior research (for a review, see Xiao and Benbasat, 2007), much of the following discussion will be devoted to describing the effects of expressiveness and transparency.

## 2.1 Trust

Research in management has differentiated between different forms of trust (Rousseau, Sitkin, Burt, and Camerer, 1998). Consistent with prior research on the effects of trust on IS adoption, we focus on the effects of calculus-based trust (Wang and Benbasat, 2005), and conceptualize it in the form of a set of trusting beliefs (trustworthiness). Trust as a belief addresses the trustor's perception that the trustee has attributes that are beneficial to the trustor (McKnight, Choudhury, and Kacmar, 2002). Specifically, it refers to the extent to which the trustor believes that the trustee has competence (the ability, skills, and expertise to perform effectively), benevolence (cares about the trustor and acts in the trustor's interest), and integrity (adheres to a set of principles that the trustor finds acceptable) (Mayer, Davis, and Schoorman, 1995; McKnight et al., 2002; Wang and Benbasat, 2005).

In addition to being considered as information systems, online virtual advisors are also trust objects (Wang and Benbasat, 2005) that act as agents involved in an agency relationship with their users. By delegating the task of product screening and evaluation to the virtual advisor, users assume the role of principals. This leads to information asymmetry, where the agent (the advisor) has more access to information, such as, information about the product alternatives or decision options, than the principal (the user). Given this information asymmetry, trust has been conceptualized to capture users' perceptions of whether the advisor is capable of performing the tasks delegated to it solely for the benefit of its users (Wang and Benbasat, 2005), and has been proposed as an antecedent of the intention to re-employ the advisor again in that capacity. Applying this approach, numerous studies have shown that trust in advisors positively affects their reuse intentions (Al-Natour et al., 2008).

H1: Trust has a positive effect on reuse intentions.

## 2.2 Perceived Enjoyment

Perceived enjoyment refers to "the extent to which the activity of using the [virtual advisor] is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis et al. 1992, p. 1113). It has been proposed as an important antecedent to reuse intentions, especially when measuring the adoption and the continuous use of hedonic systems (Van der Heijden, 2004). When applied to the context of virtual advisors, this construct captures some of the experiential aspects of the user's interaction with the advisor rather than the utilitarian outcomes of that interaction, and has been shown to affect reuse intentions (Al-Natour et al., 2005).

H2: Perceived enjoyment has a positive effect on reuse intentions.

## 2.3 Transparency

Transparency in the context of decision support systems has been proposed to increase users' understanding by offering insights into how the system works (Cramer et al., 2008). While a multitude of prior research has recognized the role of transparency as means to improving users' interaction with

decision support aids, perceived transparency has rarely been explicitly measured or pertinently defined. Two exceptions have been the works by Sinha and Swearingen (2002) and Cramer et al. (2008), in which transparency was measured and used to predict trust in virtual advisors. In these studies, transparency has been defined as the extent to which the user understands why a certain recommendation is offered.

While such early attempts to conceptualize the construct of perceived transparency are commendable, we believe these conceptualizations suffer from two main issues. First, in both studies, transparency was defined as a characteristic of the recommendation offered by the virtual advisor, rather than a characteristic of the virtual advisor itself. It is our opinion that transparency relates to the *process* that underlies the virtual advisor's inner workings, rather than the recommendation, which constitutes the output of this process. Second, unlike prior conceptualizations, we do not view understandability as an essential component of perceived transparency. While transparency aims to increase understanding of the inner workings, it does not necessarily imply that the user understands the process underlying the advisor's processing, but is rather made aware of it. This distinction between "understanding" and "knowing" is important, since the first may require a certain level of domain knowledge.

In this study, we focus on users' perceptions of the transparency of the virtual advisor, and define perceived transparency as the extent to which the inner workings of the virtual advisor are *known* to the user. This conceptualization of transparency focuses on the processes followed by the virtual advisor to solicit inputs, process them, and produce recommendations. As such, this view of transparency is more general in that the transparency of a virtual advisor is not only assumed to afford the user an insight into why a recommendation is made, but also could make the user aware of why a certain question is being asked, and how responses will be used and processed, to mention a few.

Many studies have discussed the role of transparency of a virtual advisor as an influential antecedent of users' trust in it. Whether the advisor's perceived transparency was explicitly captured (e.g., Cramer et al., 2008) or not (e.g., Wang and Benbasat, 2007), transparency has been proposed to reduce the information asymmetry between the user and the advisor. In the case of virtual advisors, this information asymmetry can relate to: 1) what the advisor does, 2) how it does it, or 3) why it does it. Transparency of a virtual advisor can help reduce these three types of knowledge-gaps, and subsequently, holding everything else constant, increase users' trust in the advisor. More specifically, communicating what the advisor does and how it is done can be used to demonstrate its expertise, subsequently increasing perceptions of its competence (Wang and Benbasat, 2007). Providing justifications as to why the advisor is doing something, alternatively, can help bridge the "intentions gap" that may arise as a result of users' unawareness of why certain information is being solicited. Bridging this gap through transparency will convey goodwill toward users, which will enhance their perceptions of the benevolence. Finally, providing descriptions of what's being done, how, and why, collectively, endow the user with the knowledge to evaluate the principles that the advisor adheres to, and whether these are acceptable from the user's point of view. Therefore, increased transparency can also facilitate the formation of integrity beliefs.

H3: Perceived transparency has a positive effect on trust.

In addition to affecting trust, perceived transparency is proposed to exert a positive effect on perceived enjoyment. The transparency of a virtual advisor ensures that users are given information at every stage of the process. This reduces the level of confusion, and increases the potential for coordination between the advisor and the user. Coordination refers to the degree to which partners are able to align their behaviors with one another in an efficient and effortless manner (Finkel et al., 2006). Because increased coordination can lessen the cognitive burden and reduce the potential for unnecessary actions, it affects the extent to which interactions are viewed as high or low maintenance.

In high-maintenance interaction, social coordination on an interpersonal task requires energy exertions beyond those required to perform the task itself. In the case of interacting with a virtual advisor, this could be manifested in the form of additional cognitive effort expended to try to understand and infer why the advisor asks certain questions, the reasoning behind a certain recommendation, how

information is being integrated and processed, or any other concern the user may have. Because a transparent advisor not only ensures that this information is available, but also that the information is communicated when it is most relevant, users' cognitive burden is lessened. This together with the reduced potential for frustration that results from confusion or performing unnecessary actions when transparency is low, will make interactions with a transparent virtual advisor less cognitively demanding and more enjoyable.

H4: Perceived transparency has a positive effect on perceived enjoyment.

## **2.4 Expressiveness**

As discussed earlier, in addition to being seen as tools that help extend users' cognitive limitations, online virtual advisors act as social partners in interpersonal interactions. Perceived expressiveness is a newly proposed construct intended to capture users' perceptions of the extent to which a virtual advisor conveys human-like emotions and feelings in its communication with users. Hence, perceived expressiveness is an evaluation of the advisor's social aptitude and its ability to relate to its users at a human level. In so being, it emphasizes the role of affective and responsive communication.

In this study, perceived expressiveness is proposed to have a positive effect on perceived enjoyment. First, the expression of feelings and emotions resulting from increased expressiveness allows for richer and more intimate interactions, in which partners can better relate to each other. This in the case of user-advisor interactions allows users to be more fully engrossed in their interaction with the advisor, and suspend disbelief in its humanness. Thus, making the interaction more enjoyable and interesting. Second, conveying emotions in response to users' actions can reinforce their feelings that the advisor is involved in their interaction and focused on them. This enhances their feelings of validation, which in turn can induce positive affect and pleasure.

H5: Perceived expressiveness has a positive effect perceived enjoyment.

We also propose that perceived expressiveness will exert a positive effect on trust. When expressing emotions in response to the actions of a user, the advisor is essentially expressing its concern for the user, and conveying its validation. Not only is the advisor communicating that it understands what the user is "saying", but also that it cares about the user and the information the user reveals. While the first can work to enhance perceptions of the advisor's competence, the latter can increase perceptions of its benevolence and integrity. Hence, perceived expressiveness is also expected to have a positive effect on trust. In fact, the expression of feelings and emotions in social interactions has been viewed as a type of trusting behavior in and of itself, which consequently, works to enhance perceptions of the trustworthiness of the communicator of these affective responses (Altman and Taylor, 1973).

H6: Perceived expressiveness has a positive effect trust.

# **3 RESEARCH METHOD**

## **3.1 Experimental Task**

Subjects were asked to use an online virtual advisor to shop for a skin care product. They were randomly assigned to one of four available advisors that differed in a number of characteristics. The advisor asked subjects a number of questions to help determine their skin care needs before recommending a suitable product(s). After completing the shopping task, subjects were directed to an online questionnaire where they were asked to evaluate the virtual advisor and their interaction with it.

The use of a skin care product context is due to a number of reasons. First, based on projections from Forrester Research, online sales of health and beauty products will reach \$7.8 billion in 2010 (14% of online retail). Second, health and beauty products are characterized by their high personal relevance,

which enhances the need for trust. Third, most users of these products do indeed enjoy visiting online stores to learn and purchase these products. When asked about their reasons for visiting online beauty websites, more than 80% indicated they do so to learn about new products, while more than 40% have visited these sites seeking beauty advice (Overby et al., 2003). Finally, to determine their skin care needs, it was necessary for the advisor to ask users a number of questions that addressed socially sensitive information (e.g., smoking habits). This increased the social relevance and sensitivity of the task and enhanced the need for trust. More importantly, it created a context in which users may provide embarrassing or socially unfavorable answers, which gives the advisor the opportunity to express feelings and emotions. Also, it heightened the need for transparency to justify the requests for the sensitive information, and the need to describe the impact of the responses provided on the recommendations, which maybe not easily discernable.

### 3.2 Treatment Conditions

To create adequate levels of variance in the exogenous variables, four virtual advisors were designed. The advisors differed in their use of “why” and “how” explanations (Wang and Benbasat, 2007), their use of expressive speech acts (Al-Natour et al., 2006), and the verbal style they manifested.

Explanation facilities have long been considered a critical component of intelligent and knowledge-based systems (Dhaliwal and Benbasat, 1996). Similar to the explanations provided by human decision makers to explain their choices, explanation facilities provide users with information regarding *why* the system asked certain questions and *how* it processed information to reach its conclusions (Gregor and Benbasat, 1999). Wang and Benbasat (2007) have differentiated between two types of explanations offered by virtual advisors. Why explanations are used to provide justification for why a certain question is asked. How explanations describe how the advisor will use the information provided.

In this study, we propose that the use of why and how explanations will affect perceptions of transparency. First, when applied to the context of virtual advisors, why explanations justify the need to ask a certain question, and in so doing, provide some justification for the advisor’s behavior. Second, we distinguish between two types of how explanations. Predefined how explanations are those that provide a general description of how the information provided will be used and integrated into the decision-making. Dynamic how explanations on the other hand, are generated based on the specific responses received from the user. For instance, when responding to a question about skin areas of concern, the user may indicate one or more areas for which she seeks improvements. Depending on the specific response she provides, the virtual advisor can provide an explanation of how this response will be factored into the decision-making and how it will affect its recommendations.

On the other hand, the four advisors also differed in their use of expressive speech acts. Speech act theory postulates that to communicate is to perform an act, such as stating facts, making requests, making promises, or issuing orders (Searle, 1979). For example, by making the statement “I will call you tomorrow,” the speaker commits to a future course of action. Hence, by uttering the sentence the speaker says something, does something by speaking, and affects the “hearer” by what is said. While prior research has investigated how directive speech acts can be used to increase perceptions of a virtual advisor’s dominance (Al-Natour et al., 2006), this study proposes that the use of expressive speech acts, which are used to express a certain psychological state by the speaker of the message, such as apologizing or expressing concern, can be used by the virtual advisor to manifest understanding and care, and thus, enhance perceptions of its expressiveness. For example, when asking about existing health conditions, advisors can use expressive speech acts to express concern for users depending on the response received.

Finally, the ability of virtual advisors to manifest a number of verbal and non-verbal cues has received much attention in HCI research (Al-Natour and Benbasat, 2009). This study focuses on the effects of verbal cues on perceptions of expressiveness. Specifically, we focus on the study of verbal style,



which includes the “choice of words and types of sentences and fluidity of speech” (Isbister and Nass, 2000, p. 253). Such verbal cues have been shown to serve as the basis on which users can form perceptions of an automated advisor’s extroversion and friendliness (e.g., Isbister and Nass, 2000). Consistent with these findings, we propose that verbal cues manifested, namely, verbal style, will affect perceptions of the advisor’s friendliness and warmth, and thus, enhance feelings of its expressiveness.

Based on the above analysis, we designed the four advisors. The first advisor did not use any of the previously described types of explanations or speech acts, and thus served as the control condition. The second advisor was designed to enhance perceptions of transparency. It accomplished this by providing why and predefined how explanations. The third advisor was designed to enhance perceptions of expressiveness, and affect aspects of transparency. To that end, the advisor offered expressive speech acts that communicated concern for the user and appropriate emotions. Additionally, the third advisor offered dynamic how explanations, underscoring its understanding of users’ needs and concerns, and describing how it will work to meet them. To enhance perceptions of expressiveness, the third advisor manifested an extrovert verbal style. Finally, the fourth advisor combined the characteristics of the second and third, and in so doing, worked to both affect perceptions of transparency and expressiveness. Following is a brief description of the protocol followed by each advisor when asking a question:

- **Advisor 1:** The advisor acted as the control condition. It simply asked the questions, and then offered a number of options to answer each.
- **Advisor 2:** The advisor provided an explanation justifying the need to ask each question. After the question itself, the advisor offered a description of how the information will be used. Next, the advisor listed the options for answering the question.
- **Advisor 3:** The advisor started by asking the question, and then directly offered the available options to answer it. After the subject chose an option, the advisor displayed additional text that communicated how the information provided will be used. Next, the advisor used an expressive speech act to express its concern for the user and/or an appropriate emotion, depending on the nature of the question and the option selected. The advisor manifested an extrovert verbal style through the use of longer sentences, expressing higher confidence levels, and the use of informal language (Isbister and Nass, 2000).
- **Advisor 4:** The advisor incorporated the characteristics of advisors 2 and 3. Before asking the question, the advisor provided an explanation as to why the question is being asked. After asking the question, the advisor provided a description of how the information solicited will be used. After the subject answered the question by choosing one of the options available, the advisor displayed some text explaining how the information provided will affect its recommendations, in addition to expressing concern for the subject and emotions when appropriate. Similar to advisor 3, this advisor used an extrovert verbal style.

### 3.3 Sample

Fifty-eight e-commerce shoppers were recruited from a nationwide panel provided by a marketing research firm. An invitation to participate in the study was broadcast via email to members of the panel. Participants were provided with a point-based incentive for their assistance in the study redeemable for various prizes available through the marketing firm. The median age group for subjects was 36-45. All participants were female. The characteristics of the subjects did not differ across the treatment conditions.

### 3.4 Measures

All constructs were measured using 7-point Likert scales. Two new scales were developed to measure perceived expressiveness and perceived transparency. The three trusting beliefs were measured using

the instrument developed by McKnight et al. (2002) and adapted to the context of virtual advisors by Wang and Benbasat (2005). Established measures for perceived enjoyment (Van der Heijden, 2004) and reuse intentions (Al-Natour et al., 2008) were used. All measurement items are available in Appendix A.

## 4 RESULTS

### 4.1 Measurement Model and Manipulation Checks

Factor and reliability analyses were performed using the Statistical Package for the Social Sciences (SPSS). Construct reliability estimates and item loadings are shown in Appendix A. All scales showed a high level of reliability, and item loadings exceeded the recommended minimum of 0.70. The third item in the scale to measure reuse intentions was recoded before conducting the analysis.

Based on the responses from 58 subjects, the scores for all exogenous variables were examined to ensure that the treatments created adequate level of variance in them. Expressiveness scores had a variance of 2.86, while transparency scores had a variance of 2.60. The scores for the three components of trust, namely, benevolence, integrity, and competence had variances of 1.51, 1.50, and 1.59 respectively. The scores for perceived enjoyment scores had a variance of 1.45. All scores ranged in value from 1 to 7. Overall, the virtual advisors used were able to create an adequate amount of variation in the examined variables. The means and standard deviation for the individual treatment groups are shown in Table 1.

	Advisor 1 (N = 16)	Advisor 2 (N = 19)	Advisor 3 (N = 11)	Advisor 4 (N = 13)	Overall
	Mean (S. Dev.)	Mean (S. Dev.)	Mean (S. Dev.)	Mean (S. Dev.)	Mean (S. Dev.)
Expressiveness	2.59 (1.58)	3.84 (1.38)	5.27 (1.22)	5.18 (0.98)	4.02 (1.69)
Transparency	3.04 (1.72)	5.11 (1.21)	5.24 (1.17)	5.33 (0.85)	4.60 (1.61)
Enjoyment	4.31 (1.51)	5.06 (1.07)	5.66 (0.78)	5.18 (0.86)	4.99 (1.20)
Benevolence	4.40 (1.45)	5.32 (1.17)	5.67 (0.94)	5.48 (0.75)	5.16 (1.23)
Integrity	4.48 (1.41)	5.30 (1.21)	5.86 (0.85)	5.52 (0.79)	5.22 (1.22)
Competence	4.53 (1.45)	5.39 (1.10)	5.70 (1.33)	5.57 (0.82)	5.25 (1.26)
Reuse	4.13 (1.77)	5.25 (1.30)	5.75 (0.79)	5.50 (1.37)	5.08 (1.49)

Table 1. Descriptive Statistics.

Collectively, the treatments explained 40% of the variance in the expressiveness scores and 37% of that in the transparency scores. Post-hoc analysis revealed that the expressiveness and transparency scores for advisors 2, 3 and 4 were statistically different from those for the control condition (advisor 1). Advisors 3 and 4 differed from advisors 1 and 2 in terms of their expressiveness scores, but not from each other. There was no statistically significant difference between the transparency scores for advisors 2, 3, and 4.

### 4.2 Structural Model Results

To test our hypotheses, we analyzed the model using Partial Least Squares (PLS) with SmartPLS 2.0 (Ringle, Wende, and Will, 2005). The results of the structural model are shown in Figure 2. Consistent with hypothesis 1, trust had a positive and statistically significant effect on reuse intentions ( $\beta = 0.49$ ,  $p < 0.05$ ). Perceived enjoyment also had a significant effect on reuse intentions ( $\beta = 0.26$ ,  $p < 0.05$ ), thus, confirming hypothesis 2. Together, these two variables explained 53% of the variance in reuse intentions. The effects of perceived transparency on trust and perceived enjoyment were also positive and statistically significant ( $\beta = 0.54$ ,  $p < 0.05$  and  $\beta = 0.36$ ,  $p < 0.05$ , respectively). Thus, hypotheses

3 and 4 were also confirmed. Consistent with our predictions in hypotheses 5 and 6, perceived expressiveness has significant effects on perceived enjoyment ( $\beta = 0.40$ ,  $p < 0.05$ ), and trust ( $\beta = 0.24$ ,  $p < 0.05$ ). In the analyzed model, trust was treated as a second-order formative construct. The factor scores for the trusting beliefs, namely, benevolence, integrity, and competence, served as indicators (Wang and Benbasat, 2005). All three sub-constructs had statistically significant weights (0.37, 0.46, 0.21, respectively. All significant at  $p < 0.05$ ).<sup>2</sup>

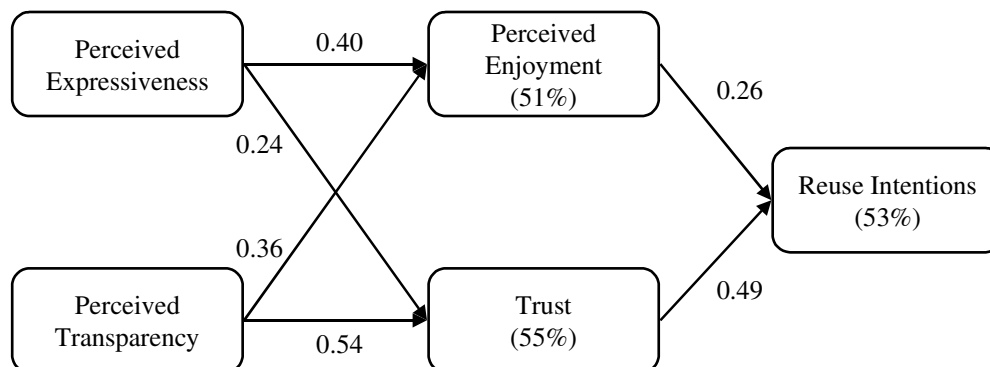


Figure 2. Results of the Structural Model.

## 5 DISCUSSION

This study investigates the effects of trust and perceived enjoyment on the intentions to reuse an online virtual advisor. The results indicate that both variables are important determinants of reuse intentions, with trust exerting a stronger positive effect. This is not surprising considering the specialized nature and high relevance of the task, and the need for the provision of socially sensitive information. While the latter increases the need for benevolence and integrity, the high relevance and specialized nature of the task increases the importance of the advisor's competence. Together, they enhance the need for trust. Interestingly, the combined effects of the two variables (trust and enjoyment) explain more than half of the variance in reuse intentions. This at minimum indicates that these factors that are social and relational in nature, are no less effective than their utilitarian counterparts.

The results also reveal that both expressiveness and transparency work jointly to explain more than half of the variance in advisor trustworthiness and interaction enjoyment. Yet, the magnitudes of their individual effects on each variable differ greatly. Specifically, the effect of expressiveness on enjoyment is almost twice that of its effect on trust. This is understandable when considering that increased expressiveness, while facilitating the conveyance of trust-building knowledge, serves mainly to increase the humanness and sociability of the interaction. Alternatively, transparency, which essentially is an evaluation of the type and amount of information the advisor divulges about its behaviors and intentions, has its largest effect on trust. Its effect on expressiveness, mainly due to it making the interaction less confusing and cognitively demanding, is smaller than that on transparency, but still sizable.

The study has a number of limitations. This includes the modest sample size and the limited number of experimental advisors. The latter made it necessary to design advisors that differed in more than one design element, making it impossible to isolate their individual effects. Future research should focus

<sup>2</sup> There were no significant changes in the results when trust is treated as a second-order construct that is *reflected* by the three components. The addition of domain knowledge, a construct measuring subjects' knowledge of skin care products, as a control variable had a minor effect on the results. Its effects on trust and reuse intentions were only marginally ( $p < 0.10$ ).

on examining the effects of individual design elements as well as any meaningful combinations of these, so as to identify the most effective designs.

## 6 CONCLUSION

This paper proposes and tests a theoretical model of the social and relational antecedents to users' intentions to reuse online virtual advisors. The results reaffirm the importance of enhancing perceptions of these advisors' trustworthiness and of making interactions with them more enjoyable. These, the study reveals can be achieved through designing advisors that are more expressiveness and transparent. Overall, this study confirms that the process of interacting with a virtual advisor is of no less importance than the outcomes of that interaction. Hence, it advocates for an increased research focus on identifying additional factors affecting the quality of user-advisor interactions, and practical attention to designing advisors that provide enjoyable and trustworthy interactions.

## References

- Al-Natour, S. and Benbasat, I. (2009). The Adoption and Use of E-Commerce Technological Artifacts: A Social Actor Perspective. *Journal of the Association for Information Systems* (10:9), 637-660.
- Al-Natour, S., Benbasat, I. and Cenfetelli, R. (2006). The Role of Design Characteristics in Shaping Perceptions of Similarity: The Case of Online Shopping Assistants. *Journal of the Association for Information Systems* (7:12), 821-861.
- Al-Natour, S., Benbasat, I. and Cenfetelli, R. (2008). The Effects of Process and Outcome Similarity on Users' Evaluations of Decision Aids. *Decision Sciences* (39:2), 175-211.
- Al-Natour, S., Benbasat, I., and Cenfetelli, R. (2005). The Role of Similarity in e-Commerce Interactions: The Case of Online Shopping Assistants. *Proceedings of the Fourth Annual Workshop on HCI Research in MIS*, Las Vegas, NV, 70-74.
- Altman, I. and Taylor, D. (1973). *Social Penetration: The Development of Interpersonal Relationships*. New York: Holt, Rinehart, and Winston.
- Cramer, H., Evers, V., Ramlal, S., van Someren, M., Rutledge, L., Stash, N., Aroyo, L., and Wielinga, B. (2008). The Effects of Transparency on Trust in and Acceptance of a Content-based Art Recommender. *User Modeling and User-Adaptive Interaction* (18:5), 455-496.
- Davis, F. D., Bagozzi, R., Warshaw, P. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace *Journal of Applied Social Psychology* (22:14), 1111-1132.
- Dhaliwal, J. S., and Benbasat, I. (1996). The use and effects of knowledge-based system explanations: Theoretical foundations and a framework for empirical evaluation. *Information Systems Research* (7:3), 342-362.
- Finkel, E. J., Campbell, W. K., Brunell, A. B., Dalton, A. N., and Scarbeck, S. J. (2006). High-Maintenance Interaction: Inefficient Social Coordination Impairs Self-Regulation. *Journal of Personality and Social Psychology* (91:3), 456-475.
- Gregor, S., and Benbasat, I. (1999). Explanations from intelligent systems: Theoretical foundations and implications for practice. *MIS Quarterly* (23:4), 497-530.
- Isbister, K. and Nass, C. (2000). Consistency of personality in interactive characters: verbal cues, non-verbal cues, and user characteristics. *International Journal of Human-Computer Studies* (53), 251-267.
- Mayer, R. C., Davis, J. H., and Schoorman, F. D. (1995). An Integrative Model of Organizational Trust. *Academy of Management Review* (20), 709-734.
- McKnight, D. H., Choudhury, V., and Kacmar, C. (2002). Developing and Validating Trust Measures for e-Commerce: An Integrative Typology," *Information Systems Research* (13:3), 2002, 334-359.
- Overby, C. S., Chaskey, K., and Delhagen, K. (2003, March 19). Make Over Beauty Sites To Reach Cosmetics Buyers. Retrieved February 1, 2006 from Forrester database.

- Reeves, B. and Nass, C. (1996). *The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places*. CLSI Publication, Stanford, CA.
- Ringle, C. M., Wende, S., & Will, S. (2005). SmartPLS 2.0 (M3) Beta. Available at: <http://www.smartpls.de>.
- Rousseau, D.M., Sitkin, S.B., Burt, R.S., and Camerer, C. (1998). Not so Different After All: A Cross-discipline View of Trust. *Academy of Management Review* (23:3), 393-404.
- Searle, J. R. (1979). *Expression and Meaning*, New York, NY: Cambridge University Press.
- Sinha, R. and Swearingen, K. (2002). The Role of Transparency in Recommender Systems. *Paper presented at the ACM CHI 02 Conference on Human Factors in Computing Systems, Minneapolis, Minnesota*.
- Van der Heijden, H. (2004). User Acceptance of Hedonic Information Systems. *MIS Quarterly* (28:4), 695-704.
- Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research* (11:4), 342-365.
- Wang, W. and Benbasat, I. (2005). Trust in and Adoption of Online Recommendation Agents. *Journal of the Association for Information Systems* (6:3), 72-101.
- Wang, W., and Benbasat, I. (2007). Impact of Explanations on Trust in and Adoption of Online Recommendation Agents. *Journal of Management Information Systems* (23:4), 217-246.
- Xiao, B. and Benbasat, I. (2007). Consumer Decision Support Systems for E-Commerce: Design and Adoption of Product Recommendation Agents. *MIS Quarterly* (31:1), 317-209.

## Appendix A: Measurement Instrument

Construct	Item	Loading
Expressiveness (Cronbach's alpha = 0.95)	1. The Shopping Assistant makes its feelings known to the customer.	0.94
	2. The Shopping Assistant expresses emotions.	0.92
	3. I felt a sense of openness on the part of the Shopping Assistant.	0.90
	4. In general, the Shopping Assistant is expressive.	0.95
Transparency (Cronbach's alpha = 0.94)	1. The Shopping Assistant explains why it asks each question.	0.91
	2. The Shopping Assistant describes how responses would be used and processed.	0.91
	3. The Shopping Assistant outlines how it would produce recommendations.	0.83
	4. The Shopping Assistant clarifies what is being done at each stage.	0.93
	5. In general, the inner workings of the Shopping Assistant are made known to the customer.	0.88
Enjoyment (Cronbach's alpha = 0.93)	1. The interaction with the Shopping Assistant was enjoyable	0.94
	2. The interaction with the Shopping Assistant was exciting	0.85
	3. The interaction with the Shopping Assistant was pleasant	0.91
	4. The interaction with the Shopping Assistant was interesting	0.92
Benevolence (Cronbach's alpha = 0.88)	1. The Shopping Assistant seemed to act in the best interest of the customer.	0.88
	2. If help is required, the Shopping Assistant seemed willing to do its best to help the customer.	0.90
	3. The Shopping Assistant seemed interested in the well-being of the customer.	0.92
Integrity (Cronbach's alpha = 0.94)	1. The Shopping Assistant seemed truthful in its dealings with the customer.	0.94
	2. The Shopping Assistant seemed like it would keep its commitments.	0.94
	3. The Shopping Assistant appeared to be honest.	0.94
	4. The Shopping Assistant seemed sincere and genuine.	0.89
Competence	1. The Shopping Assistant was effective in its role.	0.93

(Cronbach's alpha = 0.95)	2. The Shopping Assistant performed its role well.	0.95
	3. The Shopping Assistant was proficient.	0.96
	4. The Shopping Assistant was knowledgeable.	0.93
Reuse (Cronbach's alpha = 0.96)	1. I would consider using the Shopping Assistant for similar future purchases.	0.92
	2. I would be willing to let the Shopping Assistant assist me in deciding which product(s) to buy.	0.95
	3. I have no desire to use the Shopping Assistant again in the future.	0.96
	4. It is very likely that I would use this Shopping Assistant again in the future.	0.93