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Users' Interdependence with Online Virtual Advisors: Antecedents and Consequences

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ABSTRACT

Anchored in the view that users' interaction with IT artifacts as social and interpersonal, this study introduces, defines, and examines the effects and consequences of *perceived interdependence*. This relational variable captures users' perceptions of how they and the artifact influence each other's experiences. The results of an experimental study reveal that users' perceptions of their interdependence with a virtual advisor affect their intentions to reuse it as well as their willingness to disclose personal information to it. To understand how perceptions of interdependence can be cued via the advisor's design, the study examines and supports the significant effects of the design-based construct of rapport on perceived interdependence. Perceived rapport, a multi-dimensional belief, is cued through the use of explanations and expressive speech acts.

Keywords

IT adoption, information privacy, technology dependence.

INTRODUCTION

The view of users' interactions with information technology (IT) artifacts as social and interpersonal in nature has garnered broad support in the last decade. Anchored in the Computers are Social Actors (CASA) paradigm (Reeves and Nass, 1996), a plethora of studies have proposed and corroborated that users of IT artifacts view their interactions with them as social and interpersonal, and therefore, tend to subscribe social and relational characteristics to these artifacts. More interestingly, the dynamics of their interaction with IT artifacts have been proposed and observed to be similar to those that are interpersonal in nature (Al-Natour and Benbasat, 2009). Yet, past research has almost solely focused on beliefs that address the inherent characteristics of the IT artifact (interaction partner), and for the large part ignored beliefs that address the characteristics of the IT artifact in its capacity as an interaction partner, or those addressing characteristics of the interactions itself, or how users perceive their relationship with the artifact.

This study addresses this gap. Specifically, it proposes that if user-IT artifact interactions are social and interpersonal in nature, then perceptions users form about

the characteristics of an IT artifact will affect their perceptions of the relationship with it. This in part affects their intentions to maintain that relationship or sever it, as well as how they behave during that relationship.

In this study we test these propositions. Specifically we examine the antecedents and consequences of perceived interdependence; a belief about the relationship between the user and the IT artifact, which we posit is affected by the artifact's perceived characteristics. Interdependence subsequently affects users' intentions to reuse the artifact and how they behave when doing so, specifically their intentions to disclose personal information to it.

LITERATURE REVIEW

The Acquaintance Process

It is not surprising that given their multi-decade research history, *relationships* have been studied through a variety of theoretical lenses. In its most general sense, social exchange theory posits that all relationships are formed by the use of a subjective cost-benefit analysis and the comparison of alternatives (Thibaut and Kelley, 1959). This cost-benefit analysis constitutes the main rule governing the exchange of resources between two or more individuals over the course of one or more transactions. Social penetration theory focuses on information as the main resource being exchanged in relationships. It posits that closeness in relationships develops through a gradual process of exchanging this resource through self-disclosure (Altman and Taylor, 1973). These self-disclosures proceed in an orderly fashion from superficial to intimate levels of exchange as a function of both immediate and forecast outcomes. As such, self-disclosures deepen relationships, and the willingness to disclose is a marker of relational satisfaction.

One of the most significant criticisms directed at social exchange theory is that it reduces human interaction to a purely rational process (Miller, 2005). More than an evaluation of rewards and costs, the decision to interact with someone involves an assessment of the characteristics of both interaction partners, as well as the context in which these interactions occur.

In this study, we adopt these two perspectives. We affirm that a user's relationship with an IT artifact is in essence

anchored in that user's evaluations of the benefits and costs of using that system. Yet, we further propose that because a user's relationship with an IT artifact is social and interpersonal in nature, relational beliefs are instrumental in affecting the progression of that relationship as well as how the user behaves in it.

RESEARCH MODEL AND HYPOTHESES

The research model is shown in Figure 1. The model investigates the antecedents and consequences to customers' perceptions of their relational interdependence with an online virtual advisor. When serving as recommender systems, online virtual advisors elicit information to help narrow down the product search in the form of a series of questions. These questions can range from asking about how the product will be used, to more detailed questions about desired product attributes, customers' demographics and/or preferences. This difference information type creates variance in the intimacy levels of elicited customer self-disclosures, which depending on the product context, could differently help deepen the perceived relationship with the advisor, and affect customers' willingness to maintain it.

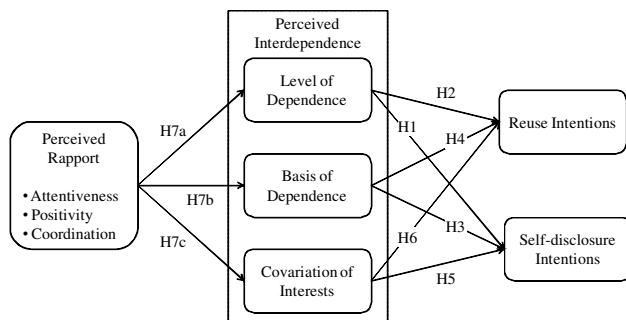


Figure 1. Research Model

The model further proposes that perceptions of relational interdependence are affected by the characteristics of the advisor, specifically perceptions of the level of rapport with it. These object-based beliefs are subsequently cued by the design characteristics of the advisor.

Perceived Interdependence: Consequences

Interdependence concerns the extent to which two interacting entities influence one another's experiences (Rusbult and Van Lange, 1996). It can be further decomposed to four component addressing: 1) the level of dependence: the degree to which an individual relies on an interaction partner, in so much as his/her outcomes are influenced by the partner's actions, 2) the mutuality of dependence: the extent to which two people are equally dependent on one another, 3) the basis of dependence: the way partners affect one another's outcomes, i.e., whether outcomes are controlled by the partner's actions or joint action, and 4) the covariation of interests: the degree to which partners' interests correspond (Rusbult and Van Lange, 2003). Variation in any of these components can

affect the extent to which the relationship between interacting partners is said to be interdependent.

In their interaction, the customer has a certain level of dependence on the advisor. Essentially, as with all dependence situations, the customer is "relying" or "needing" the advisor, and her self-disclosures make her vulnerable. On the other hand, the advisor depends on the customer to provide the solicited information, and answer truthfully so it can accomplish its objectives of assisting the customer. Hence, these two entities are involved in an interdependent relationship that could be described in terms of some of the components listed above.

A customer perceived *level* of dependence on a virtual advisor is based on her belief in the extent to which she is reliant on the virtual advisor to produce the desired outcomes of their interaction, such as, the extent to which the benefits and costs of disclosures are manifested, and the nature of these benefits and costs. To what degree the customer believes that these outcomes will be obtained through joint or unilateral action will determine the customer's perceptions in regards to the *basis* of that dependence. Alternatively, the degree to which the customer believes that her goals and those of the advisor's are congruent will form the basis for her perceptions of the covariation of interest in that dependence relationship.

In general, higher levels of *interdependence* have been shown to increase the willingness to maintain an ongoing relationship and enhance it via additional self-disclosures. When self-disclosing, individuals make themselves susceptible to a number of vulnerabilities, which are reduced to the extent that dependence is rendered mutual (Rusbult and Van Lange, 2003). When interests covary, the benefits to be gained from opportunistic behavior based on exploitation of another's self-disclosures are minimized, and self-disclosures can act to solidify the "us" stance. Therefore, covariation of interests acts to encourage self-disclosures. When the dependence is characterized by joint action, then the threat of retaliation and non-cooperation becomes a deterrent for the exploitation of self-disclosures and as a result, self-disclosures are expected to increase. Hence, self-disclosure is expected to be more prevalent in interdependent relationships categorized by joint control versus unilateral basis of dependence. Finally, when the level of dependence is reduced so that the advisor actions have minimal effects on the outcomes of the interaction, self-disclosures become less risky and exploitation less probable. In other words, reduced partner control also reduces the vulnerability resulting from additional self-disclosures, and thus, does not inhibit them.

The effects of interdependence on self-disclosure can also be analyzed within the context of power. Dependence and power are inextricably related and enjoy an inversely proportional relationship; more dependence (and hence, lower *interdependence*) on another makes the other more powerful in the relationship. In the absence of any differences in status, perceptions of another's power

reduce the willingness to maintain a relationship where one feels weaker, and as a result reduce one's willingness to self-disclose (Cozby, 1973). It could be that disclosures to powerful others are perceived to deepen the already present level of vulnerability, and/or less powerful disclosers have little ability to sanction more powerful disclosure recipients when they exploit it. Following, we propose that increased levels of *interdependence*, and thus decreased levels of the customer's dependence on the advisor, will encourage self-disclosures. These perceptions of higher interdependence are driven by perceptions of reduced levels of dependence, increased perceptions of joint action, and mutuality of interests.

H1: Perceived level of dependence influences self-disclosure intentions, where reduced perceptions of the level of dependence increase the intentions to self-disclose to the advisor.

H2: Perceived level of dependence influences reuse intentions, where reduced perceptions of the level of dependence increase the intentions to reuse the advisor.

H3: Perceived basis of dependence influences self-disclosure intentions, where reduced perceptions of unilateral action increase the intentions to self-disclose to the advisor.

H4: Perceived basis of dependence influences reuse intentions, where reduced perceptions of unilateral action increase the intentions to reuse the advisor.

H5: Perceived covariation of interest influences self-disclosure intentions, where increased perceptions of covaried interests increase the intentions to self-disclose to the advisor.

H6: Perceived covariation of interest influences the reuse intentions, where increased perceptions of covaried interests increase the intentions to reuse the advisor.

Perceived Interdependence: Antecedents

The antecedents of relational interdependence have garnered significant research attention. In this body of work, perceived interdependence has been connected to perceived rapport. Most definitions of rapport include in their descriptions the feeling of being "in sync" with the interaction partner. For instance, Tickle-Degnen and Rosenthal (1990) suggest that people experience rapport when they "click" with each other or feel the good interaction is due to "chemistry" (p. 286).

In this study, we adopt Tickle-Degnen and Rosenthal's (1990) conceptualization of the rapport construct. They propose that perceived rapport has the three interrelating dimensions of: 1) *attentiveness*, which refers to feelings of attention, focus, and involvement, 2) *positivity*, which refers to feelings of friendliness, warmth, and caring, and 3) *coordination*, which refers feelings of balance and harmony. As such, we define it as the customer's perception of being in-sync with the advisor, and of the

degree to which her interaction with the advisor is marked by harmony, conformity, and positivity.

Despite the conceptual suppleness with which the rapport construct has been dealt, it has in one form or another been linked to a variety of consequences and antecedents. In this study, we propose that perceived rapport has indirect positive effects on customers' self-disclosure and reuse intentions; in so much as it affects perceptions of relationship interdependence. Specifically, while coordination acts as an indication of mutuality, it also entails the view that the interaction is harmonious and balanced, and thus serves to emphasize that both interests covary. As such, the extent to which covariation of interest manifests in higher interdependence will depend partially on how the behaviors of those involved are coordinated. This relationship between coordination and interdependence has been discussed in detail in Rusbult and Van Lange (1996). They suggest that when interests covary, interdependence "entail coordinating in such a manner as to enjoy the good outcomes that are readily available to the pair." (p. 352)

The other dimensions of rapport can have additional effects on interdependence. Perceived attentiveness for example, acts as an indication that the advisor cares, and is motivated to assist, the customer. As such, it enhances perceptions of covariation of interests as well as strengthening perceptions that the customer matters in this exchange, and hence, perceptions of joint action. Perceived positivity of the advisor can help to reduce perceptions of dominance and power exertion in this relationship, and therefore can facilitate perceptions of reduced level of dependence and covaried interests.

H7a: Perceived rapport negatively influences perceptions of level of dependence.

H7b: Perceived rapport negatively influences perceptions of unilateral action basis of dependence.

H7c: Perceived rapport positively influences perceptions of covariation of interests.

The Role of Design Characteristics

Explanations: Explanation facilities are a critical component of knowledge-based systems. In the context of online virtual advisors, "why" explanations are used to provide justification for asking a question and recommendation made. Alternatively, "how" explanations describe the line of reasoning used by the advisor and outline the logical processes involved in reaching final recommendations (Wang and Benbasat, 2007).

In this study, we propose that the use of why and how explanations will affect the dimensions of rapport previously described. Specifically, in justifying why certain information is solicited, the advisor is following proper communicative rules, and as a result is likely to be perceived as positive and friendly. In describing how the provided information will be used, the advisor is

showcasing its concern for the customer and his/her needs, and thus is likely to be perceived as attentive. In providing pertinent information when they are needed, the interaction with the advisor will be perceived as harmonious and well-coordinated.

Speech Acts: Speech act theory postulates that to communicate is to perform an act, such as stating facts, making requests, or issuing orders (Searle, 1979). Of their many types, expressive speech acts are the ones used to express a personal feeling (Searle, 1969).

In this study, we propose that expressive speech acts, which are used to express a certain psychological state by the speaker of the message, can be used by the advisor to manifest understanding and care, and thus, increasing perceptions of the advisor's attentiveness and positivity. Because expressive speech acts address the concerns of the customer, they also act to increase perceptions that the communication with the advisor is well-coordinated.

RESEARCH METHOD

A between-subjects fully-factorial experiment with three factors and eight treatment conditions was used. The eight advisors differed in whether they used why explanations (first factor), how explanations (second factor) and expressive speech acts (third factor). Participants were randomly assigned to one of the experimental groups.

Experimental Task and Sample

Subjects were 195 females who were invited to interact with an online virtual advisor designed to help customers choose skin care products. The study was conducted online using participants recruited from an e-commerce panel maintained by an Internet market research company. The main objective of the experimental task was for subjects to familiarize themselves with the virtual advisor. During the task, the virtual advisor asked the subjects a series of multiple-choice questions that are used to determine a customer's skin care needs, and subsequently recommend personalized products. The questions varied in their intimacy level, ranging from asking about demographics, to asking about sensitive habits and health conditions.

After the shopping task, participants evaluated the virtual advisor and indicate their willingness to reuse it, and disclose the elicited information if they do so.

Measures

All constructs used in this study were measured using multi-item scales. New scales were developed to measure the three sub-dimensions of rapport and the three dimensions of interdependence consistent with their definitions. The intentions to reuse was measured using an established scale adapted from Al-Natour et al. (2011).

The intention to self-disclose was captured separately for different types of information. Specifically, based on

Morton's (1978) different types of self-disclosures, and the categories of the types of information solicited in e-commerce settings, we asked for the intentions to disclose: 1) Demographical information (e.g., gender, age, ethnicity), 2) Information about general habits (e.g., exercise, travel, face washing, make-up use), 3) Information about sensitive habits (e.g., sexual activity, smoking, use of birth control), 4) Information about skin care needs (e.g., skin type, areas to concentrate on), 5) Information about product preferences (e.g., favorite smells, skin goals), 6) Health information (e.g., changes you are going through, allergies, chronic conditions, prescription drugs), 7) Opinions on non-sensitive topics (e.g., concern for the environment, animal testing, preference for natural remedies), and 8) Opinions on non-sensitive topics (e.g., preference for natural remedies).

RESULTS

Measurement Model and Manipulation Checks

Factor and reliability analyses were conducted using the Statistical Package for the Social Sciences (SPSS). All scales showed a high level of reliability, and item loadings exceeded the recommended minimum of 0.70.

To check whether there were any differences between subsets of the treatment conditions, we performed three ANOVAs to test for the effects of the treatments on the three sub-dimensions of rapport. This analysis uncovered that the use of how explanation had significant and negative effects on customers' perceptions of the level of dependence and unilateral action (i.e., reduced perceptions that the advisor is solely in control of outcomes), and a positive effect on perceptions that the interests of the user and the advisor covary. The use of why explanations only had an effect on enhancing perceptions of covaried interests. The use of expressive speech acts reduced perceptions of unilateral action and enhanced those of covaried interests. The results did not reveal any significant two-way or three-way interactions.

Structural Model Results

To test our hypotheses, we analyzed a structural model using Partial Least Squares (PLS). In the analyzed model, rapport was treated as second-order formative constructs, where the mean scores of its respective sub-dimensions were treated as formative indicators. The three sub-dimensions of interdependence were treated as separate constructs, given that the focus of the study is to examine their independent effects. The intention to self-disclose construct was modeled as a second-order construct, reflected by the mean scores of the intentions to self-disclose the eight different types of information.

The results of the structural model, including standardized path coefficients and the corresponding significant values are depicted in Figure 2. The weights of the formative indicators on the rapport second-order constructs are also shown with their corresponding significance values.

Contrary to hypothesis 1, perceived level of dependence had no significant effect on the intentions to disclose the information solicited. Yet, the same variable had a significant and negative effect on the intentions to reuse. Hence, while hypothesis 1 is rejected, hypothesis 2 is supported. Consistent with our propositions, perceptions of unilateral action (basis of dependence) exerted negative effects on the two types of intentions. Hence, hypotheses 3 and 4 are both supported. Similarly, lending support to hypotheses 5 and 6, the results revealed that perceptions of covariation of interest exerted positive and relatively large effects on the intentions to disclose and reuse. Jointly, the three dimensions of interdependence explained 31% of the variance in reuse intentions and 20% in the intentions to self-disclose construct.

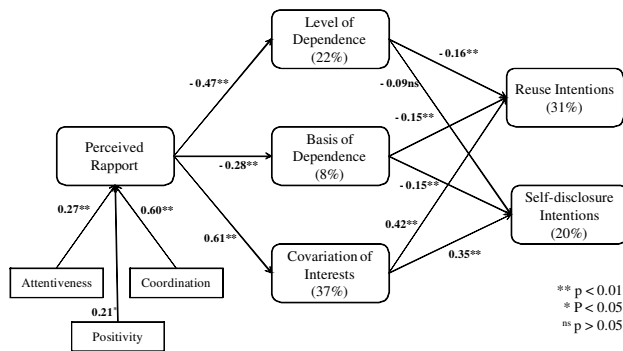


Figure 2. Research Model

The results indicated that while all three of the rapport sub-dimensions contributed to the effects of the overall second-order construct on the three dimensions of interdependence, their effects varied largely. Perceived coordination had the highest weight followed by attentiveness. Overall, the rapport exerted significant and negative effects on the level of dependence and unilateral basis of dependence, and a positive effect on covariation of interests. Therefore, hypotheses 7a, b and c are all supported. Rapport's ability to explain the variance in the three dimensions of interdependence varied significantly, and ranged from 8% to 37% of variance explained.

DISCUSSION

The results from the experimental study provide general support for the proposed model of the antecedents and consequences of the relational interdependence a customer feels with an online virtual advisor. The three dimensions of interdependence derived from the literature showed notable aptitude to predict the intentions to reuse and disclose to a virtual advisor. The larger effects of the covariation of interests dimension can be attributed to the goal-oriented nature of the shopping task. The more modest effects of the two other dimensions could be explained by the fact that the strength with which these relationship beliefs are held is positively correlated to the length and depth of the relationship. As proposed by Al-

Natour and Benbasat (2009), the saliency and effects of these beliefs increase as the relationship progresses and those involved have the knowledge-base from within the relationship to hold these beliefs with maximum confidence. In other words, with more interactions, users will have the basis to evaluate their relationship with the advisor more accurately, and as a result, will move away from focusing on the outcomes of a single interaction.

The relatively larger contribution of perceived coordination to the overall effects of rapport could be attributed to the relative complexity of the task and product class. In such a setting, increased understanding facilitated by enhanced coordination was understandably more salient and important. The low variance explained in the perceived basis of dependence construct highlight the need for further research to identify and examine further design-based antecedents to that construct.

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