AFFECT TOWARD COMPUTERS WHO COERCE IN SOCIAL EXCHANGE

by

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(Under the Direction of Dawn T. Robinson)

ABSTRACT

How does interaction, specifically coercive interaction, with computer or human actors change one's affective perception of them? "Computers Are Social Actors" (CASA) research posits that people interact with computers socially and examines how people interact with one computer differently from another, not how the interactions could differ between computers and humans. Social exchange theory suggests how coercive behaviors alter affective perceptions of exchange partners, and affect control theory predicts how perceptions of actors who coerce differ based on their computer or human identity and the observer's gender. I conducted an experiment modeled on a previous study by Molm in coercive, reciprocal social exchange. I modified and extended this study by examining how exchange partner's strategy (coercive or non-coercive), partner's identity (human or computer), and subject's gender influenced the subject's affective perception of her partner. The results supported CASA literature with computer and human identities not differing in perceived affect.

INDEX WORDS: Social Exchange, Affect Control Theory, CASA, Human-Computer Interaction, Affect, Coercion, Punishment Power, Reciprocal Exchange, Gender

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CHAPTER 1

INTRODUCTION

As interactions with computers become more commonplace, sociologists will desire a deeper understanding of the ways in which people perceive and interact with computers. Personal computers are found in many American homes and most businesses, and integrated computer systems are pervasive in mobile phones, automatic teller machines, automobiles, portable music devices, digital cameras, and entertainment systems. Because many of these are computer devices people interact with or through, these interactions are of interest to the social science researchers. "Computers Are Social Actors" (CASA) research, which was established in the disciplines of communication and psychology, suggests that people treat and interact with computers in fundamentally social ways (Nass et al. 1994; Reeves and Nass 1996). CASA shows that the psychological processes that humans use when engaging with other humans also apply to computers. Yet, it fails to specify how interactions may differ between humans and computers, which suggest an untapped sociological research question: How do people interact with computers similarly or differently than they interact with humans? Or does human versus computer identity moderate interactions and interaction outcomes?

To compare human-human versus human-computer interaction, I will focus on one type of interaction: coercion, defined as exercising the ability to punish, or force a loss of some valued resource upon another actor in order to change his or her behavior (Molm 1997). Coercion is powerful type of interaction that can produce strong affective responses (Molm 1997), and computers will be in increasingly powerful positions in the future (Brooks 2002; Fogg 2003; Kurzweil 2005). Computers coercing might include websites that require one to buy something before giving access to "free" information (Fogg 2003), commercial software packages that allow conversion from, but not to competitors' file formats, and antivirus software that identifies threats to your property but will not remove them without purchasing their product. Coercion, then, is the focus of this study, with the intention of discussing the results of this study as they might broadly inform comparisons of human-computer and human-human interaction.

A difficulty in studying the difference between human-computer and human-human interaction is the potential confounding effects of interaction modalities. Human-computer interactions often use input/output devices such as keyboard, mice, printers, speakers, monitors, microphones and differences between computers could include the size and resolution of the screen, quality of the speakers and software usability. Human-human interaction often includes small groups, spoken or written natural language, and differing social characteristics such as gender, age, race, and physical appearance. These differences necessitate a paradigm that can control for them, allowing for an unbiased and robust comparison. Social exchange theorists, traditionally interested in studying social structure without the confounding effects of status characteristics, often use experiments with subject interaction via computers. I used this social exchange paradigm to provide a common framework for making comparisons between human-computer and human-human interaction preventing the specific differences among computers or among people to confound the interactions. Therefore, conclusions about the differences and similarities of people's interactions with humans and computers can be applied broadly, and provide a baseline for future work that may include comparisons of specific types of humans and computers.

CHAPTER 2

LITERATURE REVIEW

Human interaction with computers has become a commonplace occurrence in postindustrial societies, yet this interaction is continually changing as computers are becoming more abundant, powerful, and pervasive. Leading futurist Ray Kurzweil writes, “Computers started out as large, remote machines in air-conditioned rooms tended by white-coated technicians. They moved onto our desks, then under our arms, and now into our pockets. Soon, we’ll routinely put them inside our bodies and brains” (2005). Another change is that computers continue to invade the realm of human-only tasks. Robot designer and theorist Hans Moravec writes, “Seeds long ago alleged barren are suddenly sprouting. Machines read text, recognize speech, even translate languages. Robots drive cross-country, crawl across Mars, and trundle down office corridors. In 1996 a theorem-proving program called EQP running five weeks on a 50 MIPS computer at Argonne National Laboratory found a proof of a boolean algebra conjecture by Herbert Robbins that had eluded mathematicians for sixty years” (1998).

Of particular interest to sociologists, organizational scientists, and communication researchers is how in recent years computers have become the actors representing organizations. For example, in the airline industry people book flights on the web to avoid the surcharge for booking with a human representative and passengers check in at computerized kiosks that were widely distributed in airports in 2005 (Kidwell 2007). In telecommunications, simplistic answering machines and voice mail systems have been supplanted with Computer Supported Telecommunications Applications, for which complete web-based standards were agreed upon in 2003 (Ecma International 2003). Some organizations communicate with customers almost exclusively through websites including eBay.com which had sold merchandise grossing over 52 billion dollars by 2006 (eBay 2007). Not only do computer systems represent organizations, but they mediate communications between people and make important decisions that affect people's lives and well-being. Routinely, individuals interact with computers in ways that exceed the relationship between a person and a tool, including being persuaded by computers (Fogg 2003), having emotional responses to computers (Ferdig and Mishra 2004; Troyer 2004), developing trust for computers (Madsen and Gregor 2000), and rewarding and punishing computers (Bartneck et al. 2006).

According to CASA literature the reason for these types of interaction is that people respond to computers in fundamentally social ways. Experiments in the CASA tradition show that people prefer to be matched with a computer similar in personality, either dominant or submissive (Nass et al. 1995; Reeves and Nass 1996), that people are polite to computers, that people can assign computers gender and then gender stereotype them, and that people reciprocate more to computers that have helped them (Reeves and Nass 1996). These results hold up experimentally with only minimal cues from the computer. It is not necessary to have animation, a graphical interface, natural language processing, or artificial intelligence systems (Nass et al. 1995). The causal explanation given by Nass and his colleagues is that humans tend to process information socially when possible, mindlessly using social categories, rules, stereotypes, and expectations (Nass and Moon 2000). Analogous to cognitive heuristics, humans minimize mentally expensive operations through automaticity unless compelled to engage in a more thorough analysis.

CASA demonstrates that humans interact with computers socially, but interacting socially does not mean all the processes are identical to human-human interaction. What are the fundamental similarities and differences between human-human and human-computer interaction? The research within the CASA framework has taken well-known psychological experiments and replaced all the humans, except for the subject, with computers. For Nass and colleagues' dominant/submissive experiment, instead of subjects interacting with a dominant or submission person, they would interact with a dominant or submissive computer (1995). This experiment was a 2 x 2 factorial design crossing dominance of subjects with dominance of computers (as determined by interaction style), yet they did not add a third factor manipulating human or computer interaction partner. Research on the differences between human-human and human-computer interaction remains largely untapped as human-computer interaction research in general, and CASA specifically, is rooted in computer science, psychology, and communications. A social psychological perspective provides the theoretical and empirical tools to test how cultural differences between computers and humans moderates the psychological processes found to operate in interactions with both humans and computers.

The main argument of CASA and a fundamental assumption of this research is that people interact with computers in a social manner. Because most social psychological theories of interaction have the implicit assumption that the actors in the interaction are human, the CASA argument is a necessary assumption to logically extend the scope conditions of both affect control theory and social exchange theory. Next, I will introduce these theories, their scopes, their literature related to coercion and computers, their proposed experimental use, and hypotheses that are developed from each.

CHAPTER 3

SOCIAL EXCHANGE THEORY

Social exchange theory posits that when people interact they often exchange social, economic, or cultural capital and resources including favors, friendship, money, network references, and esteem (for an overview see Cook and Rice 2003). Exchange theory is based on the work of Emerson's power-dependence relations (1962) and therefore has its origins in the power of exchange partners (Cook and Emerson 1979). In this tradition, power is conceived as a property of the relation, not of individuals, and is based on the dependence of one actor upon another. This allows for one person to have a power over a second, while simultaneously not have power over a third. Exchange theory has been used to study power (Cook and Emerson 1979; Emerson 1962; Molm 1997), equity (Cook and Emerson 1979), norms (Cook 2005), trust and trustworthiness (Cook 2005; Gerbasi and Cook 2007), and emotion and affect (Balkwell Forthcoming; Gerbasi and Cook 2007; Lawler and Yoon 1993; Molm Forthcoming). Many studies have looked at power as a result of structure (see Cook et al. 1983 for a seminal study of structure and exchange), and others have looked at power as a result of strategies of exchange (Molm 1994, 1997; Molm et al. 1993).

One assumption of exchange theory is that all actors are rational and attempt to maximize their reward, although recent developments suggest that affective responses may be significant in exchange behavior and attributions (Lawler 2001; Lawler and Yoon 1993; Molm 1991). An affect theory of social exchange suggests that global emotions are produced during interactions and that these are then attributed to some social element of the exchange situation (Lawler 2001). While this research suggests affect influences behavior and sentiments, it does not discount the rationality. Some rationality research assumes that the cognitive mechanisms involved are anticipation of future interactions (i.e., forward looking), while others believe it is reinforced learning (i.e., backward looking) (Homans 1974; Macy 1993). If people are anticipating future interactions rationally, they may be more likely to change their behavior when interacting with computers. People may anticipate computers having a stable strategy, because most personal computers people encounter are predictable in their responses. This forward-looking rationality may also mitigate people's automaticity when interacting with the computer if they assume the proper way to interact with a computer is rationally, not relationally. In contrast, if people engage in reinforced learning they will be less concerned about predicting the future strategy, and therefore be less concerned with the identity of the partner enacting that strategy. Instead, looking backwards during exchange will show a reinforcement history of exchanges, and rational reactions can be determined based on those results. In this case the *identity* of the partner should not be as important as the partner's *behavior*. Following Molm (1997), I will assume that actors are being reinforced by their learning.

If the social exchange process is rational, then the affective evaluation of one's exchange partners may be rational as well. This rationality could undermine the automatic interactions with computers (Nass and Moon 2000), yet it is possible that one could act rationally in the process of social exchange but have automatic responses in perceiving their exchange partners. Affect theory of social exchange suggests that emotion may drive social exchange with global or basic emotions being attributed to specific components of the exchange process including the exchange partners (Lawler 2001). This further suggests the salience of emotion in the exchange process would lead to affective perceptions of exchange partners in an automatistic fashion consistent with CASA literature. Cognitively, most people know a computer comprises silicon circuit boards and wires through which electricity flows, but when losing/gaining valued resources in exchange rounds, it is likely one will process the computers and its behavior automatically.

Despite recent research among exchange theorists in emotion (Lawler 2001), trust (Molm et al. 2000), satisfaction (Molm 1991), and commitment (Lawler and Yoon 1996), social exchange theory is still primarily a theory of structure, behavior, and power. As such it has developed structural manipulations, measurements for both behavioral responses and power-dependence, but does not have measures of affect. For that I turn to affect control theory.

CHAPTER 4

AFFECT CONTROL THEORY

Affect control theory (Heise 1977, 1979; Smith-Lovin and Heise 1988) is a theory of structural symbolic interactionism in which actors define situational meaning and affect through cultural sentiments, emotional states, and interaction. Inconsistency between the experienced interaction and cultural meanings is called deflection, and is signaled by emotional response. ACT is a cybernetic control theory where departures from equilibrium, i.e., deflection, lead to efforts to restore that equilibrium (see Robinson 2007). Individuals try to reduce deflection to maintain a stable meaning in a situation by adjusting their perceptions of the situation or engaging in stabilizing behaviors. ACT is mathematically stated, both on a cultural scale with aggregated codifications of the semantic meanings of words and on a contextual scale with equations that predict the transient impressions created via specific interactions (for an introduction to ACT see Heise 2007; MacKinnon 1994; Robinson and Smith-Lovin 2006).

The specific interaction syntax modeled by affect control theory is of the form: Actor Behavior Object (ABO). For example, *teacher punishes student* or *student rewards student* would each be a valid syntax to define a given event, which is a single directed interaction. Each actor, behavior, and object has three different dimensions of affective meaning on which it can be differentiated: evaluation, potency, and activity (Osgood et al. 1975; Osgood et al. 1957). These three dimensions were found to cross-culturally differentiate meanings in concepts. Evaluation ranges over a moral continuum (i.e., bad to good); potency ranges over a power continuum (i.e., powerless to powerful); and activity ranges over an action continuum (i.e., calm to lively). Individuals can rate specific words on these three dimensions using semantic differential scales, with one set of concepts on one end of the scale and an opposite set on the other end with instructions for raters to select where the word of interest falls in relation to the concept bookends (Heise 1970). For example, the evaluation scale has “good, nice” at one end and “bad, awful” at the other. If someone were rating “teacher” on it, she would decide how much each set of concepts fits a teacher in general and select the corresponding place on the scale. The scales are coded from -4 to +4 with 0 being a neutral sentiment. The average ratings of words in a culture have been collected using a sample of respondents from that culture. Therefore the affective meanings of actors, behaviors, and objects used in ACT reflect the general impression of the culture towards meanings of words, and collectively are referred to as an ACT dictionary.

The values for evaluation, potency, and activity are referred to as EPA, and shown as three values. For example, the word “teacher” had an EPA of [2.45, 1.75, 0.29][1], meaning in American culture teachers are thought of as almost extremely good (i.e., evaluation of +2.45), quite powerful (i.e., potency of +1.75) and almost neutral between quiet and lively (i.e., activity of +0.29). If a teacher has an interaction such as *teacher punishes student* then the according to the ACT equations, teacher’s EPA changes to [0.83, 1.28, 0.54]. This means that a teacher by engaging in this interaction is seen as less good, slightly less powerful, and slightly more active than before. The impression of an actor after interaction is referred as that actor’s transient impression. Transient

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[1] Brackets will be used for EPA values and differences between pairs of EPA values. Values shown are from the English Indiana 2003 ACT dictionary.

impression equations were developed by Smith-Lovin (1987) that are in this form (this is the one is for actor's evaluation):

$$A_e{}' = c_1 A_e + c_2 A_p + c_3 A_a + c_4 B_e + c_5 B_p + c_6 B_a + c_7 O_e + c_8 O_p + c_9 O_a + c_{10} A_a B_e + \ldots$$

$$\ldots + c_{28} A_p B_p O + e$$

A, *B*, and *O* refer to the actor, behavior, and object, respectively, and the subscripts *e*, *p*, and *a* refer to the evaluation, potency, and activity, respectively. The *c* values are the derived subscripts showing how components affect others in interaction. The prime refers to the new transient impression and *e* is an error term. ACT can be used to generate many types of predictions based on simulations of interactions. The transient impression equation, for example, can generate new affective meanings (i.e., EPA) for any actor, after that actor engages in a behavior toward an object, provided one has fundamental sentiments (i.e., dictionary EPA values) of the actor, behavior, and object.

Troyer suggested ACT is an effective way to model human-computer interaction by understanding that human-computer interaction is fundamentally a social situation (2004). She collected fundamental sentiments for several computer related actors, behaviors, and objects, and demonstrated how a human-computer interaction was similar in many ways to a human-human interaction. Because I am interested in human-computer versus human-human interaction, ACT provides a way to make theoretical predictions about how the transient impressions of computers and humans differ when engaging in interaction with other humans.

Although all types of words can be rated using semantic differential scales, the actors included in the ACT dictionaries are limited to primarily human identities. Using non-human identities with human-based interaction equations could be problematic if non-human actors are fundamentally perceived in different ways than human actors (i.e., the ACT equations do not hold for them). If one's impression of actors and their interactions is based on agency, then impressions of non-human actors may depend on their agency. For example if someone is hit by his friend he may attribute different affective meanings to this friend after the event, yet if someone is hit by a door blowing in the wind, he may be less likely to attribute affective sentiments to the wind or the door. Implicitly, the scope of ACT requires interactors have perceived agency. The premise of CASA is that people treat computers socially, which suggests that people attribute agency to computers. This is a necessary assumption for inclusion of non-human actors in its ACT-based interactions.

Like ACT, social exchange theory models interactions between actors, yet the model typically does not include an affective component (see Lawler 2001; Molm 1991 for exceptions). Social exchange also focuses on specific types of interaction, namely forms of exchange, of which there are fewer than the large number of potential ACT interactions. This allows ACT simulations to model affective responses, through transient impressions, for social exchange interactions. Together, these theories lead to the hypotheses about the perceived affect toward computers who coerce.

CHAPTER 5

HYPOTHESES

Exchange theory traditionally focused on how structure affected power relations (Cook et al. 1983; Emerson 1962), but more recent work looks at the role of emotions and affect produced in exchanges (Balkwell Forthcoming; Hegtvedt 1990; Lawler 2001; Molm 1991, Forthcoming). Exchange theory research rarely investigates the effect of one's partner's social category (for notable exceptions see Molm 1985, 1986), and there is no literature on computers as a social category in reciprocal exchange. Affect control theory is well suited for simulating interactions and hypothesizing about how interactions influence affective perceptions, or in ACT language, transient impressions. Affect control theory can predict different behaviors (e.g., coercion), male and female perspectives, and using an additional dictionary entry can also simulate computers as social actors (Troyer 2004). The value of using simulations in generating hypotheses is the ability to interpret complex interactions not examined in empirical studies; yet simulations are not suited to "conclusively demonstrate what people do in novel situations" (Carley 1999).

Hypotheses are typically generated either based on theoretical arguments and propositions or "grounded" in empirical studies, but rarely both, even though both are valid methods (see Lively and Powell 2006 for an example of a study that uses grounded and ACT-generated hypotheses). One way I will generate hypotheses is based on ACT simulations, which are the mathematical formulation of ACT interactions, yet they are partially grounded as well. The ACT dictionaries, like all dictionaries, are collections of cultural information subject to the culture and time of collection. They are grounded in the sense that the values come straight from empirical surveys, not derived from propositions. Though there are theoretical arguments on the relationship of affect and social exchange (Lawler 2001; Molm 1991), there are not axioms and propositions on the relation of identity and strategy to affect. Because of this, a grounded approach is necessary in social exchange in lieu of a more formal theoretical derivation. This will come from empirical studies on power (Hegtvedt 1988, 1990), coercion (Molm 1991, 1997; Molm et al. 1993) and coercion and gender (Molm 1985, 1986).

The simulations were conducted using INTERACT (Heise 2008), a program based on the affect control theory equations, using the ACT English Indiana 2003 dictionary[2]. The simulation can be conceptually divided into two parts: the theoretical and the grounded. First, the regressions were conducted on how interactions change impressions of the actors, behaviors, and objects involved and that information has been codified in equations representing non-specific interactions (Smith-Lovin 1987). Second, these equations are populated with specific EPA values of actor-behavior-object combinations and the results are specific perceptions of interactions. The actors available in the English Indiana 2003 dictionary are primarily human social identities, yet neither "human" nor "person" is included as an identity. "Student" was chosen to represent the human category because this empirical study uses students and they are fairly neutral

[2] Simulations using the values from the ACT North Carolina 1978 dictionary produced similar hypotheses except none of the gender differences were pronounced enough to make hypotheses based on gender. INTERACT was accessed at www.indiana.edu/~socpsy/ACT/interact.htm in 2008.

actors. “Computer” is not in the Indiana dictionary, so I used values collected by Troyer (2004).[3]

To hypothesize about the human/computer difference in perceptions, actors of “student” and “computer” were compared. The transient impressions were used for the actor after the following interactions: *student coerces student* and *computer coerces student*. For the non-coercive EPA values, actor’s fundamental sentiments were obtained, instead of the transient impression after an interaction, because the theoretical interest is to compare coercion and non-coercion[4]. To account for the gender differences, the fundamental sentiments and the simulations used male and female perspectives which changed the EPA values of “student” and “coerce,” but did not effect the value of “computer” as there is not gender-differentiated values for it[5]. These three binary independent variables (i.e., strategy, identity, and gender) created eight combinations of EPA values for each condition and to hypothesize about the effect of each variable independent of the others, averages across conditions were computed (Table 1). I used an arbitrary value of 0.25 as the minimum difference between categories on any affective dimension to justify proposing a hypothesis based on those differences.

Molm and colleagues measured subjects’ perceived affective sentiments of their coercive exchange partner using four 7-point semantic-differential measures: good-bad, helpful-unhelpful, nice-awful, and satisfied-dissatisfied (1993). These were combined into a single measure I call the partner’s perceived goodness. The results were somewhat

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[3] The sets of values were both collected around 2003 and from Midwestern undergraduates.

[4] Alternatively the transient impressions of the actor after the interactions *student bargains with student* and *computer bargains with student*. Using this method produced all hypotheses in the same direction as using the fundamental sentiments. The resulting EPA values are different between methods, and so I have used the fundamental sentiment because “bargain with” is not identical to non-coercive or reciprocal exchange.

[5] A comparison of gender differences between students and computer will still be possible as the values for students are different for male and female, although this biases the hypothesizing toward missing a potential interaction of gender and identity.

surprising, with the partner's perceived goodness statistically higher when the partner's ability to punish was stronger, and coercive strategies were used often (yet the values were still more negative than positive). Molm's explanation is that strong coercion used consistently is effective and predictable producing higher regard, whereas weak and unpredictable coercive behavior is ineffective producing lower regard. For the current study different power structures are not being studied, nor are consistency level of coercive strategies. Because coercive behavior always produced negative perceived goodness and decreased satisfaction toward the coercer (Molm 1991; Molm et al. 1993), coercion, compared to non-coercion, should always decrease evaluative affect. Comparison of EPA values averaged for non-coercers in all conditions, [1.36, 0.69, 0.34], with the averaged for all coercive values, [-0.72, 0.88, 0.56], shows a sizable difference in E between categories (Table 1). Thus, the literature and simulations both suggest,

***H_{1E}*: By coercing, all actors will decrease their perceived goodness.**

The above P values (i.e., 0.69 and 0.88) do not indicate a notable difference in power, yet one exchange study found that power use significantly affected perceptions of aggressiveness of the exchange partner in the structurally powerful position (Molm 1985). In another study of a one-time exchange, those who were underrewarded in spite of their own power-dependence, perceived the exchange partner as higher in power (Hegtvedt 1988). This suggests that when exchanging with a coercive partner, the underreward one receives from the punitive behavior will increase the perception that the partner does indeed have power. These studies, along with the assumption that coercive behavior is in fact a type of power (i.e., "coercive power," "punishment power strategy") (Molm 1997), suggest,

***H_{1P}*: By coercing, all actors will increase their perceived power.**

Molm measured intentionality of the exchange partner with two semantic scales: intentional-unintentional and active-passive and found statistical significance that the coercive partner was perceived as more active than a partner withholding rewards (1997, experiments 10 and 11). The specific values in Molm's experiment 10 indicate that the coercive strategy was more active than the reciprocal strategy on both semantic scales, although statistical significance was not given. Although the ACT pooled values of non-coercive and coercive (i.e., 0.34 and 0.56) show only a minimal difference, Molm's study suggests,

***H_{1A}*: By coercing, all actors will increase their perceived liveliness.**

The average perception of one's partner, both coercive and non-coercive for both males and females, is [0.66, 0.81, 1.25] for human partners, and [-0.01, 0.77, -0.13] for computers. The E and A differences suggests that,

***H_{2E}*: Computers will be perceived as less good than students.**

***H_{2A}*: Computers will be perceived as less active than students.**

Pooling over behavior and partner identity the EPA ratings for male and female actors are [0.22, 0.54, 0.28] and [0.43, 1.04, 0.84], respectively (Table 1). The differences in P and A lead to the following:

***H_{3P}*: Females will perceive all actors as more powerful than males do.**

***H_{3A}*: Females will perceive all actors as more active than males do.**

The difference between non-coercive and coercive behavior for humans is [-2.40, 0.19, 0.24] and for computers is [-1.77, 0.19, 0.64]. Comparing the E differences suggests that while all actors decrease their perceived goodness by coercing (H_{1E}),

H_{4E}: By coercing, computers will lose less perceived goodness than students.

Molm found that actual power had a stronger effect on perceived power and aggressiveness of the more powerful partner when both the subject and his or her powerful partner were of the same gender (1985). I suggest that the underlying process for distinguishing power in the gender heterogeneous group may involve attributing the power to the other gender type, yet in the homogenous group this attribution can not be made. Therefore, it will be attributed to actual structural power. A similar process may be present for groups homogenous and heterogeneous on a non-gender dimension. If this is the case, the coercers, which use more punishment power than non-coercers and are hypothesized to be perceived to have more power (H_{1P}), may be attributed to have more perceived power when they are human like than subject rather than another type of actor, such as computers. In spite of no difference found in the ACT values, this argument from the literature suggests,

H_{4P}: By coercing, computers will gain less perceived power than students.

Comparing the A differences (i.e., 0.24 for humans and 0.64 for computers) suggests that while all actors increase their activity by coercing (H_{1A}),

H_{4A}: By coercing, computers will gain more perceived activeness than students.

In structurally balanced conditions, those who use a coercive strategy should be perceived as powerful (H_{1P}). Molm's studies of gender in exchanges (Molm 1985, 1986) found that in structurally unbalanced dyads people in the less powerful position were less compliant when they were female. Engaging in less compliant behaviors (e.g., ignoring or retaliating against a coercer) will lead the coercive exchange partner to coerce more. Therefore, I expect females will be less compliant, leading to more punishment by the coercer. Each unit of additional punishment leads to a decrease in satisfaction, and this decrease is stronger than an increase caused by a unit of rewards (Molm 1991). Hegtvedt also found suggestive evidence of females experiencing more helplessness when underrewarded in an exchange (1990, footnote 10). Attribution theory suggests this negative emotion could be attributed to the self, other, situation or interaction (Hegtvedt et al. 1993), and to affect theory of social exchange (Lawler 2001) purports that positive and negative global emotions felt during exchange will be attributed situationally. Specifically, reciprocal exchange is less likely to produce attributions to the group or larger social unit but rather to the exchange partner. This suggests a further decrease in goodness when a coercer is evaluated by females, specifically,

***$H_{5E\text{-}EX}$*: By coercing, actors will lose more goodness when perceived by females, rather than males.**

Yet, the ACT difference between non-coercive and coercive behavior towards and perceived by males is [-2.93, 0.10, 0.27] and by females is [-2.24, 0.28, 0.62]. Contrary to the exchange literature ($H_{5E\text{-}EX}$) the ACT evaluation differences suggest that, while all actors perceived to be less good by coercing (H_{1E}),

***$H_{5E\text{-}ACT}$*: By coercing, actors will lose less goodness when perceived by females, rather than males.**

Comparing the A differences suggest that while all actors are perceived to be move active by coercing (H_{1A}),

***H_{5A}*: By coercing, actors will have greater increase in their activeness when perceived by females, rather than males.**

The difference between humans and computer engaging in either behavior when perceived by males is [-0.41, 0.24, -1.01] and by females is [-0.94, -0.33, -1.75]. Comparing the E difference suggests that even though computers are perceived as less good than students (H_{2E}),

H_{6E}: Computers, compared to students, will have greater decrease in their goodness when perceived by females, rather than males.

Comparing the P difference suggests,

H_{6P}: Computers, compared to students, will have a decrease in their power when perceived by females, rather than males.

Comparing the A difference suggests that even though computers are perceived as less active than students (H_{2A}),

H_{6A}: Computers compared to students will have greater decrease in their activeness when perceived by females, rather than males.

These hypotheses and the source for derivation, and their predicted directions are summarized in Table 2. Next, I detail the strategy and experiment setup used to test these hypotheses.

CHAPTER 6

METHODS

I tested the hypotheses with an experiment in reciprocal exchange modeled after previous work by Molm, Quist, and Wiseley in which each subject exchanges with two partners via a computer terminal for 100 rounds (1993). Subjects were assigned to four-actor exchange networks where they ostensibly were interacting with three other humans or three computers, based on the condition. In all conditions, the subjects were interacting with two simulated actors to manipulate strategy, and the fourth actor was hypothetical (see Figure 1). All exchanges were reciprocal and direct, meaning actors unilaterally decided to give or take away points from another and all exchange relations were reflexive. The networks were structurally balanced in power meaning each actor's rewarding and punishing capacity was equal to her exchange partners'. Finally, the network was fully, negatively connected meaning an exchange with one partner necessitated the exclusion of the alternative partner for that round.

The experiment was a 2 x 2 x 2 factorial design with subject's gender and experimental manipulations of partner's strategy (coercive or non-coercive) and partners' identity (human or computer). Subjects were university students recruited through various methods with the explicit knowledge of financial compensation that varied from $6.00 to $15.00[6]. A pre-experimental questionnaire assessed gender, age, race, academic major, and computer experience. Affect of the subject toward her exchange partner was

[6] Subjects actually earned between $6.00 and $13.40, with $6.00 guaranteed regardless of exchange outcomes.

measured with post-experimental ACT semantic differential scales for the three ACT dimensions: evaluation, potency, and activity. The questionnaire instructed the subject to rate an item (actor, behavior, or object) on how closely it matched the sets of words at each end of the scale. For example, the evaluative dimension one end read “Good, Nice” while the other end read “Bad, Awful.” Subjects rated both of their partners, themselves, and their partners’ and their own behavior on these semantic scales. Subjects also rated perceptions of justice on similar scale, but those data were not used for the current research.

The subject’s two exchange partners were simulated actors (SA), one with a constant strategy (SA_C) and the other with a modified strategy (SA_M) (see Figure 1). Both simulated actors based their strategies on the subject’s exchange (in)action on the previous round and both strategies were probabilistic to account for their hypothetical interactions with the fourth actor. The reciprocal tit-for-tat strategy included reciprocating the subject’s previous action 90% of the time. On the other 10% the SA rewarded in response to nonexchange and did not exchange in response to reward or punishment. The coercive strategy was similar in response to the subject’s reward and punishment, but on nonexchange the SA would reward 10%, not exchange 40%, and punish 50% (SA strategies are from Molm 1997, experiment 10; Molm et al. 1993) (see Table 3). SA_C always used a reciprocal strategy and SA_M used a reciprocal strategy for the non-coercive conditions and a coercive strategy for the coercive condition.

The social category of the exchange partner was manipulated by referring to partners as “Computer X” or “Student X” and displaying this on the screen, the wall, and the ACT questionnaire[7]. In the human condition, there was no mention of computer exchange partners. In the computer-exchange condition there was no mention of human exchange partners or other subjects. Both of these have high construct validity as the former was used in Molm's research and the latter is similar to the manipulations of identity in many status characteristics theory experiments. To ensure this high construct validity, there was a debriefing session where subjects were asked how they interpreted these manipulations.

[7] The four exchange actors were described using the letters W, X, Y, Z with the subject as Y, the SA_M as X, the SA_C as Z, and the hypothetical fourth actor as W.

CHAPTER 7

RESULTS

There were 112 cases in the full sample[8], but four were excluded due to subjects' misunderstanding the instructions[9] leaving 108 cases for the analyses. An additional six cases were considered for exclusion because the subjects were highly suspicious about the computer or human identity of the other actors[10]. Two points can be made about such

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[8] Eight pilot tests cases were included in the full sample because the only change made after the pilot test was adding $0.80 to the base rate for the payment. This difference was minimal considering subjects on average earned over $10.00. Also, there is no indication that pilot test subjects did not attempt to earn as much money as possible as the number of points earned on average by those in the pilot test was 406.25, compared with the rest of the subjects which earned 398.15 points on average.

[9] Misunderstanding the instructions was determined by the researcher during debriefing when either the subjects did not understand the exchange procedure and/or thought the other actors were all working together. The excluded four cases consisted of three men and one woman, two self-reported as white and two as an "other" race (see discussion of race in the text) and each had a different major from the others. The excluded cases were comparable to the remaining cases on age and computer knowledge. Of the excluded cases two were in the coercive and two in the reciprocal conditions; two were in the computer identity and two in the human identity condition.

[10] The group of six who were suspicious of the actors' identities included five who were suspicious in the computer partner condition believing they were possibly interacting with humans, not computers, and only one was in the human partner condition, believing that the interaction partner was a computer. This is fascinating in itself, because the bias found in typical social psychology experiments is the latter type (the former cannot happen in most). It is also fascinating because the five people that were suspicious of the computer identity were in fact inaccurate, while the one suspicious of not having human partners was accurate: computers were used in all conditions. Why would there be more subjects inaccurately believing they were being deceived than subjects accurately suspecting deception? Several potential answers come to mind. (1) The "social" laboratory setting was highly salient: "The Laboratory for the Study of Social Interaction" is in the sociology section of the building and includes multiple numbered rooms similar to the subject's. (2) There were highly efficient manipulations for the presences of other subjects such as research assistants opening and closing doors in the human condition and the exchange program's delay in responding after the subject made a selection in all conditions. These may have reduced standard suspicions in social psychology experiments (i.e., that people are actually computers) but increased the reverse (i.e., that computers are actually people). (3) There could be a bias for subjects toward not believing that computers are capable of social exchange or complex decision making, which would be an underestimation of the current state of artificial intelligence heuristics or the availability of that technology in the current laboratory setting. The classic test of strong artificial intelligence to "prove" that a computer is intelligence is the Turing Test (Epstein et al. 2008; Turing 1950), which uses a similar laboratory setup and suggests a subject much decide which actor connected via a computer interface is human and which is the artificial intelligence. The suspicion here is only circumstantial and not significant evidence, but it does suggest that in such a Turing Test study, there could be cultural cognitive bias against assuming computers can engage in intelligent acts.

subjects. First, the manipulations of the condition still informed them of their interaction partners' identity and gave them no reason to suspect that identity was a variable of interest in the study. Second, if they reacted differently based on identity, the results reported would be conservatively biased. These cases of highly suspicious subjects had several differences from the remaining cases[11] so I conducted analyses both with and without them. Results were generally similar so I reported results from the sample including the suspicious cases while noting significant departures in the analyses that excluded them.

The remaining sample of 108 cases included 40 males and 68 females. The sample included 74 whites, 15 Asians, 11 African Americans, and eight who marked another racial category[12]. The average age was 19.33 (sd 1.55) for the 106 subjects who selected ages 18 to 26 with two additional subjects reporting 27+. A pretest question of self reported computer knowledge was coded on a five point scale from 0 to 4 respectively corresponding to "Nothing or almost nothing," "A little," "An average amount," "Quite a bit," and "Everything or nearly everything." No one reported the extreme values, and five subjects reported "A little," 72 subjects reported "An average amount" and 31 subjects reported "Quite a bit." Women were slightly younger (19.29) than men (19.78) in this sample.

The correlations of the main variables of interest are presented in Table 4. Gender (female = 1) was significantly correlated at -0.233 with computer knowledge.

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[11] As noted in the previous footnote, five of the six cases were for the computer partner condition and one was for the human partner condition. Half were in the coercive and half into the non-coercive condition. Four of the subjects were men; two were women. The average age was lower (18.16) than the rest of the sample (19.55), but the computer knowledge was similar. Three of the subjects were white, one was black, and two were other races. The subjects all reported different majors.

[12] These included "American Indian and Alaska Native," "Native Hawaiian and Other Pacific Islander," and "Other or Interracial."

There were two significant racial correlations which were likely due to the low number of non-whites in the sample. Asians were significantly correlated with evaluative rating of the manipulated partner (E-SA_M) at -.222, but this is not surprising considering Asians in this study were more likely to be women and slightly more likely to be in the coercive condition. Also, blacks were significantly more likely to rate the manipulated partner as more powerful (P-SA_M) with a correlation of .225. Not surprisingly, there was a correlation between the manipulated actor's strategy (coercive = 1) the manipulated actor's evaluation (E-SA_M) of -.547, potency (P-SA_M) of .195 and activity (A-SA_M) of .188. This suggests that coercive actors are seen as worse, more powerful, and livelier than non-coercive actors. For the semantic ratings of the manipulated actor, activity and evaluation were negatively correlated (-.188) and activity and potency were positively correlated (.294).

The dependent variables were the EPA semantic ratings for the SA_M, and Table 5 shows their means and standard deviations parceled by the three independent variables. Preliminary analyses were conducted on the effects of age and computer experience on the DVs and because no significant effects were found, they were not included in the main analyses. An ANOVA was run for each of the dependent variables (i.e., evaluation, potency, and activity of SA_M) using all three of the first order independent variable categories (i.e., strategy, identity, gender). Strong support was found for the effects of the coercive strategy, including H_{1E}, that coercion decreases perceived goodness, ($F(1, 104) = 44.81$, $p < .001$)[13], H_{1P}, that coercion increases potency, ($F(1, 104) = 4.37$, $p < .05$), and H_{1A}, that coercion increases liveliness ($F(1, 104) = 3.43$, $p < .05$). No support was found for the hypotheses on computer identity (H_{2E} and H_{2A}).

[13] One-tailed significant tests were used for all directed hypotheses. Two-tailed tests were used otherwise.

Although there were no *a priori* hypotheses about the effect of gender on evaluation of one's partner, there was a marginally significant decrease in goodness when perceived by a woman rather than a man ($F(1, 104) = 2.88$, $p < .1$)[14]. H_{3P}, that the partner's power would increase when being perceived by women rather than men, received no empirical support. H_{3A}, that the partner's activity would increase when being perceived by women rather than men, was marginally supported ($F(1, 104) = 1.92$, $p < .1$).

Additional ANOVAs included the first order effects as well as the three possible second-order interaction effects (i.e., coercion x computer, coercion x female, computer x female). Support was not found for H_{4E} which proposed that computers who coerce have greater perceived goodness than humans who coerce, although a marginally significant effect for computer's identity having a positive effect on evaluation was found when the interaction effects are included ($F(1, 101) = 2.81$, $p < .1$)[15]. The two hypotheses for H_{5E} suggested opposite predictions, that actors who coerce have less ($H_{5E\text{-}EX}$) or greater ($H_{5E\text{-}ACT}$) goodness when perceived by women rather than men. Support was found for $H_{5E\text{-}EX}$ ($F(1, 101) = 6.99$, $p < .01$). No support was found for any of the interaction hypotheses on potency (H_{4P}, H_{6P}), activity (H_{4A}, H_{5A}, H_{6A}), or the effect of computer x female on evaluation (H_{6E}). To summarize the results, Table 7 shows the significance and direction of the results for all the hypotheses.

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[14] This marginal significance is not present when the suspicious identity cases were removed. Likely, this is due to only having 36 men left in the sample. Marginal gender effects should be interpreted extremely tentatively for this reason.

[15] This suggests that interaction effects function as a suppressor on the relationship between computer identity and evaluation. This was in the opposite direction from the hypothesized effect (H_{2E}), suggesting that computer identity has a positive affect on evaluation, but only when controlling for strategy and all three interaction effects. Because this result was only marginally significant and only present when interaction effects were included, this result should be interpreted extremely tentatively.

Coercers were perceived as less good, more powerful, and more active as hypothesized supporting previous work on coercion and affect. The identity of the partner as a human or computer did not significantly affect semantic ratings, save one tentative evaluation case. Computers who coerce were seen on average as nearly neutral (0.29), whereas humans who coerce were seen as slightly bad (-.69), but this difference in means was not significant at traditional levels.

Support was found for the influence of gender on affective ratings. Across strategies and identities, women rated partners as less good and more active than men. On a closer examination, most of this variation came from specific conditions. Men and women rated their partner in the reciprocal condition similar in goodness (2.34 for women and 2.09 for men), but women rated coercers as less good than men (-.72 for women and .89 for men). Also, women perceived a large difference in the activity of actors based on their strategy (.69 for reciprocal and 1.42 for coercive) whereas men perceived little difference (0.55 for reciprocal and 0.72 for coercive).

Because there were interaction effects of coercion x female on evaluation, additional descriptive statistics are presented in Table 6. These are graphically presented in Figure 2 which shows the relation of partner's strategy and identity, and subject's gender on evaluation. For both partner's identity and subject's gender, the reciprocal condition produced high evaluation interpreted as "quite good." Coercion decreased this goodness in all cases, but female subjects who were coerced perceive their partner as the worst. Also, coercive humans were perceived as less good than coercive computers, although this difference was not statistically significant.

The high variances for evaluation ratings (SDs ranging from 1.08 to 2.55 in Table 6) suggest that these distributions should be investigated further. Figure 3 shows histograms for evaluation by identity and strategy of the manipulated partner. For both humans and computers, reciprocal strategy produced negatively skewed evaluations (Figures 3a, 3c). When coerced, ratings of humans were more normally distributed with computer ratings resulting in a flatter distribution (Figures 3b, 3d). Both coercive histograms show that the ratings of evaluation were distributed from -4 (infinitely bad) to +4 (infinitely good) making it difficult to interpret the effect of identity on evaluation when one is coerced. Figure 4 shows histograms of how gender and partner's strategy affected evaluation. Reciprocal strategy, again, produced high evaluation with negatively skewed distributions (Figure 4a, 4c). The response to coercion by men does not reveal a clear pattern although there were slightly more positive ratings than negative (Figure 4b). This is in contrast to the clearly negative evaluation given by women who were coerced (Figure 4d).

To further elucidate why females might perceive coercers as bad in this context, I ran additional post-hoc analyses to control for the behavior. If women responded behaviorally to coercion by ignoring or punishing the coercer then the coercion would have continued; the negative evaluations may be because of the behavior led to a cycle of punishment. Women in the coercive condition were more likely to punish the coercer (7.9%, compared to coerced men, 3.9%, non-coerced women, 2%, and non-coerced men, 1.4%)[16] and less likely to reward the coercer (44.3%, compared to coerced men, 56.3%, non-coerced women, 47.5%, and non-coerced men, 47.7%). I ran ANOVAs with

[16] These percentages are the mean of times subjects in the condition engaged in that behavior out of the 100 rounds of exchange.

subject's positive and negative exchange toward SA_M included as a continuous control variable for both the first and second order models. The results indicated that gender no longer had a significant direct effect on affect in both models, but the interaction of coercion x female still had a negative effect on affect even controlling for behavior ($F(1, 100) = 2.76$, $p = .05$ controlling for positive exchange; $F(1, 100) = 5.54$, $p < 0.5$ controlling for negative exchange; $F(1, 99) = 2.73$, $p = .05$ controlling for both). This indicates that when women were coerced they rated the coercer as worse than would be predicted from either the gender or strategy effect alone, and that this effect is robust even when controlling for the women's behavioral response to the coercion.

Three-way interaction effects were added to the model containing the first- and second-order effect and were not significant, suggesting that although there was an interaction with gender and strategy, these effects did not significantly differ by identity. This is consistent with the overall lack of support for any effects of computer identity on affect, which are discussed in the next section.

CHAPTER 8

DISCUSSION

Implications for "Computers Are Social Actors"

What is the implication of no significant effects for computer identity on affect? CASA literature demonstrates that the primary mechanism for treating computers socially is automaticity (Nass and Moon 2000), suggesting that only by explicitly calling attention to the computer as a social actor would people actively analyze the computer identity. In this case, the results support CASA predictions of no difference, and suggest that affective meanings are processed automatically. This holds true even under coercive conditions, where one would be more likely to not respond automatically, but instead process the situation and make attributes of emotion to elements of the exchange as has been suggested by the affect theory of social exchange (Lawler 2001).

Implications for Computer Identity

The implications of these findings can be extended past coercive and non-coercive behavior. If human or computer identity does not make a difference in affective perception, even in a negative situation such as coercion, then this could apply to many real world negative interactions. The non-coercive results suggest that withdrawing money from an ATM or human teller, being advised by a stock program or a stock broker, and entering a building through a computer identification system or a security checkpoint booth should not differ in affective response. The coercive results suggest that this would hold even if the ATM or teller informs you of a new fee or surcharge, if the stock program or broker's advice leads to loss of money, or if the identification system or security guards deny you entrance to a building. Yet, this non-finding should be interpreted cautiously as this is one study with high variance in the data. Future work should include non-laboratory studies of affect toward computers who coerce as well as multiple types of both positive and negative behavior (e.g., computers and people overrewarding or manipulating).

Implications for Social Exchange Theory

The social exchange theory-based hypotheses overall received strong support which is not unexpected because they were taken from theoretical and empirical studies dealing with coercion, gender, and affect. The evidence found in this study supports backward looking view of social exchange, as the affective response was based more on prior behavior than partner's identity. The results suggest that future studies involving social exchange and affect should focus primarily on the evaluative dimension which was rich with results and less on the potency and activity dimensions where the only significant results the direct effect of coercion. The evaluative dimension is related to many concepts used in the study of social exchange including satisfaction (Hegtvedt 1990; Molm 1991), positive and negative emotion (Lawler 2001; Lawler et al. 2000) and perceptions of fairness (Molm et al. 2003). In addition, this study replicated the results of previous reciprocal exchange experiments in coercion with slightly different experiment setting and a different student population.

Implications for Affect Control Theory

Many of the ACT hypotheses were not confirmed. Let me suggest several reasons for this, and then further explore the implications for ACT. First, the reason many of the hypotheses were made using ACT was due to the lack of research on the intersection of computer identity as an actor with coercion, gender, and affect. In this sense, these hypotheses were partially exploratory. Second, the ACT simulations refer to an observed interaction in a specific culture. ACT predictions would only be valid for interactions in a social exchange laboratory experiment if subjects have a definition of the situation similar to that made in the prediction. Our simulations used *computer coerces student* and *student coerces student*. Subjects may have identified the situation differently, such as *computer bargains with student* (for the coercive condition if people though the computer was engaging in valid bargaining strategies) or *laboratory researcher coerces student* (if the subject attributes the computer's action as an extension of the laboratory researcher's action) or *student coerces whiz kid* or *student coerces Afro-American* (where the subject may see herself as a specific identity). In any of these cases, the subject's definition may have altered her perception of the meaning of the exchange interaction. In the debriefings for the coercive condition, only some of subjects described the strategy of the coercive partner with "coercive," "punishing," or their synonyms. Future research could explore this issue by specifically priming identity by referring to the subject as "Student Y," or asking the subject about his identity in an open-ended questionnaire.

Third, affect control theory and the semantic rating on evaluation, potency, and activity have traditionally been used for human identities, but have included objects (e.g., marijuana, cocaine) and non-human social identities (God, devil, and computer). It is not known if non-human identities as actors exhibit different properties than human identities as actors (see Francis 1997; Smith-Lovin and Douglass 1992 for ACT studies using God and devil as actors). ACT suggests that shared culture includes shared sentiments in that culture, but could a non-human social actor interaction be fundamentally different from the same interaction with a human identity? ACT may not be applicable outside of the realm of human interactions and including nonhumans in human interaction has often been avoided in sociological research (Johnson 1988). Future studies need to be conducted on spiritual beings as actors (e.g., God, devil, angels, evil spirits), mechanical actors (e.g., computers, robots, android companions, websites), animal actors, and cultural-fictional actors (e.g., Batman, Mickey Mouse, Uncle Sam).

In the debriefing several subjects stated that they found it difficult to rate a computer on the ACT scales, and of the five subjects who rated neutral (i.e., 0) for all partner scales (i.e., evaluation, potency, and activity for both partners), four of them were in the computer condition. Overall, there was a trend to reserve the worse ratings for people not computers. The manipulated partner's evaluative rating was either -3 or -4 six times with five in the human condition and all six in the coercive condition. Difficulty in rating computers in general and worse ratings being used for coercive humans suggests that attributions to computers may be difficult. Yet, overall there were no significant differences in affect for computers and humans. That suggests that in the case of a computer, people affectively perceived it as a social identity not so different from a student.

Overall, the lack of support for many of the ACT hypotheses simply shows the difficulty of integrating cultural identities into a social exchange paradigm which traditionally has focused on power-dependence relations and micro social structure. Yet, many studies have tried to add identity to social exchange, especially gender identity

(Hegtvedt 1988, 1990; Hegtvedt et al. 1993; Molm 1985, 1986), and others have studied affect and emotion in social exchange (Balkwell Forthcoming; Lawler 2001; Lawler et al. 2000; Molm 1991, Forthcoming). The affect theory of social exchange (Lawler 2001) proposed that people feel global emotions that they then attribute to social units, such as exchange partners, exchange relationships, and networks. Although this study does not measure emotions, the attribution process of global emotions could be a primary mechanism for the differences found in affect. Women found partners as less good and more active than men did suggesting that either a gender difference in fundamental sentiments or in attribution. Future research could include the rating of several of the social units to see if the attribution of global emotion may be different for males and females. The affect theory of social exchange focuses on how structure, including the power-dependence of the relationships and the network type, lead to global emotions that can result in affect when attributed to social units of the exchange. This study suggests that aside from structure being the only determinate of positive emotion, that identity and gender of the actors may play a role in affect as well.

CHAPTER 9

CONCLUSION

This research looked at the link between identity, strategy, and affective perceptions, yet the nature of intervening interactions was not explored in this research. A coercive strategy was operationalized by an algorithm which produced different levels of punishment based on the interaction. Social exchange interactions are highly complex with strategies changing over time and actions and reactions. Because this study was 100 rounds it could also be conceptualized and 100 interactions, instead of just one. Identities, especially human and computer identities, could have moderating effects over the course of the exchange. People may assume more uniformity of behavior for computers since most people have experience with predictable personal computers. There may also be a tendency to invoke different strategies toward computers and people, again based on computers being more predictable. Each of these possibilities has the potential to change the subject's behavior, attributions, and affect toward her partners, as well as changing one's actions and thus the reactions of the simulated partners. Future work should look into the exchange process and its potential to mediate and moderate identity and affect.

In sum, the identity of a computer or human did not change the affective rating of that actor. The CASA framework states that people engage in psychological and psycho-social processes when interacting with computers and this research extends that suggesting that some of these processes are similar when comparing between human-

human and human-computer interactions. This work has direct implications for organizations which use computers as representatives and computer mediated communication between people. This study also brings up questions about using affect control theory for social interactions with non-humans. Although some indicators suggested that people may consider machines more difficult to rate on a scales of affective meaning, the overall comparisons indicated no significant difference in affect by identity. This adds support to ACT's scope including non-humans when those non-humans are engaged in social actions. In this study females perceived the coercer as worse than males did, even when behavioral response was controlled. Much social exchange literature has ignored or found negligible gender effects, while this study indicates a clear difference in affective perceptions based on gender and partner's behavior. One reason could be that this study focused on affect whereas many social exchange studies focused on behavioral response. I recommend that future studies in social exchange, especially those that measure affect, should not simply balance on gender, but should consider gender as a variable of interest.

Table 1. EPA values from ACT simulations and dictionaries

		Affect								
		Evaluation			Potency			Activity		
		Partner's Behavior			Partner's Behavior			Partner's Behavior		
Partner	Actor	Non-coercive	Coercive	Mean	Non-coercive	Coercive	Mean	Non-coercive	Coercive	Mean
Human	Male	1.49	-0.65	0.42	0.31	0.53	0.42	0.75	0.82	0.79
	Female	2.22	-0.43	0.9	1.12	1.28	1.2	1.5	1.92	1.71
	Mean	1.86	-0.54	0.66	0.72	0.91	0.81	1.13	1.37	1.25
Computer	Male	0.87	-0.85	0.01	0.67	0.65	0.66	-0.45	0.01	-0.22
	Female	0.87	-0.94	-0.04	0.67	1.07	0.87	-0.45	0.37	-0.04
	Mean	0.87	-0.9	-0.01	0.67	0.86	0.77	-0.45	0.19	-0.13
Mean	Male	1.18	-0.75	0.22	0.49	0.59	0.54	0.15	0.42	0.28
	Female	1.55	-0.69	0.43	0.9	1.18	1.04	0.53	1.15	0.84
	Mean	1.36	-0.72	0.32	0.69	0.88	0.79	0.34	0.78	0.56

Table 2. Summary of hypotheses, their direction, and source

	Evaluation			Potency			Activity		
Independent Variable	Hypothesis	Direction	Source(s)*	Hypothesis	Direction	Source(s)	Hypothesis	Direction	Source(s)
Coercion	H_{1E}	-	EX, ACT	H_{1P}	+	EX	H_{1A}	+	EX
Computer	H_{2E}	-	ACT				H_{2A}	-	ACT
Female				H_{3P}	+	ACT	H_{3A}	+	ACT
Coercion x Computer	H_{4E}	+	ACT	H_{4P}	-	EX	H_{4A}	+	ACT
Coercion x Female	$H_{5E\text{-}EX}$ $H_{5E\text{-}ACT}$	- +	EX ACT				H_{5A}	+	ACT
Computer x Female	H_{6E}	-	ACT	H_{6P}	-	ACT	H_{6A}	-	ACT

* EX = Social Exchange literature; ACT = Affect Control Theory simulation

Table 3. Simulated actors response to subject's behavior based on strategy

	Subject's Behavior*		
Strategy	Reward	Nonexchange	Punish
Reciprocal tit-for-tat	reward = 90% nonexchange = 10%	reward = 10% nonexchange = 90%	nonexchange = 10% punishment = 90%
Coercive	reward = 90% nonexchange = 10%	reward = 10% nonexchange = 40% punishment = 50%	nonexchange = 10% punishment = 90%

*The simulated actor's response is based on the subject's behavior on the previous round. In both strategies the simulated actor rewards on the first round.

Table 4. Means, S.D., and correlations for important variables

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Female	.63	.48										
(2) Age	19.47	1.86	-.126									
(3) Computer Knowledge	2.24	.53	-.233*	.007								
(4) Asian	.14	.35	.197*	.071	-.082							
(5) Black	.10	.30	.005	-.053	-.038	-.135						
(6) Other	.07	.26	-.076	-.034	.207*	-.114	-.095					
(7) Identity	.51	.50	-.024	-.010	-.009	-.034	.086	-.076				
(8) Strategy	.50	.50	.077	.045	.071	.134	-.031	-.071	.011			
(9) E-SA_M	1.03	2.23	-.181^	-.015	-.014	-.222*	.051	.044	.104	-.547***		
(10) P- SA_M	.86	1.57	-.031	-.003	-.072	-.187^	.225*	-.065	-.087	.195*	-.106	
(11) A- SA_M	.91	1.49	.146	-.025	-.055	.079	.104	-.126	.001	.188^	-.188^	.294**

^ p<.10, *p<.05, **p<.01, ***p<.001

Table 5. First-order results of affective ratings for the SA_M

		Affect					
		Evaluation		Potency		Activity	
	N	Mean	SD	Mean	SD	Mean	SD
Partner's Strategy							
Non-coercive	56	2.23	1.54	.52	1.24	.61	1.26
Coercive	56	-.20	2.14	1.09	1.83	1.11	1.68
Partner's Identity							
Human	55	.82	2.35	.93	1.65	.82	1.45
Computer	57	1.21	2.09	.68	1.51	.89	1.55
Subject's Gender							
Male	43	1.51	1.94	.81	1.44	.51	1.33
Female	69	.71	2.33	.80	1.68	1.07	1.57
Total	112	1.02	2.22	.80	1.58	.86	1.50

Table 6. Evaluation results of ratings for the SA_M

	Identity					
	Human			Computer		
	N	Mean	SD	N	Mean	SD
Male						
Non-coercive	10	2.1	1.97	12	2.08	1.08
Coercive	9	0	2.55	9	1.78	1.39
Female						
Non-coercive	17	2.29	1.45	15	2.4	1.68
Coercive	17	-1.06	1.68	19	-.42	2.22

Table 7. Results summary of hypotheses, their direction, and significance

	Evaluation			Potency			Activity		
Independent Variable	Hypothesis	Direction	Significance	Hypothesis	Direction	Significance	Hypothesis	Direction	Significance
Coercion	H_{1E}	-	p < .001	H_{1P}	+	p < .05	H_{1A}	+	p < .05
Computer	H_{2E}		ns				H_{2A}		ns
Female	*None**	-	p < .1	H_{3P}		ns	H_{3A}	+	p < .1
Coercion x Computer	H_{4E}		ns	H_{4P}		ns	H_{4A}		ns
Coercion x Female	$H_{5E\text{-}EX}$	-	p < .01				H_{5A}		ns
Computer x Female	H_{6E}		ns	H_{6P}		ns	H_{6A}		ns

* There was no hypothesis made about the effect of female on evaluation.

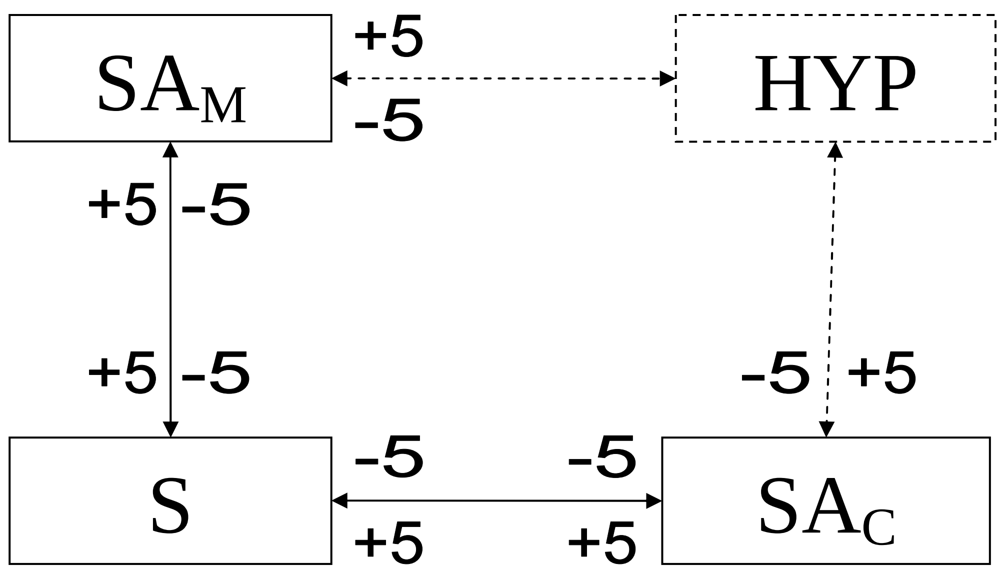

Figure 1: Social exchange balanced network. S is the subject, SA is a simulated actor, HYP is a hypothetical actor. Subscript C is for constant strategy and M is for modified strategy. The positive and negative amounts near each box indicate the reward and punishment amounts toward the respective actors.

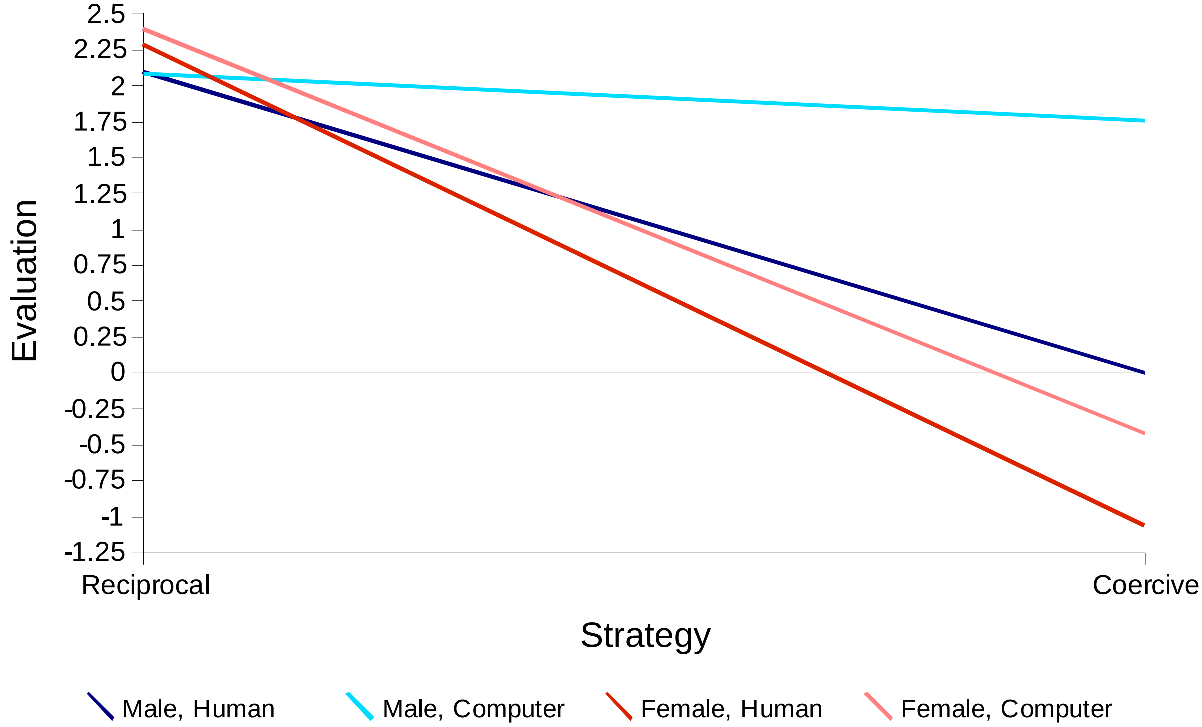

Figure 2: Mean evaluation of one's partner based on partner's strategy, partner's identity, and subject's gender.

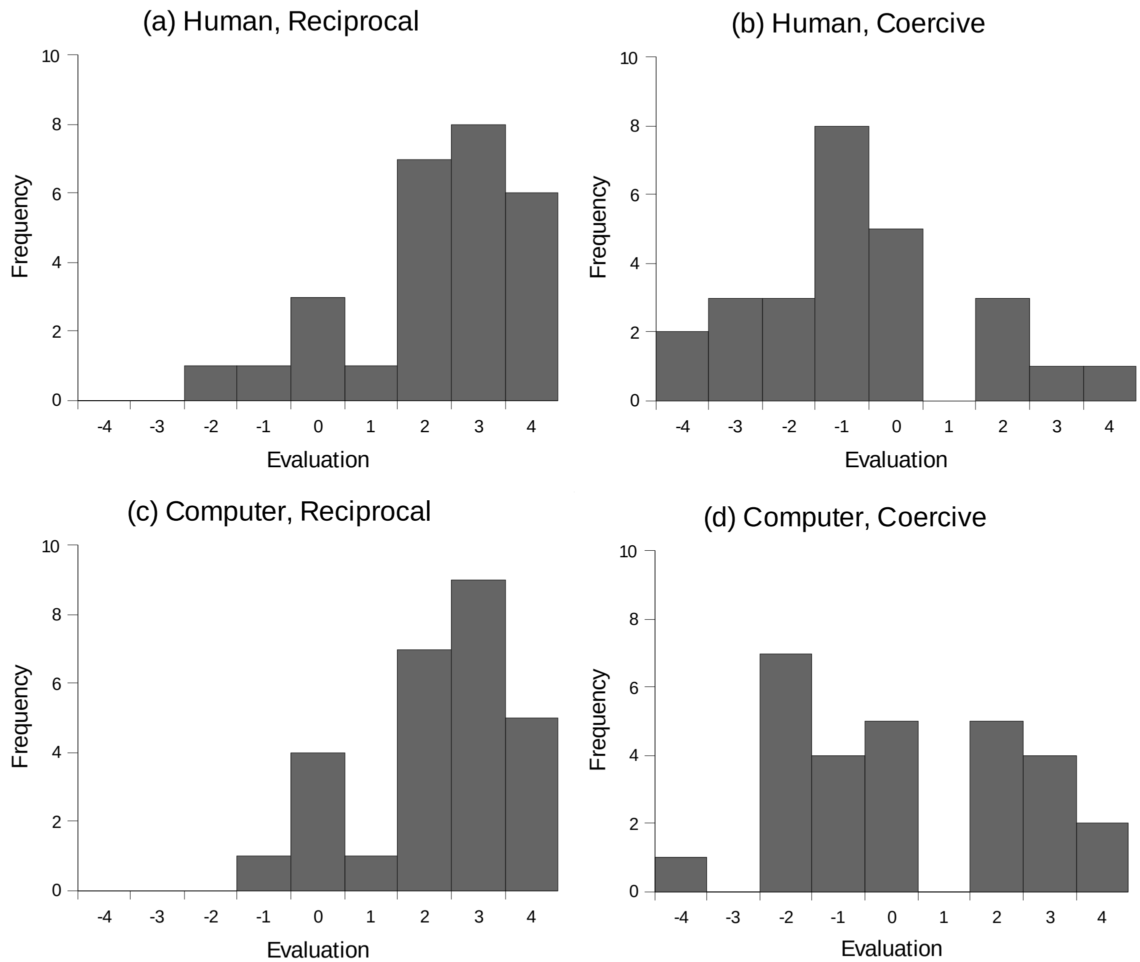

Figure 3: Histograms of evaluation of the manipulated partner based on partner’s identity of human or computer and partner’s strategy of reciprocal or coercive.

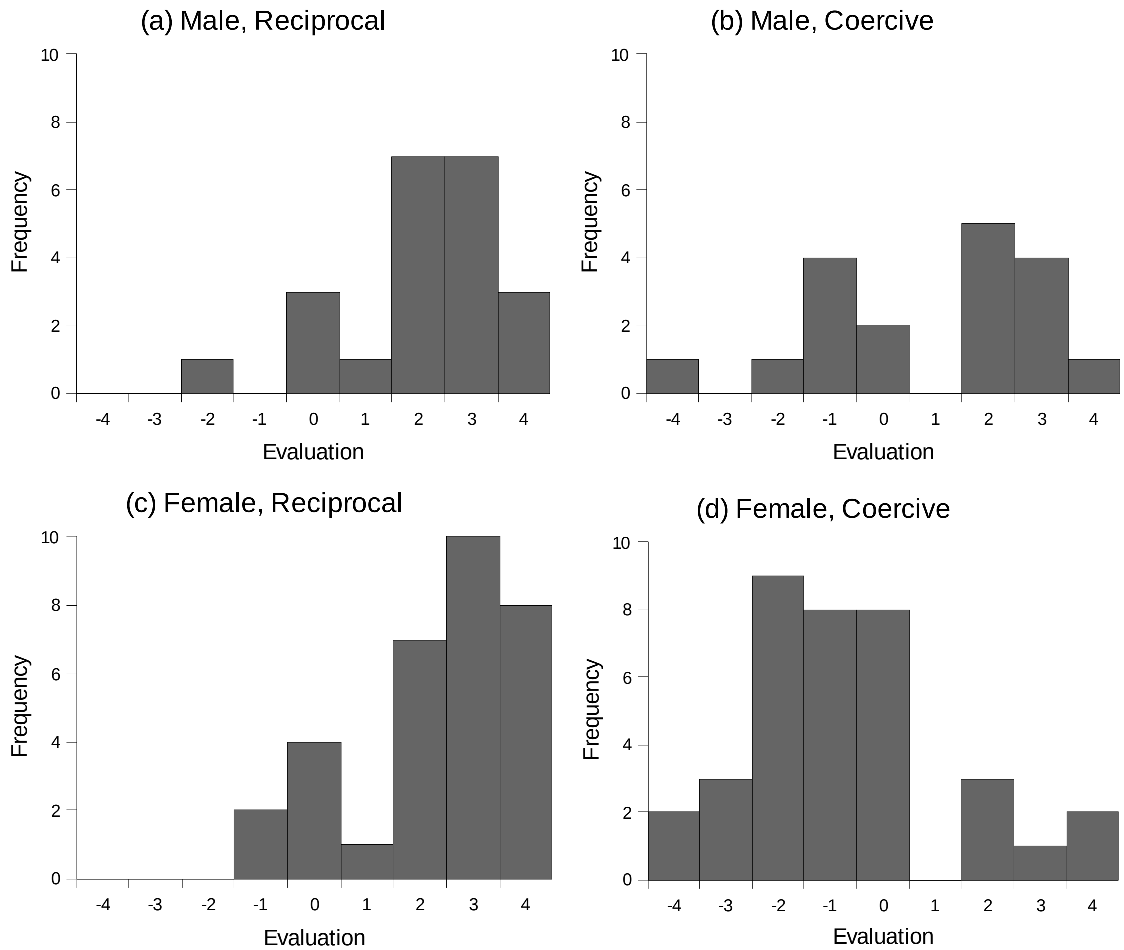

Figure 4: Histograms of evaluation of the manipulated partner based on subject's gender and partner's strategy of reciprocal or coercive.

REFERENCES

Balkwell, James W. Forthcoming. "Introduction to Network Exchange and Emotion." in *Social Structure and Emotions*, edited by D. T. Robinson and J. Clay-Warner. New York: Elsevier.

Bartneck, Christoph, Juliane Reichenbach, and Julie Carpenter. 2006. "Use of Praise and Punishment in Human-Robot Collaborative Teams." in *IEEE International Symposium on Robot and Human Interactive Communication*. Hatfield, UK.

Brooks, Rodney 2002. "Lord of the Robots." *Technology Review*.

Carley, Kathleen M. 1999. "On Generating Hypotheses Using Computer Simulations." *Systems Engineering* 2:69-77.

Cook, Karen S. 2005. "Networks, Norms, and Trust: The Social Psychology of Social Capital." *Social Psychology Quarterly* 68:4-14.

Cook, Karen S and Richard M. Emerson. 1979. "Power, Equity and Commitment in Exchange Networks." *American Sociological Review* 43:721-731.

Cook, Karen S, Richard M. Emerson, Mary R. Gillmore, and Toshio Yamagishi. 1983. "The Distribution of Power in Exchange Networks: Theory and Experimental Results." *American Journal of Sociology* 89:275-305.

Cook, Karen S and Eric Rice. 2003. "Social Exchange Theory." in *Handbook of Social Psychology*, edited by J. Delamater. New York: Springer.

eBay. 2007, "Our History", Retrieved 2008 (http://news.ebay.com/history.cfm).

Ecma International. 2003, "Ecma publishes key Web Services call control standard", Retrieved 2008 (http://www.ecma-international.org/news/CSTA-WDSL%20final.htm).

Emerson, Richard M. 1962. "Power-Dependence Relations." *American Sociological Review* 27:31-41.

Epstein, Robert, Gary Roberts, and Grace Beber. 2008. "Parsing the Turing Test: Philosophical and Methodological Issues in the Quest for the Thinking Computer." Springer.

Ferdig, Richard E. and Punya Mishra. 2004. "Emotional Responses to Computers: Experiences in Unfairness, Anger, and Spite." *Journal of Educational Multimedia and Hypermedia* 13:143-161.

Fogg, B. J. 2003. *Persuasive Technology: Using Computers to Change What We Think and Do*. San Francisco: Morgan Kaufmann.

Francis, Linda E. 1997. "Ideology and Interpersonal Emotion Management: Redefining Identity in Two Support Groups." *Social Psychology Quarterly* 60:153-171.

Gerbasi, Alexandra and Karen S Cook. 2007. "Social Structure and Emotions: The Role of Trustworthiness in Negotiated and Reciprocal Exchange." in *Social Structure and Emotions*, edited by D. T. Robinson and J. Clay-Warner. New York: Elsevier.

Hegtvedt, Karen A. 1988. "Social Determinants of Perception: Power, Equity, and Status Effects in an Exchange Situation." *Social Psychology Quarterly* 51:141-153.

—. 1990. "The Effects of Relationship Structure on Emotional Responses to Inequity." *Social Psychology Quarterly* 53:214-228.

Hegtvedt, Karen A., Elaine A. Thompson, and Karen S Cook. 1993. "Power and Equity: What Counts in Attributions for Exchange Outcomes?" *Social Psychology Quarterly* 56:100-119.

Heise, David R. 1970. "The Semantic Differential and Attitude Research." in *Attitude Measurement*, edited by G. F. Summers. Chicago: Rand McNally.

—. 1977. "Social action as the control of affect." *Behavioral Science* 22:163-177.

—. 1979. *Understanding Events: Affect and the Construction of Social Action*. New York: Cambridge University Press.

—. 2007. *Expressive Order: Confirming Sentiments in Social Actions*. New York: Springer.

—. 2008, "Interact", Retrieved (www.indiana.edu/~socpsy/ACT/interact.htm).

Homans, George Caspar. 1974. *Social Behavior: Its Elementary Forms*. New York: Harcourt Brace Jovanovich.

Johnson, Jim. 1988. "Mixing Humans and Nonhumans Together: The Sociology of a Door-Closer." *Social Problems* 35:298-310.

Kidwell, Huw. 2007, "Going It Alone" *Airport Technology*, Retrieved 2008 (http://www.airport-technology.com).

Kurzweil, Ray. 2005. *The Singularity is Near: When Humans Transcend Biology*: Viking Adult.

Lawler, Edward J. 2001. "An Affect Theory of Social Exchange." *American Journal of Sociology* 107:321-352.

Lawler, Edward J., Shane R. Thye, and Jeongkoo Yoon. 2000. "Emotion and Group Cohesion in Productive Exchange." *American Journal of Sociology* 106:616-657.

Lawler, Edward J. and Jeongkoo Yoon. 1993. "Power and the Emergence of Commitment Behavior in Negotiated Exchange." *American Sociological Review* 58:465-481.

—. 1996. "Commitment in Exchange Relations." *American Sociological Review* 61:89-108.

Lively, Katheryn J. and Brian Powell. 2006. "Emotional Expressions at Work and at Home: Domain, Status, or Individual Characteristics?" *Social Psychology Quarterly* 69:17-38.

MacKinnon, Neil J. 1994. *Symbolic Interactionism as Affect Control*, Edited by T. D. Kemper. New York: State University of New York.

Macy, Michael W. 1993. "Backward-Looking Social Control." *American Sociological Review* 58:819-836.

Madsen, Maria and Shirley Gregor. 2000. "Measuring Human-Computer Trust." in *ACIS*.

Molm, Linda D. 1985. "Gender and Power Use: An Experimental Analysis of Behavior and Perceptions." *Social Psychology Quarterly* 48:285-300.

—. 1986. "Gender, Power, and Legitimation: A Test of Three Theories." *American Journal of Sociology* 91:1356-1386.

—. 1991. "Affect and Social Exchange." *American Sociological Review* 56:475-493.

—. 1994. "Is Punishment Effective? Coercive Strategies in Social Exchange." *Social Psychology Quarterly* 57:75-94.

—. 1997. *Coercive Power in Social Exchange*. Cambridge: Cambridge University.

—. Forthcoming. "The Structure of Reciprocity and Integrative Bonds: The Role of Emotions." in *Social Structure and Emotions*, edited by D. T. Robinson and J. Clay-Warner. New York: Elsevier.

Molm, Linda D., Gretchen Peterson, and Nobuyuki Takahashi. 2003. "In the Eye of the Beholder: Procedural Justice in Social Exchange." *American Sociological Review* 68:128-152.

Molm, Linda D., Theron M. Quist, and Phillip A. Wiseley. 1993. "Reciprocal Justice and Strategies of Exchange." *Social Forces* 72:19-44.

Molm, Linda D., Nobuyuki Takahashi, and Gretchen Peterson. 2000. "Risk and Trust in Social Exchange: An Experimental Test of a Classical Proposition." *The American Journal of Sociology* 105:1396-1427.

Moravec, Hans. 1998. "When will computer hardware match the human brain?" *Journal of Evolution and Technology* 1.

Nass, Clifford and Youngme Moon. 2000. "Machines and Mindlessness: Social Responses to Computers." *Journal of Social Issues* 56:81-103.

Nass, Clifford, Youngme Moon, B. J. Fogg, Byron Reeves, and D. Christopher Dryer. 1995. "Can Computer Personalities be Human Personalities?" *International Journal of Human-Computer Studies* 43:223-239.

Nass, Clifford, J. Steuer, and E. R. Tauber. 1994. "Computers are Social Actors." Pp. 72-78 in *SIGCHI Conference on Human Factors in Computing Systems: Celebrating Interdependence*.

Osgood, Charles E., W. E. May, and M. S. Miron. 1975. *Cross-Cultural Universals of Affective Meaning*. Urbana: University of Illinois.

Osgood, Charles E., G. J. Suci, and P. H. Tannenbaum. 1957. *The Measurement of Meaning*. Urbana: University of Illinois.

Reeves, Byron and Clifford Nass. 1996. *The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places*. New York: CSLI.

Robinson, Dawn T. 2007. "Control Theories in Sociology." *Annual Review of Sociology* 33:157-174.

Robinson, Dawn T. and Lynn Smith-Lovin. 2006. "Affect Control Theory." in *Social Psychology*, edited by P. J. Burke. Stanford: Stanford University Press.

Smith-Lovin, Lynn. 1987. "Impression from Events." *Journal of Mathematical Sociology* 13:35-70.

Smith-Lovin, Lynn and William Douglass. 1992. "An Affect-Control Analysis of Two Religious Groups." in *Social Perspectives on Emotion*, edited by D. D. Franks and V. Gecas. Greenwich, Connecticut: Jai Press.

Smith-Lovin, Lynn and David R. Heise. 1988. *Analyzing Social Interaction: Advances in Affect Control Theory*. New York: Gordon & Breach.

Troyer, Lisa. 2004. "Affect Control Theory as a Foundation for the Design of Socially Intelligent Systems." in *American Association for Artificial Intelligence Symposium on Architectures for Modeling Emotion: Cross Disciplinary Foundations*. Menlo Park, CA: AAAI Press.

Turing, A. M. 1950. "Computing, Machinery, and Intelligence." *Mind* 59:433-460.