Available online at www.sciencedirect.com
ScienceDirect
Computers in Human Behavior xxx (2007) xxx–xxx
Computers in Human Behavior
www.elsevier.com/locate/comphumbeh

Different orientations of males and females in computer-mediated negotiations

Ron Katz [a,*], Yair Amichai-Hamburger [b], Efrat Manisterski [c], Sarit Kraus [d]

[a] *The Gonda Brain Research Center, Bar-Ilan University, Ramat-Gan 52900, Israel*
[b] *Bezeq International Research Center for Internet Psychology, Sammy Ofer School of Communications, Interdisciplinary Center IDC, Herzliya 46150, Israel*
[c] *Department of Computer Science, Bar-Ilan University, Israel*
[d] *Department of Computer Science and The Gonda Brain Research Center, Bar-Ilan University, Israel*

Abstract

This paper examines the existence of gender differences in computer mediated (CM) negotiations where ''gender differences'' refers to the differential patterns of behavior of males and females proposed by Rubin and Brown (Rubin, J. Z., & Brown, B. R. (1975). Bargainers as individuals. In *The social psychology of bargaining and negotiation* (pp. 157–196). New York: Academic Press). Namely, males are more profit oriented and females are more relationship oriented. External manipulations encouraging cooperativeness with other negotiators either by profitable or social incentives were inserted in the negotiations performed within the Colored Trails (CT) game framework. The negotiators included 27 females and 33 males who negotiated in foursomes via computers. In the first study we focused on independent negotiators whose success was not crucially dependent on the other party. In the second study negotiators were dependent upon one another, encouraging integrative solutions. The findings reveal that the social incentive (team factor) positively affected the females' cooperativeness in contrast to males who were slightly less cooperative. On the other hand, profitable incentive influenced the males' cooperativeness level, while no change was shown by females, which is consistent with Rubin and Brown's distinction. These tendencies were reduced when playing with a non-reciprocal simulated agent. The causes for gender differences in CM as well as in face-to-face (FTF) negotiations are discussed.

* Corresponding author. Tel.: +972 89151605/523476484.
E-mail address: katz@biu.013.net.il (R. Katz).

0747-5632/$ - see front matter © 2007 Elsevier Ltd. All rights reserved.
doi:10.1016/j.chb.2007.02.008

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

Keywords: Computer-mediated-negotiations; Gender

1. Introduction

Human behavior in negotiation situations includes various psychological aspects: intrinsic personality characteristics such as risk-aversion, motivation, authoritarianism and self-esteem; cognitive characteristics such as judgment, strategic and sometimes mathematical thinking; and social characteristics such as competitiveness, cooperativeness, altruism, aggressiveness and reciprocity (see, for example: Rickman, 1977; Rubin & Brown, 1975). Exploring negotiation processes from a gender point of view can therefore shed light on these various aspects in female and male behavioral patterns, including special aspects such as gender stereotypes and power relations between males and females (Kray, Thompson, & Galinsky, 2001; Watson, 1994b).

Extensive efforts have been invested in investigating the gender influence on competitive and cooperative behaviors in negotiations. While traditional sex-role stereotypes suggest that males negotiate more competitively than females, empirical experiments have found no unequivocal evidence for this determination. Many studies indeed have found males to be more competitive than females. However, other studies have found the complete opposite, while there also have been studies in which no significant gender difference was found (see Rubin & Brown, 1975; Walters, Stuhlmacher, & Meyer, 1998). The equivocal results might stem from the multitude of psychological parameters which are involved in negotiation processes, as well as the negotiation environments which have been examined.

An interesting explanation for the conflicting evidence was suggested by Rubin and Brown (1975), who found that in general females are highly interpersonally oriented, and "are highly sensitive and reactive to the interpersonal aspects of their relationship with the other". Males, on the other hand, "orient themselves not to the other, but to the impersonal task of maximizing their own earnings. When earnings can best be maximized through the use of a competitive strategy, males tend to compete; on the other hand, when a cooperative strategy seems most likely to maximize their own earnings, males cooperate" (p. 173).

Consistently, the meta-analysis performed by Walters et al. (1998) found that while, in general, males are less cooperative than females, playing against a contingent opponent, with whom it is worthwhile to cooperate, males show more cooperative behavior than females. Other empirical support for the different gender motivations of males and females is provided by Calhoun and Smith (1999) who show that external manipulation of concern for the other by a profitable incentive (a share in the other's profits) increases the cooperativeness and the joint outcome in negotiations that offer the possibility of integrative agreements, only for males. Their results show that for females such manipulation causes no behavioral change. The authors attribute this finding to the assumption that females naturally enter the negotiation setting with a high concern for the other player, even without external manipulation. However, this explanation is quite difficult, as the authors themselves admit, given the fact that females were less cooperative and achieved lower joint outcomes than males, under all the experimental conditions. Here we suggest an

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

alternative explanation for their results, based on the observation of Rubin and Brown (1975), which ascribes profit orientation behavior to males rather than to females. Therefore, no change in females' cooperation level is expected when the manipulation is based on profit sharing.

After having pointed out the empirical evidence for the different influences of profitable incentives on males and on females, consistent with Rubin and Brown's orientations theory, we now focus on experiments which examine the influence of social incentives. An intensifying sensitivity of females towards social cues can be demonstrated by experiments which have examined Minimal Group Paradigm (MGP). Social psychology research, beginning with Tajfel (1970) has shown that very little is needed for people to consider each other members of a group, and to favor other in-group members. Based on Rubin and Brown's theory which claims that females are more relation oriented and more sensitive to interpersonal cues, it can be predicted that an external social manipulation such as minimal grouping should make females' behavior more cooperative with in-group negotiators, while no change is anticipated for males' behavior. Indeed, several researches that have examined MGP with coding of participant's gender have revealed that males' in-group favoritism exists only when there is expectation of reciprocal favoritism from the other group members (Bourhis, 1994; Gaertner & Insko, 2000). This observation is also consistent with the other aspect of Rubin and Brown's distinction of males being profit oriented. Females' behavior, on the other hand, was consistent with in-group favoritism, even when no reciprocal favoritism could be expected (Bourhis, 1994; Gaertner & Insko, 2000; Wang & Yamagishi, 2001, 2004).

In summary, it has been shown that the distinction between males' and females' different orientations in negotiations proposed by Rubin and Brown (1975), could be supported by experiments that emphasize different incentives in the negotiation process. While females, esteemed as more relationship oriented, are influenced mainly by social incentives (such as grouping), males, esteemed as more profit oriented, are influenced essentially by profitable incentives (such as sharing in the other's profits).

The purpose of this paper is to examine the existence of gender differences in negotiation orientation, as distinguished by Rubin and Brown, in the *CM environment*. More specifically, we would like to investigate:

(1) Whether females are consistent in showing profit indifference and social relation sensitivity in CM negotiations.
(2) Whether males are consistent in showing profit orientation while neglecting social relations in CM negotiations.

In order to clarify the theoretical background and the importance of these questions, we must first understand what underlies the differences in males' and females' orientations in general, and then we shall be able to focus on the uniqueness of CM negotiations.

1.1. Explanations for gender differences in negotiation orientations

What could the reason be for the differences in male and female orientations in negotiations? Several explanations have emerged for this phenomenon. Evolutionary psychology would attribute gender differences to different challenges of genetic survival which ancestral females and males have had to face (Buss, 1997). Ancestral females were more

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

dependent on the group than males due to lower reproductive potential during pregnancy durations and greater parental investment. Therefore, in-group reciprocal and cooperative females, who were more concerned with the welfare of their group, had better chances to survive with her descendants. Ancestral males, on the other hand, who faced challenges of food obtaining and hunting, perceived his group only as a temporal tool for improving self-welfare, and established his group cooperativeness on this basis (Tooby & DeVore, 1987). De Waal (1982) found that coalitions of male chimpanzees are based upon opportunistic interests. The intensified interest of males in profit maximizing may stem from the high priority females have given to the male's economical ability when they choose a parental partner. This type of female preference has been found to exist in modern age, as well (Buss & Schmitt, 1993).

The social role theory (Eagly, 1987; Eagly & Wood, 1999) argues that people tend to develop their skills according to the social role they are designated. In many societies, females, partially by internalizing stereotypes, are designated to more social and caretaker roles both in the family and outside the family; thus they acquire friendly and cooperative attitudes toward their social environment. Males, on the other hand, are expected to succeed in their monetary and career achievements, and therefore develop a pattern of opportunistic and independent behavior.

Gender differences may also stem from power differences (Watson, 1994a). Females, who are perceived as having less power in the context of the ''masculine'' environment of negotiations, may feel a greater desire to belong to a group. Males, who enjoy a more powerful position, feel no need to bind themselves in group relations unless it is profitable for their own welfare.

A fourth explanation may attribute gender differences to an artificial adoption of social norms. While no intrinsic factor distinguishes the two sexes, females act more friendly with their teammates, and pay less attention to self-profits, because this pattern of behavior is perceived as more feminine (Stuhlmacher, Citera, & Willis, 2006). Experiments in CM negotiations may be a good paradigm for examining this approach, since the interaction is anonymous and participants are able to play naturally without social stress.

1.2. The influence of computer-mediation on negotiations performed by females in contrast to males

The behavior patterns of both females and males described above, may be totally different in the CM environment. Several unique characteristics of computer mediation in negotiations may yield significant changes comparing to face-to-face (FTF) communication: the anonymity of the player, the anonymity of the opponent, restricted communication, lack of visual feedback (face cues, excitement, nervousness, etc.), inability to send non-verbal signs, distance between the opponents, filtration and refinement of intuitive primary responses by both sides, and the perception of the computer environment and interface (see: Bordia, 1997; Galin, Gross, & Gosalker, 2007; Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Stuhlmacher & Citera, 2005; Wilson, 2005). Gender identities as well as gender behavioral differences such as attention and influence tend to diminish in CM communication (see: Bhappu, Griffith, & Northcraft, 1997; Danet, 1998). Influence of computer mediation on negotiators behavior has been observed empirically, mainly in respect to female behavior patterns. Recent empirical works which examined gender effects on virtual negotiation, and used media other than FTF communication,

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

such as computer, telephone and video-conferencing, show that while males are consistent with their behavior characteristics in FTF negotiations, females behave differently in FTF and in computer interfaced negotiations. A meta-analytic research consisting of 40 previous papers, which compared human behavior in FTF and in virtual negotiations, found that females behave more hostile and more competitive in virtual negotiations in comparison to FTF, while males showed no difference between these two conditions (Stuhlmacher et al., 2006). This finding is consistent with Walters et al.'s (1998) meta-analysis finding that in matrix games, which are characterized by restricted communication and often without visibility of the opponent, similar to CM communication, women are more competitive than men.

Similarly, in persuasion experiments, females show less message agreement in response to e-mail versus FTF interaction, whereas males show no difference between these communication modes (Guadagno & Cialdini, 2002). A comparable pattern has been observed in CM *battle of the sexes* game, where females, much more than males, become more cooperative when pairs are introduced to each other before the beginning of the game, in comparison to anonymous pairing (Sonsino & Sirota, 2003).

As for males' pattern of behavior, according to the above mentioned researches males are not influenced by computer mediation. However, findings from a series of negotiation studies has shown that the removal of visual access between bargainers (as in the CM environment) leads to less hostility and more integrative solutions than when bargainers have visual access (Carnevale & Isen, 1986; Carnevale, Pruitt, & Seilheimer, 1981; Lewis & Fry, 1977; Sheffield, 1989). Stuhlmacher et al. (2006) noticed that this phenomenon, which was named the *barrier effect*, was found mainly in male populations.[1] Similarly, a recent study has found that persuasion emails lead to lower agreement among women and higher agreement among men compared to FTF, because of restricted cues for personal connection (Guadagno & Cialdini, 2007). Therefore, the barrier effect may be revealed as a positive reaction of males to *social incentives* in CM environments.

In conclusion, there is evidence of a less cooperative attitude of females in CM compared to FTF negotiations, and a certain probability of the opposite trend in males' behavior according to the barrier effect. These phenomena, among others, yield a clear reduction in gender differences in CM communication characteristics such as cooperativeness–competitiveness, hostility, attention and influence. Two optional explanations for this reduction are presented in the discussion of the findings.

It is noteworthy that all of the above evidence focuses only on the competitiveness level in CM negotiations, and does not examine sensitivity to social relations or to profits, which Rubin and Brown suggest to be more general and robust gender characteristics of the negotiators' behavior. However, this phenomenon may cast doubt with reference to the existence of the females' relationship orientation in CM environments. Moreover, a general tendency of reversed behavior in internet communication in comparison to off-line behavior has recently been suggested by Amichai-Hamburger (2005), based on Jung's Theory (1939). Jung believed that human beings are made up of opposing sets of characteristics, and well-being is the result of a successful creation of a balance between these opposing forces. Amichai-Hamburger suggests, based on findings in introverts, that

[1] These authors hypothesized that the barrier effect has a greater influence on males, since the effectiveness of the barrier is salient whenever the FTF environment is competitive, and males have been shown to be more competitive without visual barriers.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

the internet may be able to assist in the construction of such an equilibrium, by allowing individuals to express the undeveloped part of their personalities. This insight may explain the modification in female's cooperativeness in the CM environment, and may also suggest a similar modification in their orientation in CM negotiations.

In order to check the existence of typical orientations of males and females, we use external manipulations which encourage cooperativeness with other negotiators by either profitable or social incentives. The profitable incentive is manipulated by giving each player a share in the other's profits, as in Calhoun and Smith (1999). The social incentive is manipulated by simply telling participants that they belong to the same team with other negotiators, without any monetary meanings, as inspired by MGP.[2] The negotiations were handled in the framework of the Colored Trails (CT) negotiation game, which will be broadly described.

Since this a pioneer research in this field, we had no specific prediction of the results. On one hand, as described above, gender differences have a tendency to diminish in several aspects in CM communications, and the difference in negotiation orientations may be reduced as well. On the other hand, the difference in orientations found in FTF negotiations is much more robust than other aspects of gender differences such as competitiveness, as explained above. Moreover, in contrast to the evidence for the reduction of the gender differences mentioned above, there are also experiments which have demonstrated the existence of such differences in CM environments, especially in reference to communication styles (Gefen & Ridings, 2005; Guiller & Durndell, 2006).

The importance of this research is twofold: First, we would like to understand the psychological and social effects of the computer environment, since it has become a serious framework through which a great deal of our social relations and commercial activities are performed. Second, this computer mediated research enables us to expose intrinsic and genuine motives of behavior without the masking of social influences. Thus, it might shed light on different female and male behavior patterns in FTF negotiations, whether it be intrinsic personality differences or rather an artificial adoption of social norms when other humans are present.

2. Method

2.1. The negotiation environment

We used the Colored Trails (CT) game (Grosz, Kraus, & Talman, 2004) as the negotiation paradigm in our experiments. CT is a conceptually simple but highly expressive computer mediated game framework that can be used to model a range of multi player task settings and decision-making situations. The game is played on an $N \times M$ (6×6 in the current research) board of squares of different colors, as shown in Fig. 1. Players move from a starting position toward a goal square using chips of colors that match the board squares. For a player to move onto an adjacent square, she must turn in a chip of the same color as the square. The chips, which each player does not necessarily have enough in order to reach the goal in the beginning of the game, may be exchanged between the players,

[2] Prior research indicates that this random categorization produces effects similar to categorization based upon a more meaningful criterion both for females (Brewer & Silver, 1978) and for males, when reciprocity may be expected (Billig & Tajfel, 1973).

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

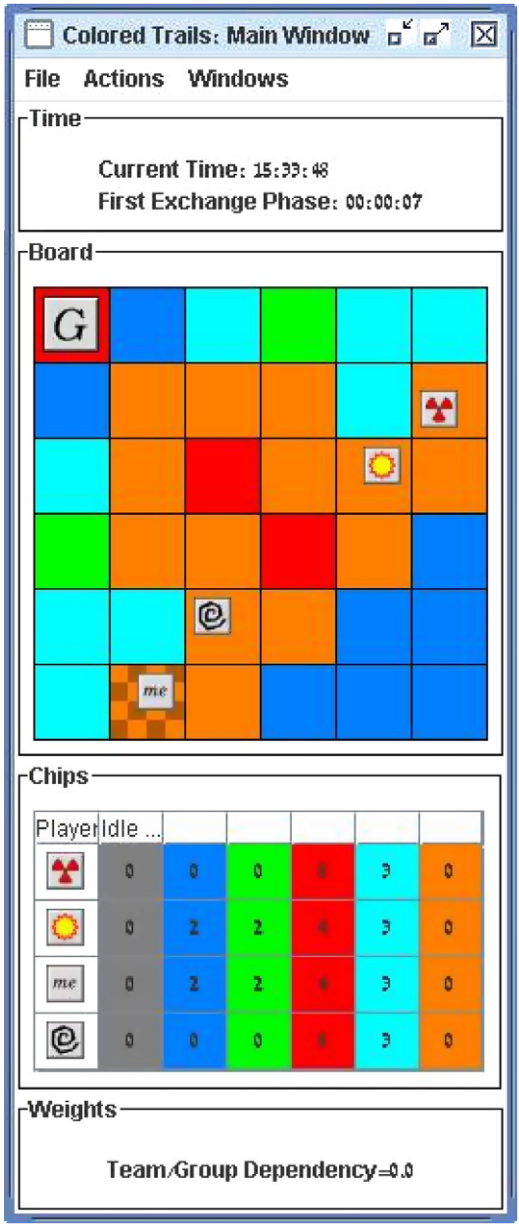

Fig. 1. A sample of a CT board. The upper section indicates the time passed from the beginning of the game. The section below presents the main game board: the location of each of the 4 players, and the goal cell ("G"). The third section describes the chips inventory of each of the players. Each entry indicates the number of chips from each color. For example, the upper player ("radioactivity") possess 8 red chips and 3 azure chips. The lower section indicates the OPDwt value, which is here set to 0. In this board there is no distribution to teams. The setting of this board was the initial setting in Study 1.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

according to the communication and negotiation strategies constrained by the game protocol. Each player can send offers for chip exchanges to any other player, during certain negotiating periods, which can be accepted, rejected or unanswered by the receiver of the offer. However, agreements are not enforced by the game controller, allowing players to break agreements, thus providing an abstraction of ''real-life'' domains. A player's performance in CT is determined by the scoring function, which is also set by the game protocol for a particular instantiation of CT. The scoring rule used in the current paper incorporates three factors in the individual player's score: (1) whether the player reaches the goal square; (2) the distance the player is from the goal square, if the goal is not reached; (3) the number of chips the player possesses at the end of the game. Each player has knowledge of the scoring function, as well as full view of the board and the other players' chips. It was clarified that performance of individuals would be measured non-competitively; players were to try to maximize their own scores, not to minimize other players' scores. Thus, certain configurations of the CT game provide the possibility of integrative agreements which produce a high mutual benefit.

The advantages of the CT framework, which is more similar to real-life negotiations than typical economic games, and can provide an analogue for more complicated task settings, have, in a very short time, made it a paradigm for various behavioral aspects, such as: social dependencies (Grosz et al., 2004), social preferences (Gal et al., 2004; Talman et al., 2005), and inter-personal relationships (Marzo, Gal, Grosz, & Pfeffer, 2004).

2.2. Participants

The participants were 60 (27 females and 33 males) upperclass computer science students at Bar Ilan University, aged 18–29 (average 24.35), who were not experts in negotiation strategies nor in economic theories directly relevant to the game (e.g. game theory, decision theory). The participation was voluntary and the students were motivated to play seriously by the possibility of receiving extra bonus points on their final grade of a course, depending upon their performance in the several games played. Since each player started from a different position, the performance evaluation was relative to the specific position in each game. As mentioned above, the game was not competitive, and each participant was evaluated only according to her score, regardless of the scores achieved by other players.

2.3. Procedure

Each meeting included 8 or 12 participants that were seated apart at computer-terminal stations in a large computer laboratory, in a setting which did not allow them to see each others' screens. The students were randomly divided into groups of four players, without knowing the groups' compositions. They were also told that in each game the groups' compositions would change. The experiment began with a 50 min oral tutorial of the game accompanied by a written manual, consisting of an explanation of the rules and the scoring function. In addition, all the participants participated in a short practice game. At the end of this phase, the experimenters, who were not aware of the goals of the experiment, verified the complete understanding of the game on the part of each of the participants personally. Each game began with 3 min dedicated to becoming familiar with the board setting and contemplating optional tactics. After playing four games (two games in one

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

variant of Study 1, one variant of Study 2 and Study 3), the students were asked to fill out a short demographic questionnaire and to briefly summarize the tactics they used in the games.

The basic scoring rule gave 200 points to a player who reached the goal square, 15 points for every chip the player possessed at the end of the game, and a deduction of 8 points for every square in the *Manhattan distance* of the player from the goal square, in case the goal was not reached. A player's performance in the game may depend on the performance of other players, if a non-zero "Other Player Dependency weight" (OPDwt) factor is included in the scoring function. In particular, in addition to his basic score, each player would receive the score of other player multiplied by the OPDwt value. By this addition, we are able to manipulate a profitable incentive for cooperating with other players.

3. Study 1 – Asymmetrical bargaining environment

In the first study we examined the influence of both social and profitable incentives on females and males in the CT bargaining environment. Particularly, we designed a board, in which there are two "self-sufficient" players, i.e. players who can make it to the goal square with the initial allocation of chips and are thus "independent", and two players who are dependent on these players. The dependency is set-up so that either independent player can provide the resources (chips) needed by the dependent players, but neither independent player can simultaneously provide all the resources both dependent players need. In particular, as shown in Fig. 1, each dependent player (the red "radioactivity" and the black "snail") needs a green chip and a blue chip and each independent player ("me" and the yellow "sun") has exactly one extra green chip and one extra blue chip.

We set three variations of the dependencies in this board:

(1) No teams are set and OPDwt = 0, which means that each player receives only his own basic score. Thus, there is neither social incentive nor profitable incentive for cooperation in this setting.
(2) The players are divided into pairs. Each pair consists of an independent player and a dependent player which are declared as a team. OPDwt = 0. Thus, there is only social incentive for cooperation in this setting.
(3) The same as in 2 but OPDwt = 0.9, which means that each player receives 90% of the score of the other team member in addition to his own basic score. Thus, there are both social and profitable incentives for cooperation in this setting.

Ten 4-player games were examined for each of the three settings of the board. Each player participated in two games: once as an independent player, and once as a dependent player. The behavior of the players was measured by their own basic score (before the OPDwt weighting), as well as their companion's basic score. We also consider the reliability-type which measures the extent to which the player has kept her exchange deal commitments. For each player we consider the number of deals that she made, termed d. We identify the number of deals that the player fully satisfies, termed f, and p, the number of deals the player partially satisfies, i.e. when she sends only part of the chips she has agreed to send. We define the level of reliability of a player as $(f + 0.5p)/d$. In this study we focus only on the independent players' behavior, since it is mainly their decision which

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

determines the results of the game. Therefore, we examine the behavior of 20 different participants in each of the three variations.

3.1. Results

The assumptions of the research consider the influence of gender and incentive on the cooperation of the independent players with the dependent players. In order to examine the influence of gender (male vs. female) and incentive (team with OPDwt = 0.9, team with OPDwt = 0, no team with OPDwt = 0) on the score gained in the game by the independent players and by their companions, we conducted a $2 \times 3 \times 2$ (gender × incentive × score's reference (self-score vs. companion's score)) repeated measures analysis of variance (ANOVA) with the score's reference as a within-subjects variable, and gender and incentives as between-subjects variables. The analysis revealed a significant difference between self-scores and companion scores ($F(1,54) = 76.20$, $p < .001$, $\text{Eta}^2 = 0.59$). While the independent players gained an average score of 293.95 points (SD = 31.76), their dependent companions gained only 176.63 points (SD = 100.27). This finding is not surprising, considering the fact that the independent players had a better initial position. The analysis revealed also a significant interaction between the score's reference, incentive and gender ($F(2,54) = 3.19$, $p < .05$, $\text{Eta}^2 = 0.11$). It is worthy to note that no significant difference was found between players who played their first game as independent players, and players who played their first game as dependent players.

In order to find the source of the interaction, simple effect tests were conducted in which 2×3 ANOVA's (gender × incentive) were examined for each one of the score's references. Results indicated a main effect of incentive on a *companion's score* ($F(2,54) = 4.40$, $p < .05$, $\text{Eta}^2 = 0.14$). In addition, the analysis found a significant interactive effect of incentive and gender on the companion's score ($F(2,54) = 3.29$, $p < .05$, $\text{Eta}^2 = 0.11$).

The interaction was further analyzed via Scheffe follow-up comparisons of the score means with each incentive for females and males, separately. Results indicated as depicted in Fig. 2 that females became significantly more cooperative with their team companions.

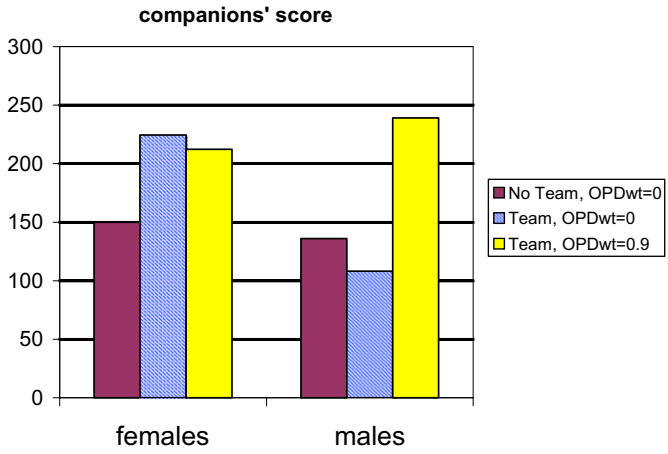

Fig. 2. Independent players' companion's score categorized by gender and incentives.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

The females' companions' score in the team setting (with OPDwt = 0) was higher than the average score of the two dependent players with no team setting. Males, on the other hand, showed no significant difference, and even showed a slight tendency against their team members, as can be seen in Fig. 2. In addition, it was revealed that the females' team companions (with OPDwt = 0) gained higher scores than the males' team companions (*t*-test, $p < .05$).

As for the influence of the profitable incentive (OPDwt), the Scheffe analysis revealed that while higher OPDwt had a significant cooperative influence on the males' behavior, it made almost no difference in the females' behavior. In particular, the males' companions gained higher scores in the positive OPDwt setting than in both OPDwt = 0 settings. Females, on the other hand, showed no significant difference between the positive OPDwt setting and the OPDwt = 0 setting with a team. Moreover, the females' companions in the OPDwt = 0 setting gained slightly higher scores than in the positive OPDwt setting, as can be seen in Fig. 2.

An analysis of the simple effects of the gender × incentive interaction revealed a main effect of incentive on the *self-score*, as well ($F(2,54) = 8.08$, $p = .001$, Eta^2=). A Scheffe follow-up analysis revealed that the males' self-score was significantly lower in the OPDwt = 0.9 setting than in the OPDwt = 0 with a team setting, apparently due to the willingness to self-sacrifice for the other's welfare with a positive OPDwt.

In order to examine the influence of gender and incentive on the *reliability level* of the independent players we conducted a 2 × 3 ANOVA (gender × incentive) with the reliability level as a dependent variable, which revealed a main effect of gender ($F(1,54) = 7.275$, $p < .01$, $Eta^2 = 0.12$) and a main effect of incentives ($F(2,54) = 3.56$, $p < .05$, $Eta^2 = 0.12$). The analysis also revealed a significant interaction between gender and incentive ($F(2,54) = 3.19$, $p < .05$, $Eta^2 = 0.11$).

The interaction was further analyzed via Scheffe follow-up comparisons of the reliability levels with each incentive for females and males, separately. Results indicated that males' reliability level was significantly higher in the positive OPDwt setting than in both settings of OPDwt = 0. Females, on the other hand, showed no significant difference between the positive OPDwt setting and the OPDwt = 0 setting. Moreover, females were even slightly more reliable in the OPDwt = 0 setting, compared to the positive OPDwt setting, as can be seen in Fig. 3. In addition, a significant difference was found between the males' and the females' reliability level in the team setting with OPDwt = 0 (*t*-test, $p < .01$). These findings are fully consistent with the results of the score analysis. The team

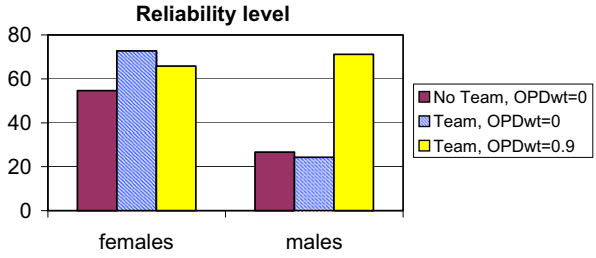

Fig. 3. Independent player's reliability level classified by gender and incentives.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

factor showed similar patterns of influence on the reliability level as well, though it did not reach a statistical significance.

4. Study 2 – Integrative bargaining environment

In the second study we examined gender differences in an *integrative* bargaining environment, in which cooperation is crucial for both sides. For this purpose, we designed a board in which neither player could reach the goal at the onset of the game. In the board there are two pairs of players, where in a given pair, each player needs two chips that can be provided only by the other player of the pair. We examined environments which encourage integrative agreements to find out whether males would still show lower cooperativeness with team members. In addition, the cooperative mood inspired by the environment may make a difference between different indistinct treatments. Thus, if the results of this study would be still similar to those of the previous one, it would significantly reinforce our findings concerning the different influences of social and profitable incentives on females and males.

For each of the three settings of the board (no team with OPDwt = 0, team with OPDwt = 0 and team with OPDwt = 0.9), we examined five games. Thanks to the symmetry of the board setting, we could examine the behavior of all four players in each game. Hence, as in Study 1, we collected data from 20 different participants in each of the three variations. The current study was based on the same participants as in Study 1, each participating in one of the three experiment variations, not necessarily in the same variation as she played in Study 1. In addition, the compositions of foursomes were different from Study 1. However, the experiment procedure and the behavioral measures were exactly the same. The participants were not allowed to talk to each other during or between the games.

4.1. Results

Our goal was to examine the influence of gender and incentive on the basic score gained in the game. We conducted a $2 \times 3 \times 2$ (gender $\times$ incentive $\times$ score's reference) repeated measures analysis of variance (ANOVA) with the score's reference as a within-subjects variable, and gender and incentives as between-subjects variables. The analysis revealed a significant interaction between incentive and gender ($F(2,54) = 3.66$, $p < .05$, $\text{Eta}^2 = 0.12$).

In order to find the origin of the interaction, simple effect tests were conducted in which 2×3 ANOVA (gender $\times$ incentive) were examined for each one of the score's references. Results indicated a main effect of incentive on the *companion's score* ($F(2,54) = 5.30$, $p < .01$, $\text{Eta}^2 = 0.16$). In addition, the analysis found a significant interactive effect of incentive and gender on the companion's score ($F(2,54) = 3.47$, $p < .05$, $\text{Eta}^2 = 0.11$).

The interaction was further analyzed via Scheffe follow-up comparisons of the score means by incentives for females and males, separately. As depicted in Fig. 4 the results indicate that females become significantly more cooperative with their team companions. The females' companions' score for the team setting (with OPDwt = 0) was higher than for the no team setting. The males, on the other hand, showed no significant difference, and even showed a slight tendency against their team members, as shown in Fig. 4. Thus,

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

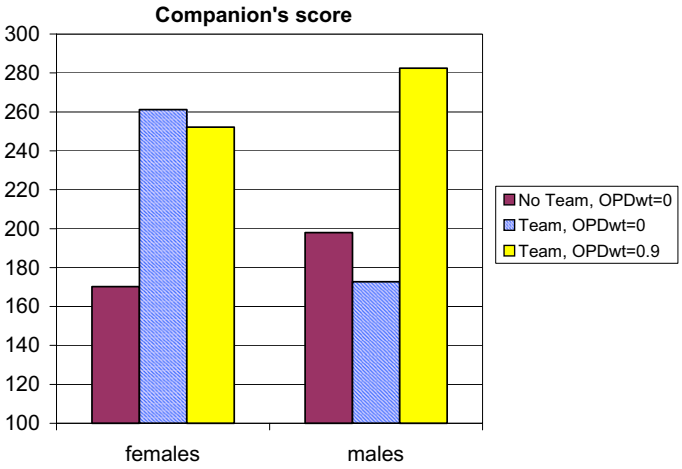

Fig. 4. Companion's score classified by gender and incentives.

the males' tendency not to cooperate, and in some cases even to discriminate against their team members, was encountered once again. In addition, the results revealed that the females' team companions (with OPDwt = 0) gained higher scores than the males' team companions (*t*-test, $p < .05$).

Concerning the influence of the profitable incentive (OPDwt), the Scheffe analysis revealed that while a higher OPDwt had a significant cooperative influence on the males' behavior, it made almost no difference in the females' behavior. In particular, the males' companions gained higher scores in the positive OPDwt setting than in both settings of OPDwt = 0. The females, on the other hand, showed no significant difference between the positive OPDwt setting and the OPDwt = 0 setting with the team. Moreover, as in Study 1, the females' companions in the OPDwt = 0 setting gained slightly higher scores than in the positive OPDwt setting, as can be seen in Fig. 2. Thus, the results for the current board settings are not qualitatively different from the results of Study 1.

An analysis of the simple effects of the gender × incentives interaction revealed no significant effect on the *self-score*. However, there was a clear correlation between the self-score and the score achieved by the companion, as can be concluded from the similarity of Fig. 4 (companion's score) and Fig. 5 (self-score). This result is a consequence of the game setting, in which cooperation with other players yields a mutual beneficial outcome.

In order to examine the influence of gender and incentive on the *reliability level* of the independent players we conducted a 2 × 3 ANOVA (gender × incentive), which revealed no significant effect. This is mainly due to the fact that in the current study the males' reliability level was generally higher in the OPDwt = 0 settings, compared to Study 1. Apparently, the mutual independence encouraged fulfillment of agreements. However, the general pattern of the results was quite similar to the results of Study 1. In addition, there was still a significant difference between the males' and the females' reliability levels in the team setting (with OPDwt = 0). While the females' reliability level was 69% (SD = 35), for the males it was only 36% (SD = 29) (*t*-test, $p < .05$).

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

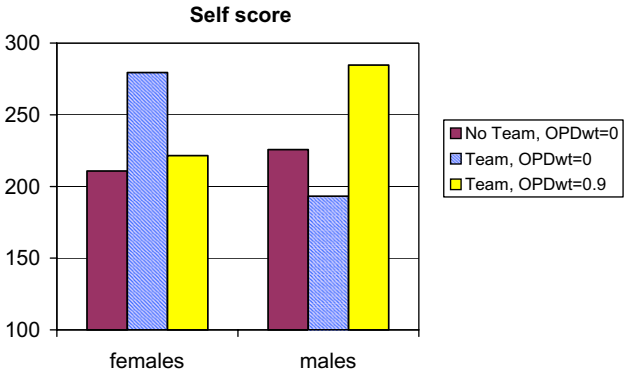

Fig. 5. Self-score classified by gender and incentives.

5. Study 3 – A non-reciprocal companion

In this study we aspired to challenge the robustness of both the males' and the females' responses to profitable and social incentives, respectively. Therefore, we designed a CT board in which a non-reciprocal automated agent was paired as a team companion of human players. Specifically, we designed and implemented a special agent, which we will refer to as the *greedy agent*, that agreed only to accept chips but did not agree to send chips. We let people play against the greedy agent on the same board as in Study 1, where people played the independent roles and the greedy agent played the dependent roles. We let half of the 60 participants think (incorrectly) that they were playing against another person, and the second half were told that they were playing against an agent. The board was set to OPDwt = 0.9, in order to examine whether the male participants are consistent with their profit dependent cooperativeness attitude, when their companion is not cooperative and even is an exploiter. Each person was teamed with one agent, in order to examine the females' faithfulness to a non-reciprocal team member. Although it has been found that females demonstrate in-group favoritism even when they do not expect reciprocity (Bourhis, 1994; Gaertner & Insko, 2000; Wang & Yamagishi, 2004), in the current case the team mate explicitly shows a non-reciprocal attitude.

5.1. Results

Examining the left side of Fig. 6 reveals that both males and females showed a low percentage of cooperativeness with the exploiter agent, when they thought it was human. Only 33% of the males and 25% of the females supplied their teammate the chips they needed, significantly less than the percentage of Study 1 under similar conditions, where 78% of the females and 82% of the males reached the goal (χ^2 test, $p < .05$). It appears that neither profitable nor social incentives can make most participants cooperate with a non-reciprocal opponent. Examining the right side of Fig. 6 reveals that males were much more cooperative than females when they knew they were playing against an automated agent (χ^2 test, $p < .01$). Knowing that the greedy teammate was non-human significantly changed the males' behavior (χ^2 test, $p < .01$), while this knowledge hardly influenced the females' behavior. This interesting finding will be discussed later in this paper.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

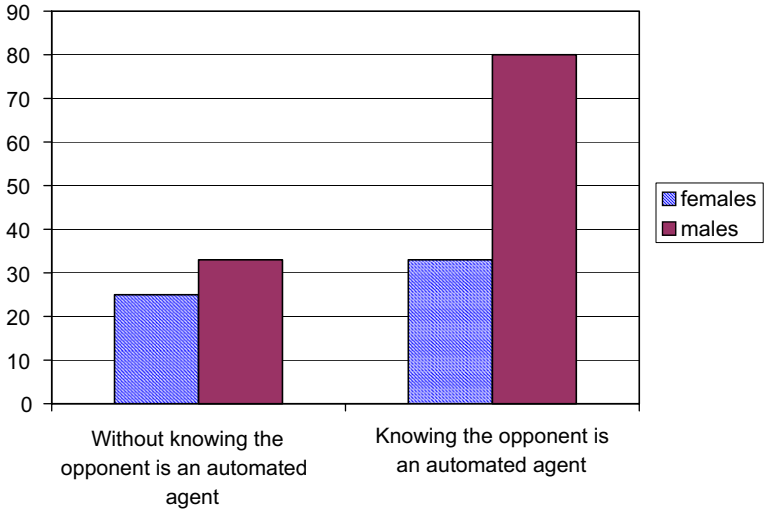

Fig. 6. Percentage of human players whose team mates agents reached goal. The left side presents results for players who thought they were playing with human opponents. The right side were aware to the fact that they were playing with automated agents.

6. Discussion

In this paper we examined the existence of gender differences in computer mediated negotiations. Typical male and female patterns of behavior were based upon the widely accepted general distinction proposed by Rubin and Brown (1975), and recently supported by a large meta analytical research (Walters et al., 1998). According to Rubin and Brown males are profit oriented, and they will increase their cooperativeness whenever it is worthwhile for their own outcome. Female negotiators, on the other hand, are relationship oriented, and are sensitive to interpersonal cues much more than monetary incentives. We checked these patterns by using external manipulations which encourage cooperativeness by either profitable or social incentives. We used the framework of the CT game as a negotiations environment. In the first study we designed a CT board in which two out of four players could reach the goal independently of other players. The results revealed that the profitable incentive (OPDwt factor) influenced the male cooperativeness level, while the females showed no change, consistent with Rubin and Brown's distinction. The social incentive (team factor) positively affected the females' cooperativeness, in contrast to the males, who became (not significantly) less cooperative with their team members. These different gender dependent behavior patterns were consistently observed in study 2, where we used an integrative bargaining platform which included mutual dependencies. Thus, it appears that the unique behavior of both genders are robust in the current CM environment either when integrative negotiation is encouraged or not. Results of the first study also reveal the females' consistent attitude despite their higher status as independent players. This finding may challenge theories which attribute gender differences merely to the difference in the males' and females' situational power positions (see: Watson, 1994a; Watson, 1994b).

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

Our findings reveal that both males' and females' basic behavioral patterns in negotiations are valid in CM negotiations, as well. This observation is not trivial; recall the phenomenon of decreased cooperation level of women in virtual negotiations, exposed by several researches mentioned above. Two optional explanations for this phenomenon were suggested by Stuhlmacher et al. (2006). The first attributes the females' change in behavior to their tendency to be perceived as more cooperative in FTF environments, because of social norms that expect them to behave cooperatively. When negotiating over a more restricted and anonymous media, they feel free to behave more naturally, and hence more competitively and hostile. Males, on the other hand, let themselves use a competitive attitude in FTF environments as well, since social norms favor competition among men. According to this explanation, the virtual environment actually explores the females' natural behavior, which appears to be quite similar to the males' behavior. This explanation, however, appears not to correspond with our findings. Both females' indifference to profitable incentive and their sensitivity to social incentive indicate that the females' behavior is much more intrinsic and genuine than just a public conformity.

The second explanation is based upon The *Psychological Distance* model, which suggests that virtual media leads to more depersonalization and less social impact than FTF interactions. This is because they have fewer informational cues and reduced communication and mutual interaction in the virtual media. Stuhlmacher et al. (2006) (as well as Guadagno & Cialdini, 2002) suggest that this reduced social influence would have a greater impact on females' behavior than on males' since females are more sensitive to social relations, as mentioned above. Hence, when there is greater psychological distance (less relationship), a female negotiator's concern for the other should diminish and result in her being less cooperative and more hostile. Males, on the other hand, who are less concerned with the social perspective show much less psychological distance dependent behavior. This explanation is based on the assumption that gender differences in FTF negotiations stems from the intrinsic differences between male and female attitudes, which is more suitable for our results. However, it appears that though psychological distance increases the females' hostility in virtual environments, it has no influence on more intrinsic characteristics of females' behavior: profit indifference and social relations sensitivity.

The barrier effect mentioned above, which was observed mainly in male populations, also seemingly does not influence CM negotiations. Reduced hostility in males' behavior was not found in Stuhlmacher and Citera's (2005) meta-analysis, nor was increased sensitivity to social cues found in the current CM environment. Nevertheless, a barrier effect may be revealed in negotiation settings which inspire more competitiveness among negotiators (Lewis & Fry, 1977; Sheffield, 1989). Further research that will examine gender affects on such negotiations is still required.

An interesting finding which emerged in these experiments shows males to have a less (though not statistically significant) cooperative attitude towards companions which are team members, compared to companions with no team setting, in both studies. This phenomenon is similar to the results of recent experiments which found a tendency of out-group favoritism among males and in-group favoritism among females (Wang & Yamagishi, 2001, 2004).[3] This phenomenon may stem from the males' unwillingness to

[3] Although in Study 1 of our research, when a choice had to be made between cooperating with an in-team or an out-team player, there was a significant preference for the former.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

take responsibility and to fetter themselves to a frame of a virtual team without any monetary value.

Two interesting findings also emerged in Study 3, where a non-reciprocal automated agent was paired as a team companion of human players. The first finding is that most participants, of both sexes, refused to cooperate with the non-reciprocal opponent, regardless of the profitable and the social incentives. It appears that though females may favor in-group members even without expecting reciprocity (Bourhis, 1994; Gaertner & Insko, 2000; Wang & Yamagishi, 2004), an explicit selfishness of a teammate is beyond their tolerance threshold. The second finding is a significant gender difference found in the attitude towards automated agents. Males were significantly more cooperative with these agents than females. In order to check the possibility that males and females perceive automated agents differently, we examined the denominations that the participants used in their summaries of tactics, when they referred to the agent. It was revealed that while 72.41% of males used non-human denominations, such as "agent" or "computer", only 42.86% of females used such denominations (χ^2 test, $p < 0.1$). The other 37.59% of males, and 57.14% of females used human denominations, such as "partner", "teammate", "player" and "opponent", although they were explicitly informed that they were playing against an "agent". Thus, it seems that females, more than males, perceive automated agents as humans, consistent with their explicit behavior in Study 3. This interesting gender difference in automated agent perception, which was also found in poker slot machine personification (Delfabbro & Winefield, 2000), calls for further exploration.

In the future, we would like to further examine some of the interesting phenomena which emerged in this study, such as males' in-group antagonism and different gender attitudes toward automated agents. In addition, we wish to explore other behavioral aspects of CM negotiations, such as reciprocity, reliability, fairness and rationality. A somewhat different direction of future progress would be to design an automated negotiator which will adjust its strategies according to its human opponent's gender identity, and thus improve its performance. This automated agent would also be able to identify a human negotiator gender identity, according to negotiation styles.

As demonstrated in this paper, exploring negotiation processes in CM environments is important for several reasons. First, it is necessary to understand the psychological and social effects of the computer environment, since it has become a serious framework where a great deal of our social relations and decision making take place. Second, the E-commerce has taken over a growing share of commercial transactions, and it is important both for companies and for customers to know relevant behavioral rules. The current research, for example, demonstrates that in CM environments males and females are driven by totally different incentives. Third, the computer mediation enables us to expose intrinsic and genuine motives of behavior without the masking of social influences. Thus, the computer functions as a very important research tool which enables us to discover typical behavioral characteristics and their causes. Future research in this area, therefore, should be of interest for economists, social psychologists and cognitive researchers.

Acknowledgments

We want to thank Barbara Grosz from Harvard university for her valuable comments.

We also want to thank Alice Stuhlmacher from DePaul University for sending us her important unpublished papers.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

References

Amichai-Hamburger, Y. (2005). Personality and the Internet. In Y. Amichai-Hamburger (Ed.), *The social net: Human behavior in cyberspace* (pp. 27–55). New York: Oxford University Press.

Bhappu, A. D., Griffith, T. L., & Northcraft, G. B. (1997). Media effects and communication bias in diverse groups. *Organizational Behavior and Human Decision Processes, 70*, 199–205.

Billig, M., & Tajfel, H. (1973). Social categorization and similarity in intergroup behavior. *European Journal of Social Psychology, 3*, 27–52.

Bordia, P. (1997). Face-to-face versus computer-mediated communication: a synthesis of the experimental literature. *The Journal of Business Communication, 34*, 99–120.

Bourhis, R.Y. (1994). Power, gender, and intergroup discrimination: Some minimal group experiments. In *Ontario symposium on personality and social psychology*, Vol. 7.

Brewer, M. B., & Silver, M. (1978). Ingroup bias as a function of task characteristics. *European Journal of Social Psychology, 8*, 393–400.

Buss, D. (1997). The evolutionary psychology of human social strategies. In E. Higgins & A. Kruglanski (Eds.), *Social psychology: Handbook of basic principles*. New York: The Guilford Press.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: an evolutionary perspective on human mating. *Psychological Review, 100*, 204–232.

Calhoun, P. C., & Smith, W. P. (1999). Integrative bargaining: Does gender make a difference? *International Journal of Conflict Management, 10*, 201–224.

Carnevale, P. J. D., & Isen, A. M. (1986). The influence of positive affect and visual access on the discovery of integrative solutions in bilateral negotiations. *Organizational Behavior and Human Decision Processes, 37*, 1–13.

Carnevale, P. J. D., Pruitt, D. G., & Seilheimer, S. (1981). Looking and competing: accountability and visual access in integrative bargaining. *Journal of Personality and Social Psychology, 40*, 111–120.

Danet, B. (1998). Text as mask: Gender, play, and performance on the Internet. In S. G. Jones (Ed.), *Cybersociety 2.0: Revisiting computer-mediated communication and community* (pp. 129–158). Thousand Oaks: Sage Publications.

Delfabbro, P. H., & Winefield, A. H. (2000). Predictors of irrational thinking in regular slot machine gamblers. *Journal of Psychology, 134*, 117–128.

De Waal, F. (1982). *Chimpanzee politics: Sex and power among apes*. Baltimore: Johns Hopkins University Press.

Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Hillsdale, NJ: L. Erlbaum Associates.

Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: evolved dispositions versus social roles. *American Psychologist, 54*, 408–423.

Gaertner, L., & Insko, C. A. (2000). Intergroup discrimination in the minimal group paradigm: categorization, reciprocation, or fear? *Journal of Personality and Social Psychology, 79*(1), 77–94.

Gal, Y., Pfeffer A., Marzo F., & Grosz B. (2004). Learning social preferences in games. In *National conference on artificial intelligence (AAAI), San Jose, CA*.

Galin, A., Gross, M., & Gosalker, G. (2007). E-negotiation versus face-to-face negotiation what has changed – if anything? *Computers in Human Behavior, 23*(1), 787–797.

Gefen, D., & Ridings, C. M. (2005). If you spoke as she does, sir, instead of the way you do: a sociolinguistics perspective of gender differences in virtual communities. *ACM SIGMIS Database, 36*(2), 78–92.

Grosz, B., Kraus, S., Talman, S., Stossel B., & Havlin M. (2004), The influence of social dependencies on decision-making. In *Proceeding of AAMAS 2004*.

Guadagno, R.E., & Cialdini, R.B. (2002). Online persuasion: An examination of gender differences in computer-mediated interpersonal influence. *Group dynamics: Theory research and practice. Special Issue on Internet Research*, 6, pp. 38–51.

Guadagno, R. E., & Cialdini, R. B. (2007). Persuade him by email, but see her in person: online persuasion revisited. *Computers in Human Behavior, 23*(2), 999–1015.

Guiller, J., & Durndell, A. (2006). 'I totally agree with you': gender interactions in educational online discussion groups. *Journal of Computer Assisted Learning, 22*(5), 368–381.

Kray, L. J., Thompson, L., & Galinsky, A. (2001). Battle of the sexes: gender stereotype confirmation and reactance in negotiations. *Journal of Personality and Social Psychology, 80*(6), 942–958.

Lewis, S., & Fry, W. (1977). Effects of visual access and orientation on the discovery of integrative bargaining alternatives. *Organizational Behavior and Human Decision Processes, 20*, 75–92.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008

Marzo, F., Gal, Y., Grosz, B., & Pfeffer, A. (2004) Social preferences in relational context. In *IV Conference in collective intentionality, Siena, Italy*.

Rickman, D. (1977). *Negotiations. Social-psychological perspectives*. Beverly Hills: Sage.

Rubin, J. Z., & Brown, B. R. (1975). Bargainers as individuals. In *The social psychology of bargaining and negotiation* (pp. 157–196). New York: Academic Press.

Sheffield J. (1989). The effects of bargaining orientation and communication medium on negotiations in the bilateral monopoly task: a comparison of decision room and computer conferencing communication media. In *Proceedings of the SIGCHI conference on human factors in computing systems: Wings for the mind*, March 1989, pp. 43–48.

Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes, 37*, 157–187.

Sonsino, D., & Sirota, J. (2003). Strategic pattern recognition – experimental evidence. *Games and Economic Behavior, 44*, 390–411.

Stuhlmacher, A. F., & Citera, M. (2005). Hostile behavior and profit in virtual negotiations: a meta-analysis. *Journal of Business and Psychology, 20*, 69–93.

Stuhlmacher, A. F., Citera, M., & Willis, T. (2006). Gender differences in virtual negotiations: A meta-analysis. In *Gender, Conflict, and Influence: New Directions and Findings, 21st Annual conference of the Society of Industrial-Organizational Psychology (SIOP)*, Dallas, TX.

Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American, 5*(223), 79–97.

Talman S., Gal Y., Kraus S., & Hadad M. (2005). Adapting to agents' personalities in negotiation. In *Proceedings of the fourth international joint conference on Autonomous agents and multiagent systems (AAMAS) 2005*, pp. 383–389.

Tooby, J., & DeVore, I. (1987). The reconstruction of hominid behavioral evolution through strategic modeling. In W. Kinzey (Ed.), *Primate models of hominid behavior*. New York: SUNY Press.

Walters, A. E., Stuhlmacher, A. F., & Meyer, L. L. (1998). Gender and negotiator competitiveness: a meta-analysis. *Organizational Behavior and Human Decision Processes, 76*(1), 1–29.

Wang, F. & Yamagishi, T. (2001). Outgroup favoritism and gender difference in China. In *The 4th annual conference of asian association of social psychology*. Australia: The University of Melbourne, July 10–13.

Wang, F., & Yamagishi, T. (2004). An experimental study on group identity and ingroup favoritism in China. *The 4th Academic Conference of Chinese Psychologists*. Taipei Academia Sinica, October 25–28.

Watson, C. (1994a). Gender differences in negotiating behavior and outcomes. Fact or artifact? In A. Taylor & J. Beinstein Miller (Eds.), *Conflict and gender*. Cresskill, NJ: Hampton Press.

Watson, C. (1994b). Gender versus power as a predictor of negotiation behavior and outcomes. *Negotiation Journal, 10*, 117–127.

Wilson, E. V. (2005). Persuasive effects of system features in computer-mediated communication. *Journal of Organizational Computing and Electronic Commerce, 15*(2), 161–184.

Please cite this article in press as: Katz, R. et al., Different orientations of males and females ..., *Computers in Human Behavior* (2007), doi:10.1016/j.chb.2007.02.008