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# The Need for a Female Perspective in Designing Agent-based Negotiation Support

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## ABSTRACT

This study investigates whether an agent-based Negotiation Training System (NTS) can teach women Strategic Empathy – a recently introduced negotiation strategy based on perspective taking - and whether this can improve their negotiation performance. Developed and tested through an interaction-based real-time experiment was a NTS that integrated instructions on how to utilize Strategic Empathy. Women in the experimental group showed significantly higher levels of perspective-taking compared to the control group, and their understanding and use of Strategic Empathy increased over time. Also, a significant positive effect was found of Strategic Empathy on women's self-efficacy. No significant positive effect was found of Strategic Empathy on persistence. The high cognitive load of the experiment and a lack of intrinsic motivation may have caused this finding. Overall, this work demonstrates the applicability of using NTS to teach Strategic Empathy, and its effectiveness for enhancing women's self-efficacy in salary negotiations.

## KEYWORDS

Negotiation Training Systems, Strategic Empathy, Perspective Taking, Women in Negotiation.

## 1 INTRODUCTION

To date, the majority of women hold an adverse attitude towards salary negotiations [39]. Women, in general, lack confidence and often are uncertain of when and how to bargain [4]. Many women don't dare to ask for something, are not aware that there is room for negotiation, or are afraid to offend or hurt the other [3]. Moreover,

due to low self-efficacy, inexperience, and low end-goals, women may respond to resistance with reduced persistence. While rejection is argued to be the start of a negotiation [46], few women persist after hearing "no" from their opponent [3, 29]. A lack of persistence has been argued to negatively impact negotiation performance and outcomes [3, 29].

A backlash is triggered when women adopt gender-incongruent behaviour such as self-promotion, competitiveness, authoritative leadership styles, or criticism [5, 24, 39]. The dilemma that arises from these findings is evident: while agentic negotiation strategies are most effective, women's negotiation performance and outcomes are negatively affected by such behaviors.

Recent studies argue that adoption of a process view rather than an outcome orientation may increase the effectiveness of negotiations [11, 15]. According to [46], negotiations are profound psychological processes in which empathy and emotional intelligence can lead to superior outcomes. Successful negotiators should focus on perspective-taking – i.e., attempts at understanding the opponent's incentives, desires, and boundaries [19]. This approach, frequently referred to as *Strategic Empathy*, suggests that a different set of traits, centered around social intuition, flexibility, and empathic capabilities, is significantly influential in negotiations [38, 39]. Interestingly, the elements stated as qualifications for effective negotiators according to Strategic Empathy are typically presented in the literature as female traits [4].

Strategic Empathy can increase women's self-efficacy as it promotes behaviour with which women are more familiar and confident. Furthermore, Strategic Empathy can enlarge a negotiator's perceived room for negotiation, with positive effects on both confidence and persistence.

This study investigates the effects of negotiation training based on strategic empathy to women by means of an agent-based negotiation training system (NTS). The NTS was tested in an online experiment to evaluate the effects on perspective taking, confidence and persistence. As a participant's initial Perspective Taking Ability may influence how successfully they embrace Strategic Empathy, the impact of this personality trait was also investigated. The following hypotheses are evaluated:

**H1** The NTS enables women to adopt Strategic Empathy.
**H2** Participants who adopt Strategic Empathy will be more confident in the negotiation.

H3 Participants who adopt Strategic Empathy will be more persistent in the negotiation.

H4 Participants with high Perspective-Taking Ability will be more confident and more persistent in the negotiation as they may adopt Strategic Empathy more easily.

Establishing a better understanding of effective strategies and possible designs for virtual training tools could enhance the effect and breadth of negotiation training. Women from different social backgrounds and geographic locations could be empowered to avoid the negative consequences of poor negotiations and break through the glass ceilings that hinder gender equality in the labour market.

## 2 RELATED WORK

Over the past decades, negotiation has become a popular topic within AI [18]. Especially advancements in the field of virtual agents have contributed to the fast-growing body of research on NTSs [21, 41]. Initially, the focus was on agent-to-agent negotiations. In such studies, agents exchange thousands of offers per second to determine the solution space and find the most economically efficient agreement. By simulating and analyzing different negotiation strategies and offering patterns, these systems structure negotiations and determine optimal decision-making [2, 22]. Then, negotiations are regarded mathematical problems to be targeted through systematic mechanisms, classical economic, and rational principles, such as game theory [13].

Such systems provide valuable insights for researchers on the complexity of negotiation structures and strategies, but the importance of linguistic and emotional aspects in the negotiation process are increasingly being acknowledged [2, 34]. Fully rational NTSs neglect unique characteristics of human communication and decision-making, and thus fail to imitate real-world human-to-human negotiations [22]. Human negotiators are influenced by not just economic trade-offs but also by subjective factors, such as losing face, reputation, and maintaining a good relationship [20]. Consequently, research has started to focus on establishing an understanding of the effect of interpersonal factors and the integration of Affective Computing [6, 19, 44].

Several systems have been introduced that allow participants to negotiate with human-like agents for training purposes. Systems such as conflict resolution agents [20], pocket negotiators [22], IAGO [31], and Bilat [23] effectively increase participants' negotiation skills. One major distinction between the different designs is the degree of freedom in communication. Interactivity in existing NTSs ranges from passive user interaction (such as a personalized voice-overs that articulate the negotiator's thoughts at each step [9]), or scripted interaction (where participants can choose their speech acts from a set of options in a menu [13]), to no textual input at all [22]. Others choose semi-interactive methods, in which participants react to an offer by selecting an option – i.e., accept, propose a counter-offer, or walk away – complement by argumentation, either in written or verbal format [40]. Design choices on interactivity levels mainly depend on the research narrative, the desired level of control, and technical feasibility [36]. Predefined response options are easier to implement and analyse, but hold

significant limitations for the analysis of verbal and non-verbal behaviour (certain emergent patterns of interaction will be neglected) [1].

Distinct NTSs have been introduced to enhance the skills of participants in various stages of negotiation. Some systems aim to enhance information gathering in the preparation stage by, for example, scraping salary benchmarks from the Web to help a participant set their reservation and target price. The majority of NTSs focus on the interactive part. Contrasting this, in this paper, agents are used to enable users to practice negotiation. Participants learn how to maximize personal or mutual gain, make effective concessions, and when to accept or walk away [22, 23]. This approach relates to the work of Gratch and Johnson [19], in which teaching perspective-taking is integrated in the interactive phase. Their agent expresses its aims through implicit information, providing patterns, to train a participant's perspective-taking capabilities.

## 3 NEGOTIATION TRAINING SYSTEM DESIGN

Following the negotiation set-up of Pocket Negotiator [22], the system designed for this paper focuses on a 6-issues negotiation task (salary, working hours, working from home, career opportunities, lease car, permanent contract). The scenario is described as a small technology company seeking new employees. Participants are job seekers that enter negotiation with the hypothetical employer. For each issue, a range is given within which agreement should be reached – i.e., to negotiate a salary between €2500 to €4500 a month.

The introduced NTS distinguishes four phases: a goal setting phase, an educational phase where the concept of strategic empathy is introduced, a practicing phase in which negotiation is practiced in interactive mode, and a feedback and reflection phase.

### 3.1 Goal setting

Jonker et al. [22] argue that the preparation phase should not only focus on enhancing a participant's understanding of strategies and principles, but also on their own preferences and objectives. Goal setting is argued to be an essential step towards effective negotiation and claiming value.

In the NTS designed for this study, Goal Setting was included by requesting participants to specify their target deal for each of the six negotiation issues for each round of negotiation. This encouraged them to take a moment to determine their own preferences, priorities, and boundaries.

### 3.2 Introducing Strategic Empathy

One of the major objectives of the present NTS was to educate women about Strategic Empathy, and to enable them to practice using it. The focus was on the perspective-taking element: A cognitive capacity of knowing another's internal states including thoughts and feelings – as also expressed in the definition by Holmes and Yahri-Milo ([15], p. 1): "The ability to take the perspective of others and understand their cognitive and affective states without necessarily sympathizing with them". Strategic Empathy is a negotiation strategy that advocates leveraging perspective-taking skills to gain crucial information on the cognitive and affective states of the opponent, so as to anticipate their behavior. In this paper, Strategic Empathy was characterized by the level of perspective-taking and

the extent to which this was effectively leveraged leading to a better negotiation outcome. Strategic Empathy was introduced with the method proposed by Galinsky et al. [12], as follows:

> "In preparing for the negotiation and during the negotiation, adopt Strategic Empathy. Take the perspective of the opponent. Try to understand what they are thinking in their situation. After reading your role, try to visualize yourself on the other side of the table, in that role, thinking as the opponent. Use the information that you have gained about the opponent in your argument supporting your bids."

## 3.3 Human-Agent Interaction

Participants interacted with the NTS through an agent, which was disembodied and text-based. This section describes (1) the role of the agent, and (2) the dialogue between the agent and the participant, as implemented in the agent-based NTS.

The agent takes on the role of a potential employer in a multi-issue negotiation task. Possible issues to negotiate on include salary, a company car, and the opportunity to work from home. A hard-headed agent design was implemented, which means that the agent would never fully agree with the participant. The interaction itself was carried out via text. The agent responded, while pre-scripted, with an array of variations in form.

The Dialogue Management System (DMS) determined which information was provided to the participant. It (1) provided the participant with information about the opponent prior to negotiation. To maintain a realistic scenario, this was presented as information the participant had retrieved through research and earlier conversations. The DMS (2) revealed this information to the participant through argumentation provided by the agent. The arguments adapted to the focus of the participant, as specified by the participants themselves via a choice of an argumentation theme. The responses were topic-specific and generic enough to be applicable. Each argument contained some insights on the agent's position, incentives, or constraints.

The dialogue was agent-initiated – i.e., the agent made the first offer (see Figure 1). The participant always had three options with which to respond to the offer. She could accept, propose a counter-offer or walk away. If she chose to opt for a counter-offer, she was asked to specify the issue to discuss (the argument theme), as well as to provide argumentation (with a minimum of 200 characters). Based on the selected argument theme, the agent returned a response (the content of which was determined by the DMS).

The DMS kept track of the choice behaviour of the participant, and fed the agent appropriate responses to avoid repetition of answers.

In addition, the agent introduced ultimatums, signalling that there was no further room to negotiate based on the state of the negotiation (determined by the DMS). During the negotiation, the agent communicated statements such as: "This is the best I can do". A positive feedback mechanism encouraged participants to ignore the signalled ultimatum and to propose a counter-offer. Persistent behaviour of participants was rewarded by a better bid from the opponent.
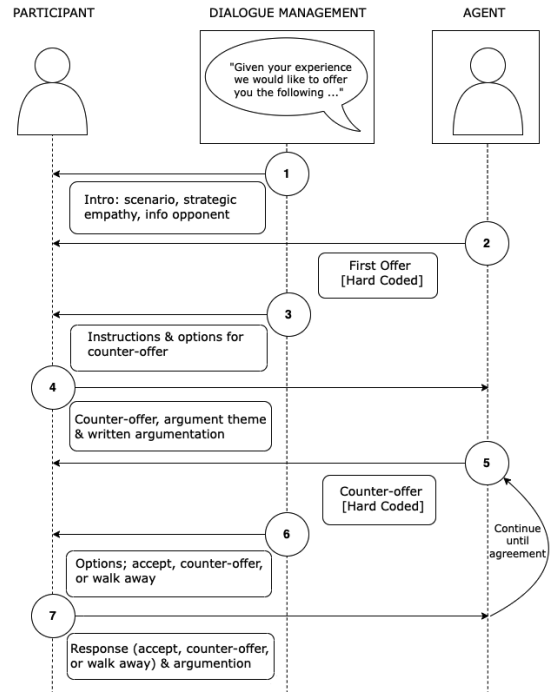


**Figure 1: Interaction Design Overview**

## 3.4 Evaluation and Reflection

Reflection through evaluation and feedback is essential to learning and growth processes [21]. Research shows that learning is enhanced through engaging cognitively and emotionally, and through reflecting upon one's own actions [24]. In the present NTS, actionable feedback was provided on the basis of assessment of participants' negotiation outcomes and the factors that had shaped this outcome. The NTS included performance metrics for persistence, Strategic Empathy, and negotiation performance, on which feedback was based.

## 4 EXPERIMENT

This research obtained the ethical approval of the Ethics Committee from Delft University of Technology, the Netherlands.

## 4.1 Participants and design

A total of 141 women participants were randomly assigned to either the experimental (received Strategic Empathy instructions) or the control group (received only general instructions) of a negotiation exercise. Thirty participants failed to complete the experiment, and were removed from the sample. The final sample, used for the analyses presented below, thus included 111 women participants (experimental group: 56, control group: 55). The majority of the participants were between 18 and 24 years old (52.2 percent), and more than a third was between 25 and 34 of age (31.9 percent). The most common mother tongue among the participants in the sample was English (32.4 percent).

## 4.2 Protocol

Online crowd-sourcing platform Prolific Academic™ was used to recruit the majority of the participants. This platform is dedicated to connecting researchers to high-quality research participants, based on a number of quality filters.

The filters for this study were as follows: (1) recruited participants had to exclusively be female; (2) a high proficiency in English was required, as the NTS was set in English, and the formulation of negotiation arguments was considered a vital element of the experiment; (3) participants had to have successfully completed more than 10 studies on the survey platform, and (4) had to have a 95 percent or higher approval rate from earlier studies.

Via a Qualtrics™-link, recruited participants were directed to the landing page with the opening statement, a brief introduction to the study, and informed consent questions. First, a personality test was administered (see measures below). Next, participants were randomly assigned to the experimental or control group of the negotiation experiment, which consisted of three stages: an introduction part and two rounds of negotiation (T1 and T2).

After finishing T1, participants were asked to fill out a couple of reflection questions on their own negotiation performance. Participants in the experimental group also had to answer six questions about their own perceived Strategic Empathy understanding and performance. All participants received general feedback on the negotiation. Next, participants were given the link to the second negotiation exercise T2. To separate the two exercises, a bogus game was conducted prior to T2. Importantly, T2 was identical to T1. Also, participants remained in the experimental or control group they had initially be assigned to. Upon completion of T2, participants were thanked for their participation. They received a completion code that proved their successful participation in the experiment.

## 4.3 Measures

Several self-report and linguistic measures were collected as presented in this section.

*4.3.1 Perspective-Taking Ability.* People differ in their ability to establish an understanding of other people's intentions and priorities. While this is an ability that can be learned, some people are inherently more aware of others, and inherently better at understanding another person's point of view. The degree to which people possess this personality trait is referred to as Perspective-Taking Ability [7, 12]. The ability to adopt Strategic Empathy and gain insights about the opponent may depend on this individual difference measure.

As in related studies [28, 45], the IRI perspective-taking questionnaire [7] was used to assess participants on their self-reported perspective-taking ability. Participants indicated to what extent they agree or disagree on ten different statements describing their own behavior and mindset towards others on a five-point Likert scale, ranging from 1 ("Does not describe me well") to 5 ("Describes me very well"). The sum scores for perspective-taking ability were converted into low and high perspective-taking ability categories by means of a median split.

*4.3.2 Strategic Empathy.* The evaluation of Strategic Empathy is a challenging and fairly unaddressed topic of research – partially due to the lack of a generally accepted definition. In this study, Strategic Empathy was operationalized by a set of linguistic measures from the Linguistic Inquiry and Word Count (LIWC) [37]. The LIWC provides the overall percentages of words in a given text, falling into a linguistic, psychological or topical categories [42].

The analysis of linguistic characteristics, such as pronouns, verbs, adverbs, and word length, can reveal a negotiator's attentional allocation, level of cognitive complexity, and perceptual processes – all effective measures for the level of perspective-taking [28, 42, 45].

The effectiveness of the NTS in the teaching of Strategic Empathy was assessed using: i) the number of second-person singular pronouns (you, your, your), ii) the number of words belonging to the cognitive LIWC category (words related to thought and reasoning, e.g. think, know, consider, cause, should, would, guess), and iii) the perceptual LIWC category (language describing observations and senses, e.g. hear, feel, view, see, touch, listen ). These linguistic categories were chosen to identify the level of perspective-taking from the argumentation provided by the participants.

*Attentional Focus.* The number of second-person pronouns was used to measure attentional focus. Quantifying the number of instances of second-person pronouns present in a participant's argumentation indicates whether one is self or other-oriented [33]. For each participant, two attentional focus scores were calculated: one for T1, and one for T2. They were computed by summing all instances of second-person pronouns in the participant's arguments (one piece of argumentation per counter-offer). This sum score was divided by the total number of words used by the participant. Hence, the number of instances was normalized by the number of words used by the participant in that particular experiment round.

*Perceptual and Cognitive LIWC Category.* The LIWC Perceptual Processes included language describing observations and senses. In a negotiation context, this would relate to statements such as "I can hear that I this is an important issue for you" and "I see that you are very passionate about your work". The Cognitive Mechanisms in LIWC referred to language related to thoughts and reasoning, and tapped statements in negotiation such as "I understand your concern" and "I know this is important to your company". Similarly to the first metric, the scores were calculated by counting the number of instances of the category words used by the participant in T1 and T2, and normalized accordingly.

*Cumulative Feature.* To assess whether the teaching of Strategic Empathy resulted in strategically emphatic behavior in the NTS, a collective score was calculated of all three linguistic features mentioned above. To do so, the mean was taken of all three metrics per round. Hence, two overall linguistic scores were calculated per participant, one for T1 and the other for T2.

*4.3.3 Self-Perceived Strategic Empathy.* At the end of each negotiation round, participants were assessed on their understanding and self-perceived performance of Strategic Empathy (experimental group only). The questions, originating from [16], assessed the extent to which participants perceived they: i) understood Strategic Empathy, ii) put themselves in the other's shoes, iii) leveraged the Strategic Empathy for the creation and argumentation of their bids. One question was included to determine the extent to which they

**Table 1: Descriptive statistics Confidence for experimental (1) and control (0) groups.**

| Time | Group | N | Mean | Std. | Skewness |
|------|-------|-----|-------|-------|----------|
| T1 | 0 | 55 | 24.49 | 23.66 | 1.05 |
|    | 1 | 56 | 26.57 | 29.62 | 0.81 |
| T2 | 0 | 55 | 12.38 | 19.51 | 1.82 |
|    | 1 | 56 | 31.73 | 29.85 | 0.54 |

**Table 2: Descriptive statistics Persistence for experimental (1) and control (0) groups.**

| | Group | N | Mean | Std. | Skewness |
|------|-------|-----|-------|-------|----------|
| T1 | 0 | 55 | 2.07 | 1.59 | 0.87 |
|    | 1 | 56 | 1.52 | 1.25 | 0.71 |
| T2 | 0 | 55 | 2.27 | 1.54 | 0.46 |
|    | 1 | 56 | 1.61 | 1.33 | 0.86 |

would recommend Strategic Empathy to their friends. All the questions were answered on a five-point Likert scale (from 1: "Highly disagree" to 5: "Highly agree").

*4.3.4 Confidence.* The confidence level of participants in negotiation was investigated via the LIWC linguistic metric Clout. Clout is a nontransparent summary variable indicating the level of confidence conveyed in the text [32]. Clout determines whether someone is writing from a perspective of confidence and certainty, or in a doubting and uncertain manner [42]. The level of confidence was analysed across groups (experimental and control) and over time (T1 and T2).

*4.3.5 Persistence.* Persistence was measured by the number of counter-offers the participant provided in T1 and T2, respectively. The level of persistence was equal to the number of counter-offers made by the participant up until an agreement was reached, or either party had walked away from the negotiation. Two persistence scores were calculated per participant, one for each negotiation round (T1 and T2).

## 5 RESULTS

This section presents the descriptive statistics, followed by the results of the hypotheses tests. The data were analyzed in the open source statistics software package JASP [17].

### 5.1 Descriptive statistics

The descriptive statistics for the participants' linguistic confidence levels are presented in Table 1. As explained in section 4.3, confidence was assessed based on LIWC's Clout variable. In the table, the data is split on the Confidence levels in the first (T1) and second round (T2), and further split between the experimental (1) and control group (0). The skewness levels affirm the assumption of normality (as all values are below an absolute value of 2) [10].

Table 2 summarizes the descriptive statistics for the participants' persistence levels. As introduced in section 4.3, persistence was operationalized by the number of counter-offers made. The data is
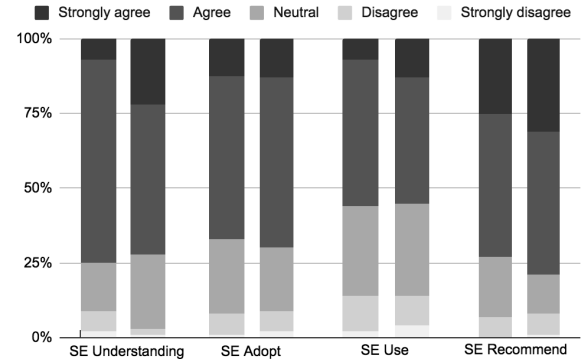


**Figure 2: Level of Self-Perceived Strategic Empathy Skills Experimental Group after first (left) and second (right) round.**

**Table 3: Descriptive Statistics Self-Perceived Strategic Empathy Experimental Group**

| Question | Time | Mean | Std. | Skewness |
|----------|------|------|------|----------|
| Understand |    | 3.74 | 0.75 | -1.45 |
| Adopt | T1 | 3.74 | 0.77 | -0.51 |
| Use |    | 3.51 | 0.81 | -0.35 |
| Understand |    | 3.89 | 0.87 | -1.50 |
| Adopt | T2 | 3.73 | 0.89 | -1.54 |
| Use |    | 3.47 | 1.03 | -0.86 |

split on the Persistence levels in the first (T1) and second round (T2), and further split between the experimental group (1) and control group (0). The assumption of normality is again confirmed, as all values of skewness are below an absolute value of 2 [10].

At the end of each negotiation round, participants were asked to reflect on their understanding of, and self-perceived performance in, Strategic Empathy (experimental group only). Figure 2 presents the distribution of the answers after the first and second round, for i) the level of understanding of Strategic Empathy, ii) the degree to which they put themselves in the other's shoes (adopted Strategic Empathy), and iii) the degree to which participants had used Strategic Empathy in the creation of arguments and bids.

The majority of participants felt they had successfully understood, adopted, and used the strategy. Moreover, the self-reported understanding of Strategic Empathy slightly increased in T2 (M = 3.89, SD = 0.88) compared to T1 (M = 3.745, SD = 0.75), see Table 3. Self-reported adoption and use remained fairly stable across the two rounds, with a slight decrease in T2.

### 5.2 Hypothesis testing

*5.2.1 Learning Strategic Empathy.* To assess the extent to which the NTS effectively explained and encouraged the adoption of Strategic Empathy, the linguistic patterns across the experimental and the control group were analysed. The mean of all three linguistic perspective-taking metrics was used to assess the frequency of words used. The results of a repeated measures Analysis of Variance
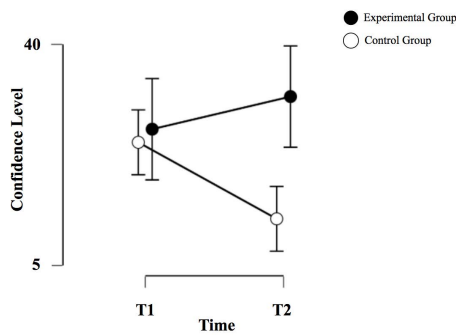
Figure 3: Confidence Levels of the Experimental Group across T1 and T2



(a) Low PTA

(a) High PTA

Figure 4: Interaction Effect between Strategic Empathy and Perspective-Taking Ability on Persistence

(ANOVA) showed a strongly significant overall effect of the experimental condition on the use of the linguistic features (F(107)=38.230, p<0.001, $\eta^2$ = 0.261). Moreover, the frequency of use of linguistic features increased significantly from the first round (T1) to the second round (T2) (F(107)=6.564, p<0.05, $\eta^2$ = 0.042). In particular, the interaction between the experimental condition and the frequency of linguistic features across the different rounds was highly significant (F(107)=40.497, p<0.001, $\eta^2$ = 0.262). This indicated that the experimental group leveraged Strategic Empathy, and that the level of Strategic Empathy had increased in the second round (T2) compared to the first round (T1).

*5.2.2 Strategic Empathy and Confidence.* The effect of Strategic Empathy on Confidence was tested with the LIWC metric Clout. The level of Confidence was analysed in a repeated measures ANOVA across groups and over time. The argumentation of the experimental group contained a significantly higher level of Confidence than that of the control group (F(107)=10.140, p<0.01, $\eta^2$ = 0.085), see Figure 4. Moreover, in the experimental group, the level of Confidence was found to significantly increase from T1 to T2 (F(107)=4.264, p<0.05, $\eta^2$ = 0.038), while the level of Confidence of the control group decreased. The teaching of Strategic Empathy exerted a significantly positive effect on the participants' level of Confidence. This confirms the first hypothesis.

*5.2.3 Strategic Empathy and Persistence.* The second hypothesis predicted a causal effect between Strategic Empathy and the participant's level of Persistence. Participants adopting Strategic Empathy were expected to be more persistent in their negotiation than those who did not adopt Strategic Empathy. Contrasting predictions, Strategic Empathy did not have an overall positive effect on Persistence, (F(107)=0.13), p=0.719). Over the whole, the control group was significantly more persistent in negotiation than the experimental group (F(107)=3.944, p=0.05, $\eta^2$ = 0.035). For both the experimental and the control group, a repeated measures ANOVA showed that the level of Persistence did increase across the two rounds (*experimental*: T1: M = 1.52, SD = 1.25, T2: M = 1.61, SD = 1,33; *control*: T1: M = 2.07, SD = 1.60, T2: M = 2.27, SD = 1.51), but this trend was not significant (F(107), p = 0.128).

This unexpected result may have had to do with fact that the degree of Adoption was not taken into account. That is, the level of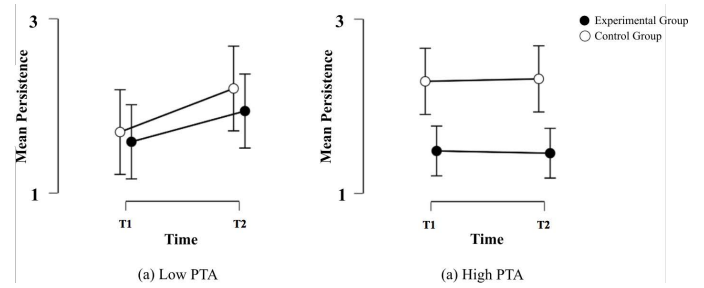 Strategic Empathy exercised by the participants within the experimental group could have varied also depending on level of understanding, effort, and abilities. This variance in Adoption may have had an impact on the overall effect of Strategic Empathy on Persistence. To investigate this alternative explanation in more detail, the effect of the degree of Strategic Empathy on Persistence was analysed. The linguistic features (mean score) were taken as a proxy for the degree of adoption of Strategic Empathy. A significant effect, indeed, was found of the frequency of use of linguistic features on the level of Persistence (F(104) = 116.819, p < 0.001, $\eta^2$ = 0.485). Also, a strong significant correlation was found between the overall linguistic features (mean score) and Persistence, both in T1 (r(56) = 0.55, p<0.001) and T2 (r(56) = 0.64, p < 0.001). Figure 6.11 depicts the correlation in the different rounds. This pattern of results seems to suggest that participants, who really embraced Strategic Empathy (measured by linguistic features), were more persistent in their negotiation.

*5.2.4 Strategic Empathy and Perspective-Taking Ability.* The third hypothesis predicted a causal relationship between a participant's Perspective Taking Ability, Confidence and Persistence. That is, the participant's initial Perspective Taking Ability was expected to influence the degree to which someone successfully understands, learns and leverages Strategic Empathy. Participants who scored high on Perspective Taking Ability were expected to more easily adopt Strategic Empathy, and thus to be more confident and persistent in the negotiation.

The results of a repeated measures ANOVA indicated that Perspective Taking Ability did not have a significant effect on the level of Confidence (F (107) = 0.004, p = 0.949). Also the interaction between Confidence and Perspective Taking Ability was not significant (F(107) = 0.191, p = 0.663).

Likewise, a repeated measures ANOVA showed no significant overall effect of Perspective Taking Ability on Persistence (F(107) = 0.014, p = 0.907). However, the interaction effect between Persistence and Perspective Taking Ability did reveal a trend towards what was hypothesized, F(107)=2.315, p=0.131. This is, why this interaction effect was further decomposed in a simple main effect analysis. This type of analysis is designed to look into an overarching interaction term from within one (low or high) level of a main effect (hence, 'simple' main effect analysis) [14]. This analysis revealed a significant simple effect of Perspective Taking Ability within the Persistence x Strategic Empathy interaction. This simple

effect within the interaction existed for women who scored high on Perspective Taking Ability (both in T1: $F(107) = 5.075$, $p < 0.05$; and in T2: $F(107) = 6.838$, $p < 0.05$), but not for women who scored low on Perspective Taking Ability (neither in T1 nor in T2; $F(107) = 0.214$, $p = 0.646$). However, this significant finding was contrary to what was predicted. Women with high Perspective Taking Ability had been significantly more persistent in the control group than in the experimental group, see Figure 4. This hypothesis, therefore, had to be rejected.

## 6 DISCUSSION

This study provided evidence that NTSs can be used to teach effective negotiation based on Strategic Empathy. The results show that participants, to whom the strategy was taught, adopt Strategic Empathy in the negotiation. Moreover, a learning curve was found, as Strategic Empathy levels were shown to increase from the first to the second round. These findings were complemented by the levels of Strategic Empathy that participants reported to have used. The majority of women under study felt that they had successfully understood, adopted, and utilized the strategy in the negotiation. In addition, more than 75 percent of those participants stated that they would recommend Strategic Empathy to their friends. The study, therefore, provided evidence that the NTS, within which Strategic Empathy was integrated, worked!

The findings are in harmony with earlier psycholinguistic literature [27, 28, 42, 45], as they revealed that cognitive processes, such as perspective-taking, are conveyed in language through linguistic patterns. These results also give direction to further research on Strategic Empathy evaluation metrics, and contribute to the scarce body of research on automated evaluation of empathy and Strategic Empathy [1, 35].

Confidence has proven to be crucial to negotiation, hence the findings support the predicted value of teaching Strategic Empathy to overcome the lack of confidence that is hindering women's negotiation success [12, 43, 47]. In doing so, this study contributes to the knowledge gap on effective strategies to enhance women's self-efficacy in salary negotiation [26, 30]. As such, it complements the existing body of research on this topic, as limited studies have investigated the effect of perspective-taking on a negotiator's confidence.

One limitation of this research is the exclusion of male participants from the study. This rendered it impossible to compare the negotiation performance of women with a reference group (men). As a consequence, we do not really know yet, how well women are doing in their negotiations relative to men. In future study with our NTS, this mistake should be rectified. This and other variations, such as accounting for opposite genders, are interesting and also necessary designs for future research.

In contrast to expectations, no overall positive effect was found of Strategic Empathy on persistence. In fact, the control group showed significantly more overall persistence than the experimental group. This difference in persistence turned out to be particularly strong for one specific subgroup: women who scored high on Perspective-Taking Ability. Also, within the experimental group, it was this very group of women (i.e., with high Perspective-Taking Ability),

who appeared to be less persistent in negotiation than those with low Perspective-Taking Ability.

A number of factors may have contributed to this unexpected finding. First, the majority of our participants was selected via survey platform Prolific Academic™, and recruited from the pool of available participants with 95 percent or higher approval rates. Higher extrinsic motivation (focused on obtaining (monetary) rewards [8]), may have played a more than substantial role in their participation. This could have influenced their level of persistence in the experiment. Second, the overall difference in persistence between the groups could be due to the time- and energy-consuming nature of our experiment. Especially for the experimental group, the NTS design included a number of additional preparation steps. Consequently, the non-significant effect of Strategic Empathy on persistence could be due to the substantial cognitive load of the experiment for the experimental group [19].

The opposite change in confidence level of the control group versus the experimental group observed in the NTS is surprising. One explanation may be that this was due to the abstract nature of our experiment. The confidence level of women in the control group may have dropped, because they did not experience the natural satisfaction that comes with closing the deal in successful – real – negotiations. All the more impressive that the women in our experimental group were capable of gaining confidence under those abstract circumstances. In future research, we will include individual differences in women's cognitive style to the design. Cognitive style tends to influence the extent to which people deal with – and learn from – abstract (vs. more specific) information systems [25]. As such, it may partly explain for which type of participant drastic changes in confidence in interaction with the NTS are to be expected.

Finally, further research will focus on further expansion of automated Strategic Empathy metrics, agent behavior, and on enhancing the system architecture. We will focus in future research endeavors on allowing participants to raise questions about the negotiator and the negotiation task, and to more interactively engage with the agent. Among others, this added functionality should be able to increase the participants' level of understanding of Strategic Empathy, while lowering the adverse effect of cognitive load and extrinsic motivation.

## 7 CONCLUSION

This study presented a study with an agent-based NTS, designed to train women on how to negotiate their salary and job conditions while using Strategic Empathy. Women's negotiation performance increased. In general, the agent-based NTS positively affected participants' perspective-taking ability in their argumentation. Also, the NTS managed to increase Strategic Empathy in repeated use of the system. Over the whole, this indicated that the NTS worked according to predictions.

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