

# The impact of negotiators' motivation on the use of decision support tools in preparation for negotiations

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## Abstract

Thorough preparation for a negotiation is considered critical for the achievement of successful relational and substantive results. Careful specification of preferences and determining the negotiation offer scoring systems is one of the most important preparation activities. To facilitate this process, preference elicitation aids have been designed and implemented in decision and negotiation support systems (NSSs). This paper shows that negotiators' motivation affects the use of simple elicitation aid and elicited preferences. We identify three types of motivations: epistemic, social, identity, and assign the factors that describe them. Then, using the dataset from electronic negotiation experiments, we apply logistic regression to identify those motivations that allow distinguishing negotiators who make errors in the determination of the scoring systems from those who do not make them. The key result allows us to identify relational- and learning-oriented goals of the identity motivation as having a significant and direct impact on the negotiators' classification. Accommodating and competing approaches of social motivation impact agents' accuracy with the differences observed for gender. Surprisingly, epistemic motivation represented by rationality and experientiality factors does not affect users' accuracy in the prenegotiation phase. The results obtained can be used to design decision support tools adjusted to the motivational profiles of the NSS users.

**Keywords:** negotiation experiments; preferences; scoring systems; motivation; logistic regression; negotiation support

## 1. Introduction

Negotiations are mixed-motive processes where negotiators cooperate to reach an agreement as well as compete to claim resources (Lax and Sebenius, 1986). Elfenbein (2015) provides a systematic review of individual differences in negotiation, such as background characteristics, abilities,

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personality traits, expectations, beliefs, and motivations. Out of this list, motivation is considered to be one of the key reasons for negotiators to behave in a particular manner.

In negotiations, social motivation is particularly important (Van de Vliert and Kabanoff, 1990; Rhoades and Carnevale, 1999; Harinck and De Dreu, 2011) because it is related to the attention people pay to their own and others' interests (McClintock, 1977; McClintock and Van Avermaet, 1982). Various studies show that traits such as the negotiators' risk attitude, emotions and culture, as well as the negotiation context, affect the impact of social motivation on the negotiation process and outcomes (Tjosvold and Sun, 2002; Callanan et al., 2006). Carnevale and De Dreu (2006) and De Dreu (2004) proposed a classification of motivation which, besides social motivation, also includes epistemic and identity motivation. Epistemic motivation can be understood as the desire to develop and hold accurate and well-informed conclusions about the world, which are dependent on the general ways people process available information to build knowledge (De Dreu and Carnevale, 2003). Identity motivation is based on the premise that people use identities to prepare for action and make sense of the world around them (Oyserman, 2015). Motivation also appears to be important in representative negotiations, where external agents negotiate on behalf of their principals. In such cases, the agents' motivations and incentives may not align with those of their principals. Hence, agents may perceive the negotiation problem differently and formulate different goals, aspirations, and reservation levels that may affect the negotiation results (Miller and Whitford, 2002; Lee and Thompson, 2011). The fact that each negotiator comes to the negotiation table with a different mix of motivations may affect the negotiation process and outcomes that the parties achieve.

To support parties in their negotiations, negotiation analysis has developed tools that aim to (1) make the entire process fluent, (2) assure that negotiators do not end in deadlock, and (3) assure that they negotiate efficient and mutually satisfying agreements (Raiffa et al., 2002). These tools are often implemented in negotiation support systems (NSSs) or electronic negotiation systems (eNSSs) such as Inspire (Kersten and Noronha, 1999), Negoisst (Schoop et al., 2003), Smart-Settle (Thiessen and Soberg, 2003), or eNegotio (Wachowicz and Roszkowska, 2021). The support offered by these systems extends to all the phases of the negotiation process, including prenegotiation preparation, the actual conduct of negotiation, and the postnegotiation phase. Prenegotiation is considered crucial from the viewpoint of successful negotiation (Zartman, 1989; Peterson and Shepherd, 2010). Within this phase, parties conceptualize the negotiation problem, build its formal structure, and define their goals and preferences. Formal tools proposed by negotiation analysis to support these tasks derive mainly from decision making theory and multiple-criteria decision aiding (MCDA) (Ehrgott et al., 2010). They allow for the building of formal scoring systems that represent the preferences quantitatively and may be used to evaluate the negotiation history, concession strategies, and the quality of the negotiation agreement. If the agents wish to represent their principals' interests well and negotiate good contracts, then they should pay attention to mapping the principals' preferences into the formal scoring system adequately. However, different factors may impact an agents' accuracy in determining the scoring systems. As behavioral agency theory posits, agents can have various motivations and goals that do not fully reflect their principals' goals (Kersten et al., 2013; Pepper and Gore, 2015). Despite the fact that the importance of preparation has been stated unequivocally (e.g., Raiffa et al., 2002; Lax and Sebenius, 2007), there is a lack of experimental studies on the preparation and its antecedents (Jang et al., 2018). Thus, studies focused on the assessment of motivation and its impact on

preparation should contribute to our understanding of the agents who negotiate on behalf of their principals.

The purpose of this paper is to investigate which epistemic, social, and identity motivation factors impact the ordinal errors that agents make while building their scoring system during prenegotiations. Motivational factors are determined through three instruments. The first one is the Rational-Experiential Inventory (REI) test (Epstein et al., 1996) that allows distinguishing between two information processing systems; rational and experiential. The second is the Thomas–Kilmann Conflict Mode Instrument (TKI) (Thomas and Kilmann, 1974), which allows measuring negotiators' attitudes in conflict situations; it describes the bargaining profiles that implement the dual concern concept and the dimensions of assertiveness and cooperativeness and thus can be used to measure social motivation. Finally, the negotiation's substantive, relational, and learning goals are measured by the modified Subjective Value Inventory (SVI), that is, the test for substantive, relational, learning (SRL) goals (Kersten et al., 2013). Since gender is often raised as a factor that differentiates negotiation approaches, processes, and outcomes (Kray and Thompson, 2005; Kolb, 2009; Stuhlmacher and Linnabery, 2013), we will also look at its impact on prenegotiation preparation.

In this study, we analyze bilateral-negotiation experiments facilitated by the Inspire NSS (Kersten and Noronha, 1999). The agents were given information describing the priorities of their principals, both in verbal and graphical format. A simple direct rating technique was used to determine their scoring systems (Raiffa et al., 2002). We used a logistic regression model to differentiate between two classes of agents: those who made ordinal errors in determining the scoring systems that represent their principals' preferences inaccurately, and those who did not make such errors. Using motivational factors as predictors allowed us to assess to what degree motivational change impacts the chance that negotiators move from one class to the other.

The main contribution of this paper is the identification of a mix of motivational factors that make the agents use prenegotiation preference elicitation tools efficiently and determine scoring systems consistent with the principals' preferences. To the best of our knowledge, there are no similar studies conducted in the field of software supported electronic negotiations. Our work thus contributes to theory and research on prenegotiation support software in several important ways. First, we explain how the agent's motivational profile can be built based on their information processing system (epistemic motivation), negotiation approach (social motivation), and goals (identity motivation). Second, we experimentally verify what elements of the motivational profile significantly impact the quality of negotiation preparation. Furthermore, we identify the differences between female and male agents in the set of factors describing their negotiation approach and goals that significantly impact their prenegotiation accuracy. The results of this study show the importance of taking into account motivational factors while designing decision support modules for prenegotiation preparation in NSSs.

The paper proceeds in seven sections. In Section 2, we briefly discuss the issue of determining the scoring system in prenegotiations and problems with agents' accuracy in determining scoring systems consistent with the principals' priorities. Section 3 describes agents' motivations in negotiations, while Section 4 explains how the mix of these motivations may affect the prenegotiation preparation of the scoring system and its accuracy. We also define the research model and formulate the research question. In Section 5, an experiment designed to verify the research question is described, whose results are then analyzed (Section 6). Conclusions are presented in the last section.

## 2. Scoring systems and agents' accuracy

Negotiation analysis (Raiffa et al., 2002) recommends that the parties define the negotiation problem and build scoring systems in the prenegotiation phase. This allows providing symmetric and asymmetric support throughout the entire negotiation process. The problem is technically defined in the form of a negotiation template as a set of negotiation issues and sets of salient options defined for these issues (i.e., the issues' feasible resolution levels). It can be formally denoted by  $T = \{G, \{X_i\}_{i=1, \dots, m}\}$  (with  $G = \{G_i\}_{i=1, \dots, m}$  being a set of issues and  $X_i = \{x_{ij}\}_{j=1, \dots, n_i}$ , a set of salient options for issue  $i$ ). The template should be evaluated, that is, the negotiators should define their preferences for each element of  $T$ . Typically, an additive preference model is used to capture these preferences as it allows to define the negotiation offer scoring system represented by the set of cardinal ratings  $S = \{V, \{V_i\}_{i=1, \dots, m}\}$ , where  $V = \{v_i\}_{i=1, \dots, m}$  is the set of issue weights, and  $V_i = \{v_{ij}\}_{j=1, \dots, n_i}$  are the sets of salient options ratings, one for each issue  $i$ . Having defined the scoring system  $S$ , any feasible offer  $a$  can be evaluated by the negotiator through the weighted sum of options that comprise this offer, that is,

$$v(a) = \sum_{i=1}^m \sum_{j=1}^{n_i} z_{ij}(a) \times v_i \times v_{ij}, \quad (1)$$

where  $z_{ij}(a)$  equals 1 if the option  $x_{ij}$  is contained in offer  $a$ , and 0 otherwise.

When scoring systems are built by agents for their principals, the issue of accuracy of preference representation by the former arises. Here we assume that both principal's and agent's preferences are represented quantitatively through scoring systems  $S_P$  and  $S_A$ , respectively. Hamming distance measures the similarity of  $S_P$  and  $S_A$ , and it counts the number of times the agent made an ordinal error in comparing two issues or two options of an issue. If an issue (option) is more important for the principal than another issue (option) but is less or equally important for the agent, then 1 is added to the distance, and 0 otherwise. Let  $r_{ii'}$  define the agent's error in scoring issues  $i$  and  $i'$ . The values  $r_{ii'}$  are obtained from

$$r_{ii'} = \begin{cases} 1 & \text{if } \text{sign}(v_i^P - v_{i'}^P) \neq \text{sign}(v_i^A - v_{i'}^A) \\ 0 & \text{otherwise} \end{cases}, \quad (2)$$

where  $\text{sign}(x)$  is the function that extracts the sign of  $x$ . An error of comparison of options  $j$  and  $j'$  in the  $i$ th issue is  $r_{jj'}^i$  and its value is obtained analogously from

$$r_{jj'}^i = \begin{cases} 1 & \text{if } \text{sign}(v_{ij}^P - v_{ij'}^P) \neq \text{sign}(v_{ij}^A - v_{ij'}^A) \\ 0 & \text{otherwise} \end{cases}. \quad (3)$$

The Hamming distance between  $S_P$  and  $S_A$  can be determined as

$$D_H(S_P, S_A) = \sum_{i=1}^{n-1} \sum_{i'=i+1}^n r_{ii'} + \sum_{i=1}^n \sum_{j=1}^{n_i-1} \sum_{j'=j+1}^{n_i} r_{jj'}^i, \quad (4)$$

which is a sum of errors observed for the issue and option ratings. Agents who make no pairwise-comparison errors while defining the ratings according to principals' preferences are ordinally accurate, that is,  $D_H(S_P, S_A) = 0$ .

### 3. Agents' motivation

As mentioned in the Introduction, agents are driven by a mix of motivations that can be classified as epistemic, social, and identity. These different motivations can be described by certain types of factors important for negotiation behavior and related to information processing style, bargaining style, and the system of situational goals.

#### 3.1. The information processing system

Information processing is a function of the individuals' epistemic motivation (Ten Velden et al., 2010). People differ in thinking styles and in the ways they process information. Dual-process theory assumes that people process information using two distinct systems: (1) an intuitive-experiential system, and (2) a conscious analytical-rational system (Epstein et al., 1996; Stanovich et al., 2014), which are also called fast and slow thinking modes (Kahneman, 2003, 2011), respectively. The experiential system is fast and automatic; it does not require cognitive and logical resources. Experiential processing results in forming unwarranted impressions and is related to agreeableness, spontaneity, favorable interpersonal beliefs, and emotional expressivity. It has also been found to be more strongly related to the development of positive interpersonal relationships than the rational system (Epstein et al., 1996). According to Shiloh et al. (2002), the experiential system is often used by people with low motivation or cognitive abilities. It allows negotiators to bypass difficulties and produce results quickly if a problem is difficult and time-consuming.

The rational system is slow and deliberate. It relies on the rules of evidence, logical inference, analysis, and high level of engagement of cognitive resources. Pacini and Epstein (1999) found the rational system to be positively related to the ego strength, the ability to exercise self-control as well as control of events, and conscientiousness. Motivation to engage in analytical processing increases when the need for confidence increases (Gawronski and Creighton, 2013). This suggests that the greater the subjective assessment of the task's impact on the subsequent actions the more likely is the use of the rational system. However, "As rationality and experientiality are orthogonal, it is possible for a person to be high on both or on neither of these attributes" (Pacini and Epstein, 1999, p. 985).

#### 3.2. Negotiation approach

Social motivation refers to the preference for a particular distribution of outcomes between oneself and the counterpart (McClintock, 1977). The theory of conflict distinguishes between proself and prosocial motivation (Beersma and De Dreu, 2002; De Dreu et al., 2006). Proself motivation comprises both competitive and purely individualistic goals, while prosocial motivation comprises both

cooperative and purely altruistic goals. Social motivation has also influenced how systematically information is processed (De Dreu et al., 2006). Prosocial individuals are likely to be cooperative, whereas proself individuals tend to be competitive. When prosocials employ a rational system they tend to behave like proselfs (Cornelissen et al., 2011).

These relationships may be described in more detail when an alternative typology of social motivation is used, for example, the one proposed by Thomas and Kilmann (1974). In their TKI inventory, they identified five categories of intentions (approaches): collaborating, accommodating, competing, compromising, and avoiding. Shell (2001) notes that negotiators typically have a medium-to-strong predisposition to two or three approaches rather than one.

Accommodating and collaborating approaches are associated with prosocial orientation, while the competitive approach corresponds to the proself orientation. Accommodating behavior may suggest greater concern for relationships (social outcomes) and competitive behavior, concern for the terms of the negotiation agreement (economic outcomes) (Pruitt, 1981; Thompson et al., 2010; Kulik and Olekalns, 2012).

Avoiding and accommodating approaches do not require significant cognitive efforts. Therefore, they are often associated with high experiential and low analytical systems. Collaborating and compromising approaches require considerable cognitive effort; therefore, they are associated with a high analytical system. Negotiators who use these approaches make an effort to consider the problem from different perspectives—their own, the principal's, and the counterpart's. They search for solutions that are consistent with their values and accommodate the requirements of the counterparts (Van Lange, 1999).

The competing approach requires learning and consideration of the preferences and needs of the counterparts; otherwise, gains for self and losses for others are not possible to obtain. Competing agents with a strong rational system try to achieve as much for themselves as possible and also take away from their counterparts as much as possible (Cornelissen et al., 2011).

### 3.3. *Goal-setting theory and identity motivation*

Carnevale and De Dreu (2006, p. 55) claim that goals and motives can be considered “as central elements of negotiation, indeed as the *raison d'être*.” When the agents realize that they will participate in a negotiation in a particular context, they are likely to formulate specific aspirations that they want to achieve and goals that they want to reach. This is related to their identity-based motivation (Oyserman, 2015). Goal-setting theory claims that performance depends on goals (Locke and Latham, 1990). Its general rule is that: “If people try for specific, hard goals, then they will—given certain moderating conditions such as feedback, knowledge, and commitment—perform better than when they have vague and/or easy goals” (Locke and Latham, 2004, p. 400). This rule was confirmed in the negotiation context; participants who were given challenging goals achieved better results than those who were given no goal or a compromise goal (Neale and Bazerman, 1985).

There are, however, different types of goals. For example, substantive goals are related to the negotiation problem and to solving it most efficaciously from the viewpoint of an agent; relational goals are related to the social part of the negotiation process, context, and relationships between the parties (Euwema et al., 2003). Curhan et al. (2006) observed that relational outcomes

have value in themselves and the negotiators assess negotiations based on the outcomes associated with feelings about: (1) the substantive outcomes, (2) the self, (3) the process, and (4) the relationship. In the specific context of laboratory negotiation experiments with university students (like the one we use in our analyses), another set of goals may appear. It is related to the possibility of learning, that is, getting a new experience in conducting negotiations, using decision support tools and NSSs. Taking this into account, Kersten et al. (2013) extended the Subjective Value Inventory proposed by Curhan et al. (2006) by adding learning goals to the analysis of identity motivation.

### 3.4. Gender and negotiation

Gender differences are one of the most challenging issues in negotiation research, as they often result in ambiguous or contradictory conclusions (Kray and Thompson, 2005; Kolb, 2009; Kulik and Olekalns, 2012; Stuhlmacher and Linnabery, 2013). Research has often produced mixed results regarding the relative differences between men and women in the negotiation process and outcomes. According to Kray and Thompson (2005) an effective negotiator is strong, dominant, assertive, and rational. The “negotiation stereotype” suggests (Watson, 1994; Walters et al., 1998; Kray and Thompson, 2005) that men are assertive, rational, and competitive, while women are passive, cooperative, and relationship-oriented. In their paper, Miles and LaSalle (2009) show that, in negotiations that have integrative potential, men negotiate better contracts than women do. Some studies suggest that women, compared to men, display a lower propensity to initiate negotiations (Bowles et al., 2005; Bowles, 2013), and negotiate less competitively (Walters et al., 1998; Westbrook et al., 2011). When information processing style is concerned, Handley et al. (2000) showed that women display a greater propensity for experiential thinking style than men. Those results were confirmed by Epstein (2003). Furthermore, Sladek et al. (2010) reported that men more often than women operate with a rational thinking style, and conversely, women more often than men use an experiential style. However, other research did not find any gender differences in decision-making style (Baiocco and Laghi, 2009; Loo, 2000).

A series of studies investigated how gender may affect bargaining style. Using the TKI mechanism, Gbadamosi et al. (2014) showed that female students used competitive style more than male students and were less likely to avoid conflicts than males. From Brahnam et al. (2005), we learn that females are more collaborative than males and also less avoidant when dealing with conflict. When The Rahim Organizational Conflict Inventory (Rahim, 1983) was used to determine the conflict mode, Brewer et al. (2002) showed that females were more avoiding than males, while Nelson et al. (2015) proved that female negotiators were less dominating, more obliging, and more compromising. Also, there was no statistically significant difference between genders in the collaborating (high concern for others and self) and avoiding styles (low concern for others and self). Other studies reported that women are less competitive and more accommodating (Rubin and Brown, 1975), while men are less cooperative and more dominating (Vinacke et al., 1974). Additionally, the meta-analysis of gender in negotiation conducted by Mazei et al. (2015) shows that differences between men and women in economic outcomes depend on the context. Gender differences in negotiation outcomes diminished when negotiators were experienced and were provided information about the bargaining range.

#### 4. Motivation assessment, preferences, and prenegotiation preparation

Evans and Beltramini (1987) propose a general framework for negotiations in which prenegotiation conditions play a central role. The conditions include motivations and attitudes, goals, preferences, and power relationships. The framework distinguishes between three classes of motivations, that is, epistemic, social, and identity. Here we posit that motivation may affect preference elicitation accuracy and the determination of the scoring system consistent with the principal's preferences.

- *Information processing system and prenegotiation accuracy.* Motivated agents who are willing to expand the cognitive effort and time required to perform the task are likely to be more accurate than agents who make fast judgments. Epstein (2003) shows that people who use the experiential system prefer images and graphs in the description of their tasks, while those who use the rational system prefer text and numbers. Agents with strong experiential and weak rational systems have been found more prone to anchoring and framing biases and their perception may be more selective than that of agents with strong rational and weak experiential systems (Epstein et al., 1996). Witteman et al. (2009) found a significant positive correlation between the rational system and the performance of tasks that required computations and deductive reasoning, and a significant negative correlation between the experiential system and the performance of those tasks. With this in mind, we expect that rationality will have a positive effect on the prenegotiation accuracy, while the experiential system will have a negative effect.
- *Negotiation predisposition and prenegotiation accuracy.* The agents' general predisposition to negotiation has been found to shape their behavior in the initial phase of negotiations (see, e.g., De Dreu et al., 2000; Fleck et al., 2017). Accommodating agents can be found to be more willing than competing agents to represent their principals' interests accurately (Aaldering et al., 2013). One may also argue that the agents with a strong avoidance and accommodating predispositions may not wish to make an effort to prepare for negotiations because they either do not want or do not wish to engage with their counterparts. Collaboratively predisposed people have been found to generate less conflict than competitors and avoiders (Friedman et al., 2000). To avoid conflict, they may change their preferences in substantive attributes (i.e., the principal's preferences) in favor of preferences for the process and relationship attributes. Because collaborating and compromising negotiators want to maintain a good relationship with both principal and counterpart, the preference changes are likely to be moderate and with no ordinal errors. Competitively predisposed agents are concerned with the achievement of the best substantive outcome. This suggests that competitive agents should try to represent their principal's preferences accurately as this would help them to achieve a high score.
- *Negotiation goals and prenegotiation accuracy.* Preparation involves the development of loosely connected goals and plans. Goals are represented conceptually just as are other concepts and these representations can lead to automatic activation. Both assigned and self-set goals were shown to be mostly about the substantive outcomes (Zetik and Stuhlmacher, 2002), except for the experiments that focused on learning (Gentner et al., 2003). Goals affect the effort that one commits as well as the aspects of the task that one focuses on (Locke and Bryan, 1969). Negotiators who are concerned with substantive outcomes and know that these outcomes can be assessed by the principal, need to make an effort to understand their principals' preferences correctly. Those



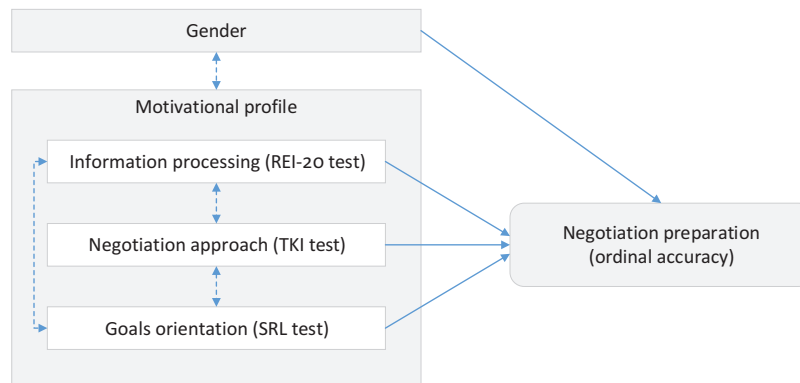


Fig. 1. Overview of methods and constructs.

oriented toward relationship goals are likely to value a positive atmosphere, emotions, and trust more than the agreement score.

Negotiators' goals may be directly, as well as indirectly, associated with the task-at-hand. This is in line with the assumptions about identity-based motivation (Oyserman, 2015), for example, students learning new skills. Learning goals require that the negotiators understand the process and its potential impact on their future activities. Negotiators who pursue learning goals are likely to work harder and consider various aspects of the negotiation and its context as well as the immediate and future outcomes. They are less interested in substantive outcomes and more interested in the effects of strategies, techniques, and tools on the process and the results (Tasa et al., 2013). Thus, they should be well prepared for the negotiation because it is expected that they pay attention to the preference system that reflects their principals' preferences.

Taking the above into account, we built our research model of the relationship among motivational profile, gender, and negotiation preparation. We hypothesize that three types of agents' (negotiators') motivations (i.e., epistemic, social, identity) and gender have an impact on negotiation preparation. Thus, the question that we put forward is

*What is the impact of motivational profile on the accuracy of agents in prenegotiation preparation?*

The main constructs used in the model are shown in Fig. 1.

To set up the predictors within each group of motivations precisely, several research instruments were used. Rational and experiential information processing, which represents the epistemic motivation in our model is determined through REI-20 (Marks et al., 2008) test, which is a modified REI test. Social motivation is operationalized by means of accommodating, avoiding, compromising, competitive and collaborating intentions determined by the TKI instrument. Substantive, relational, and learning (SRL) goals are inferred from the modification of SVI test proposed by Kersten et al. (2013). Finally, the quality of negotiation preparation will be measured using the notion of ordinal accuracy operationalized by a new variable  $ACCURACY = \{OA, OI\}$ . If  $D_H(S_P, S_A) = 0$ , the agent is accurate in the ordinal sense (OA) ( $ACCURACY = OA$ ), while if  $D_H(S_P, S_A) > 0$ , the agent is ordinally inaccurate (OI) ( $ACCURACY = OI$ ).

Table 1  
Negotiation issues and options

| Issues   | Options                         |
|--|---------------------------------|
| Number of new songs (introduced and performed each year) | 11; 12; 13; 14; or 15 songs     |
| Royalties for CDs (percent)                              | 1.5%; 2%; 2.5%; or 3%           |
| Contract signing bonus (dollars)                         | \$125,000; \$150,000; \$200,000 |
| Number of promotional concerts (per year)                | 5; 6; 7; or 8 concerts          |

### 1. Number of promotional concerts

This is the most important issue for the management.  
The more concerts the better for WorldMusic.  
From your discussion with the management, it follows that:

- The most preferred option is 8 concerts.
- The difference between 7 and 8 concerts is almost the same as between 6 and 7 concerts.
- 5 concerts is significantly worse than 6.
- Less than 5 concerts cannot be accepted because it makes little sense in the entertainment business.

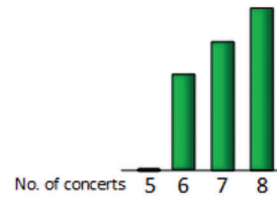


Fig. 2. Principal's preferences for the number of concerts presented to Mosico.

## 5. Experiments

### 5.1. Experimental setup

In order to verify the relationships between motivations and the quality of agents' performance in prenegotiation preparation, we conducted a series of bilateral-negotiation experiments using the eNS Inspire (Kersten and Noronha, 1999). The participants, university students, played the role of the representatives (agents) of either a song writer (Fado) or of an entertainment company (Mosico). The purpose of the negotiation was for the parties to negotiate the best contract for their principals. In order to increase engagement, the students were informed that their involvement in the negotiation and performance would strongly influence the final course grade. The negotiation template consisted of four issues (Table 1).

Both agents were provided with a detailed description of their principal's priorities and preferences in a written text accompanied by bar graphs that visualized the structure and strength of preferences. An example of the principal's preferences is given in Fig. 2, which shows that Mosico (the representative of WorldMusic) has four options to choose from regarding the number of promotional concerts.

Then they were asked to read the case description and the information regarding their principal's preferences. At this point, a simple preference elicitation algorithm, based on a direct rating mechanism, was used to determine the participants' scoring systems. Preference elicitation was organized as a three-step procedure. In the first one, the agents assigned ratings to issues defining their weights thought  $\sum_{i=1}^4 v_i^A = 100$ . Then all options within each issue were rated. The best option was

Table 2  
Participants

| Characteristics                     |             |              |
|-------------------------------------|-------------|--------------|
| Demographics and age data           |             | No. (%)      |
| Gender (females)                    |             | 137 (63.7)   |
| Age (years)                         | 20 and less | 12 (5.6)     |
|                                     | 21–25       | 164 (76.3)   |
|                                     | 26–30       | 29 (13.5)    |
|                                     | 31–50       | 10 (4.6)     |
| Skills and ability                  |             | Average (SD) |
| English proficiency <sup>a</sup>    |             | 4.00 (1.39)  |
| Case understanding <sup>a</sup>     |             | 3.92 (1.28)  |
| Negotiation experience <sup>a</sup> |             | 2.56 (1.37)  |

<sup>a</sup>Scales 1–7 (1 = low; 7 = high).

assigned a rating equal to the issue weight, that is,  $\max_j (v_{ij}^A) = v_i^A$ , while the worst option had a rating equal to 0 ( $\min_j (v_{ij}^A) = 0$ ). As a result, the scoring system was normalized to the (0; 100)-scale. The principals' scoring systems  $S_P$  were determined by measuring precisely the heights of the bars used to visualize the principals' preferences.

Before they start the prenegotiation phase, agents filled in a prenegotiation questionnaire that included REI-20, TKI, and SRL, which allowed the motivational factors to be identified.

## 5.2. Participants

In all of the Inspire experiments described here, 754 participants from seven countries took part. We eliminated incomplete records and those agents who did not reach an agreement. To eliminate the potential impact of role-playing factors related to the specificity of the structure of principals' preferences on the agents' errors and to achieve a high level of cultural homogeneity (see Wachowicz et al., 2018), we limited our analyses to the representatives of one principal only, that is, Mosico. Furthermore, we looked at Mosicos from one country. Finally, after eliminating two outliers based on Mahalanobis distance, we obtained a sample of 215 agents. The general characteristics of the participants are shown in Table 2.

## 6. Data analysis and results

### 6.1. The predictors

Of 215 participants, 70 (32.6%) were accurate in the OA, while the rest were OI. To determine motivational differences between OA and OI groups, a causative binomial regression model was needed. Before building such a model, the set of predictors describing all motivational factors was identified. To extract the variables describing epistemic and identity motivation from the instruments

Table 3  
Fit indexes of two confirmatory models of REI-20

| Models | $\chi^2$ | df  | $p$    | $\chi^2/\text{df}$ | $\Delta\chi^2$ | $\Delta\text{df}$ | $\Delta p$ | CFI   | RMSEA [CI 90%]       | Bollen–Stine |
|--------|----------|-----|--------|--------------------|----------------|-------------------|------------|-------|----------------------|--------------|
| M1     | 469.405  | 169 | <0.001 | 2.78               |                |                   |            | 0.822 | 0.091 [0.080; 0.101] | 0.001        |
| M2     | 132.431  | 96  | 0.008  | 1.38               | 336.974        | 73                | <0.001     | 0.975 | 0.042 [0.022; 0.059] | 0.185        |

Table 4  
Fit indexes of two confirmatory models of SRL

| Models | $\chi^2$ | df | $p$    | $\chi^2/\text{df}$ | $\Delta\chi^2$ | $\Delta\text{df}$ | $\Delta p$ | CFI   | RMSEA [CI 90%]       | Bollen–Stine |
|--------|----------|----|--------|--------------------|----------------|-------------------|------------|-------|----------------------|--------------|
| M1     | 92.987   | 51 | <0.001 | 1.82               |                |                   |            | 0.958 | 0.062 [0.042; 0.082] | 0.013        |
| M2     | 65.533   | 41 | 0.009  | 1.60               | 27.454         | 10                | 0.002      | 0.971 | 0.053 [0.027; 0.076] | 0.056        |

(REI-20 and SRL), a confirmatory factor analysis (CFA) was used. It allowed us to confirm the fit of the measurement models. We applied a standard approach, that is, CFA was performed employing maximum likelihood estimation and the resulting model was restructured using modification indices (Brown, 2014). The dataset was analyzed using AMOS 20.

Multiple fit indices were used including chi-square statistic, relative chi-square, root mean square error of approximation (RMSEA), and confirmatory fit index (CFI), with classic rules of thumb (Kline, 2015). A relative chi-square in the range (1;3) verifies a favorable fit between the hypothetical model and the sample data for large samples (i.e., >200); RMSEA value <0.05 indicates a close fit to the data; CFI index >0.90 indicates an acceptable fit, while >0.95 indicates a good fit.

- *Epistemic motivation.* In the case of the REI-20 instrument, the original model (M1) included all 20 items from the test. A poor fit of this model made us conduct *post hoc* searches. As a result, four items were removed (questions: 8, 11, 12, 14—see Table A1) because of their significant cross-loadings, which resulted in model M2. As multivariate normality was not confirmed in either model, Bollen–Stine bootstrapping (Bollen and Stine, 1993) was used. The fit indexes of both models are presented in Table 3.

Model M2 shows significant relative improvement in fit when compared to model M1. Since its fit is acceptable, we used it to determine two factors describing the information processing style of our agents, that is, rationality (RAT) and experientiality (EXP).

- *Identity motivation.* The original list of 12 questions from the SRL instrument was used to build model M1 describing the identity motivation of agents. Its fit was poor, thus using the modification indexes we determined a revised model with one item removed (question 2—Table A2). As previously, in view of multivariate non-normality, the Bollen–Stine approach was used to test the model's acceptance. Results are shown in Table 4.

The modified model M2 shows relatively high fit and significant improvements in fit when compared to M1. It confirmed that a three-factor structure is appropriate to measure the system of agent goals defined as identity motivation, that is, relational (REL), substantive (SUB), and learning (LEARN).

- *Social motivation* was measured with five conflict modes: competing (COMP), collaborating (COLLAB), compromising (COMPRO), avoiding (AVOID), and accommodating (ACCOM);

Table 5  
The statistical comparison of explanatory variables

| Explanatory variables | Accurate (OA)<br>( <i>N</i> = 70) | Inaccurate (OI)<br>( <i>N</i> = 145) | Statistical comparison       |                 | Univariate<br>logistic model |
|-----------------------|-----------------------------------|--------------------------------------|------------------------------|-----------------|------------------------------|
|                       | Mean/<br>percentage               | Mean/<br>percentage                  | M–W test/<br>chi-square test | <i>p</i> -Value | <i>p</i> -Value              |
| GENDER (females)      | 68.6                              | 61.4                                 | 1.056                        | 0.304           | 0.305                        |
| Epistemic motivation  |                                   |                                      |                              |                 |                              |
| RAT                   | 0.878                             | 0.744                                | −1.097                       | 0.273           | 0.221                        |
| EXP                   | 0.293                             | 0.378                                | −0.611                       | 0.541           | 0.435                        |
| Social motivation     |                                   |                                      |                              |                 |                              |
| COMP                  | 5.700                             | 4.655                                | −2.583                       | 0.010           | 0.015                        |
| COLLAB                | 5.371                             | 5.110                                | −0.881                       | 0.378           | 0.327                        |
| COMPRO                | 8.543                             | 8.552                                | −0.065                       | 0.948           | 0.977                        |
| AVOID                 | 6.271                             | 6.545                                | −1.188                       | 0.235           | 0.395                        |
| ACCOM                 | 4.043                             | 5.062                                | −3.061                       | 0.002           | 0.003                        |
| Identity motivation   |                                   |                                      |                              |                 |                              |
| REL                   | 0.959                             | 1.331                                | −2.407                       | 0.016           | 0.011                        |
| LEARN                 | 1.546                             | 1.250                                | −2.859                       | 0.004           | 0.006                        |
| SUB                   | 1.618                             | 1.412                                | −2.447                       | 0.014           | 0.039                        |

the five modes were derived directly from the TKI questionnaire. The TKI scoring rule counts the number of choices supporting each mode made by respondents within dichotomous comparisons. This allowed us to measure the strength of the negotiators' predisposition toward particular conflict modes using the scale [0;12], assuming that the sum of all scores is equal to 30.

## 6.2. Logistic regression model

The logistic regression model uses independent (explanatory) variables to estimate the probability that the response variable takes on a given value (Hosmer et al., 2013; Jaccard 2001; Kleinbaum et al., 2002). The dependent variable in our model is ACCURACY. The motivational model includes epistemic, social, and identity motivations that may affect each other. This suggests that there may be interactions between the predictors. Thus, the model can be represented in the following way:

$$\text{logit}(P(\text{ACCURACY})) = \beta_0 + \sum_{k=1}^K \beta_k Y_k + \sum_{k=1}^{K-1} \sum_{m=k+1}^K \beta_{km} Y_k Y_m, \quad (5)$$

where  $Y_k$  are explanatory variables listed in Table 5;  $\beta_k$  and  $\beta_{km}$  (for  $k \neq m$ ) are the coefficients describing odds ratios for variables and their interactions, respectively.

First, we verified the variables as potential predictors performing Mann–Whitney (M–W) and chi-square tests, and univariate logistic regression (Table 5).

The results indicate significant differences between OA and OI groups in social and identity motivation. Respondents with high scores in COMP, SUB, and LEARN are more likely to be accurate

Table 6  
Fitting information

|                | Model-fitting criteria |                  | Likelihood ratio tests |    |        | Hosmer and Lemeshow test |    |       |
|----------------|------------------------|------------------|------------------------|----|--------|--------------------------|----|-------|
|                | AIC                    | −2Log-likelihood | Chi-square             | df | Sig.   | Chi-square               | df | Sig.  |
| Intercept only | 273.332                | 271.332          |                        |    |        |                          |    |       |
| Model 1        | 254.770                | 246.770          | 24.562                 | 3  | <0.001 | 3.976                    | 8  | 0.859 |
| Model 2        | 247.222                | 229.222          | 42.110                 | 8  | <0.001 | 11.319                   | 8  | 0.184 |

Note: Statistical significance ( $p < 0.05$ ) suggests a good model fit.

than inaccurate; those with high scores in ACCOM and REL are less likely to be accurate. However, none of the variables describing epistemic motivation or gender significantly differentiated the clusters. The same predictors appeared significant in the univariate logistic regression models (at  $p < 0.05$ ).

Despite the insignificant impact of gender on agents' accuracy, a two-dimensional comparison between gender and OA/OI clusters suggests some gender-specific differences. Females seem significantly more experiential than males (EXP: 0.467 vs. 0.147;  $p < 0.001$ ), and more oriented on relational (REL: 1.308 vs. 1.038;  $p = 0.054$ ), learning (LEARN: 1.429 vs. 0.201;  $p = 0.017$ ) and substantive (SUB: 1.572 vs. 1.317;  $p = 0.09$ ) goals than males. Finally, females also seem more compromising (COMPRO: 8.78 vs. 8.14;  $p = 0.026$ ) than males.

For the next step of the analysis, only those predictors that were significant in the univariate analysis should have been selected. However, having in mind a significant impact of gender and suggestions for retaining predictors with higher  $p$ -values (see Hosmer et al., 2013), we decided to include gender in the model. To make the interpretation of regression model coefficients easier, we rescaled all the predictors using the centering method.

A series of alternative designs of predictors were tested with and without interaction between variables. Backward stepwise selection resulted in two different models: Model 1, with no gender nor interaction, and Model 2, with gender and interaction. Their fitting indexes, which confirm good fits, are presented in Table 6.

The estimated parameters for significant predictors (at  $p < 0.05$ ) in both models are listed in Table 7. Since it is required that Model 2 be hierarchically well formulated, it must contain all lower-order components of any term even if it is not significant. A less conservative rule of thumb allows logistic models to use a minimum of 5–9 events per predictor (Vittinghoff and McCulloch, 2007). In our study, we have  $\min(70, 145) = 70$  events, which shows that both models meet requirements for data sample size. The pseudo- $R^2$  statistics are typically much lower than the  $R^2$  statistics in linear regression. The explained variation of the dependent variable is 14.3% for Model 1 and 24.8% for Model 2 measured by Nagelkerke pseudo- $R^2$  statistics. The latter falls into range (0.2; 0.5), which is fairly typical for logistic regression models.

The area under the ROC curve (AUC) is an aggregated metric that evaluates how well a logistic regression model classifies positive and negative outcomes at all possible cutoffs (Hosmer et al., 2013). AUC values greater than 0.7 are considered acceptable. Table 8 presents the classification statistics depicting groups that were best predicted by the models. Let us observe that only Model 2 has an acceptable AUC value and the highest accuracy.

Table 7  
Parameter estimates for the models without interactions

| Variable        | $\beta$ | Standard error | Wald   | df | Sig.   | exp( $\beta$ )<br>(odds ratio) | 95% confidence interval |        |
|-----------------|---------|----------------|--------|----|--------|--------------------------------|-------------------------|--------|
|                 |         |                |        |    |        |                                | Lower                   | Upper  |
| <b>Model 1</b>  |         |                |        |    |        |                                |                         |        |
| Intercept       | −0.815  | 0.158          | 26.481 | 1  | <0.001 |                                |                         |        |
| cREL            | −0.427  | 0.165          | 6.682  | 1  | 0.010  | 0.653                          | 0.472                   | −0.427 |
| cLEARN          | 0.720   | 0.231          | 9.742  | 1  | 0.002  | 2.055                          | 1.307                   | 0.720  |
| cACCOM          | −0.173  | 0.073          | 5.623  | 1  | 0.018  | 0.841                          | 0.729                   | −0.173 |
| <b>Model 2</b>  |         |                |        |    |        |                                |                         |        |
| Intercept       | −0.698  | 0.201          | 12.089 | 1  | 0.001  |                                |                         |        |
| GENDER          | −0.293  | 0.355          | 0.680  | 1  | 0.410  | 0.746                          | 0.372                   | 1.497  |
| cREL            | −0.403  | 0.182          | 4.903  | 1  | 0.027  | 0.668                          | 0.468                   | 0.955  |
| cLEARN          | 0.612   | 0.253          | 5.837  | 1  | 0.016  | 1.844                          | 1.122                   | 3.029  |
| cCOMP           | 0.174   | 0.087          | 4.023  | 1  | 0.045  | 1.190                          | 1.004                   | 1.410  |
| cACCOM          | 0.003   | 0.101          | 0.001  | 1  | 0.974  | 1.003                          | 0.824                   | 1.222  |
| GENDER × cCOMP  | −0.392  | 0.141          | 7.712  | 1  | 0.005  | 0.676                          | 0.513                   | 0.891  |
| GENDER × cACCOM | −0.533  | 0.201          | 7.012  | 1  | 0.008  | 0.587                          | 0.395                   | 0.871  |
| cLEARN × cCOMP  | 0.224   | 0.097          | 5.373  | 1  | 0.020  | 1.251                          | 1.035                   | 1.511  |

Note: cX, centered variable X; Pseudo- $R^2$  statistics—Model 1: Nagelkerke = 0.151; Model 2: Nagelkerke = 0.248. The reference group is OI and the reference GENDER denotes females.

Table 8  
The classification statistic

| Model/classification statistic             | Model 1 | Model 2 |
|--|---------|---------|
| AUC  | 0.677   | 0.731   |
| Specificity—correctly predicted inaccurate | 93.8%   | 93.1%   |
| Sensitivity—correctly predicted accurate   | 30.0%   | 40.0%   |
| Accuracy—correctly predicted all           | 73.0%   | 75.8%   |

## 7. Results

Model 2 shows the highest fit of values. Therefore, we will focus on the impact of motivational mix on prenegotiation preparation using this model. The interpretation of the parameters for all predictors in the model needs to be performed assuming the potential changes in average values of the predictors that were defined for the reference group (with the exception of the binary variable GENDER). Note, however, that these predictors are described using strong continuous scales (the variables related to epistemic and identity motivations result from CFA analysis), or interval scale (TKI modes). As the unit change has no particular interpretation, when analyzing the effects of changes we decided to consider a standard deviation ( $\pm$ SD), which can be interpreted as a significant change in the motivation.

Interpreting the logistic model, we were surprised to find that no significant impact ( $p < 0.05$ ) of epistemic motivation on the agents' accuracy was identified. It was not observed either individually for rationality and experientiality or for any interactions they could have had. However, other pre-

Table 9

Changes in odds ratio for male agents representing selected levels of their competing and accommodating modes when compared to female agents

| Accommodating       | Competing |            |         |             |         |
|---------------------|-----------|------------|---------|-------------|---------|
|                     | Low       | Medium low | Average | Medium high | High    |
| Low (−SD)           | 8.044**   | 4.532**    | 2.553** | 1.439       | 0.811   |
| Medium low (−SD/2)  | 4.348**   | 2.450**    | 1.380   | 0.778       | 0.438*  |
| Average (0)         | 2.350**   | 1.324      | 0.746   | 0.420**     | 0.237** |
| Medium high (+SD/2) | 1.270     | 0.716      | 0.403** | 0.227**     | 0.128** |
| High (+SD)          | 0.687     | 0.387**    | 0.218** | 0.123**     | 0.069** |

Note: \*\* Significant at  $p < 0.05$ ; \* significant at  $p < 0.1$ ;  $SD_{ACCOM} = 2.31$ ;  $SD_{COMP} = 2.93$ .

dictors describing social and identity motivations play a significant role in differentiating between accurate and inaccurate agents. The social and identity motivations interact with gender.

As all variables for logistic models were previously centered according to mean values, the reference subgroup for which the intercept can be interpreted is female agents with average epistemic, identity, and social motivations. The negative intercept (−0.698) in our model confirms that those average female agents are more likely to be inaccurate rather than accurate and the odds for the former are two times higher, that is,  $1/\exp(-0.698) = 2.01$ . The negative  $\beta$  value for GENDER (−0.293) suggests that male agents of average motivational profile tend to be more inaccurate than females (of 1.34 times). However, this difference is not significant ( $p = 0.410$ ). Therefore, female and male agents with the same average motivational profile do not differ in the quality of the prenegotiation preparation. Consequently, some unique mixes of motivations make female and male agents more accurate in their preparation.

From the model in Table 7 we may conclude that gender interacts with competing and accommodating modes. These effects need to be measured by the general formula describing the change in odds ratio (Hosmer et al., 2013, pp. 74–75). Considering the effects for male agents, we have

$$OR_{GENDER} = \exp(-0.293 - 0.391 \times cCOMP - 0.533 \times cACCOM). \quad (6)$$

We can see that male and female agents differ in accuracy for various mixes of their social motivation (Table 9).

Male agents with high competing and high accommodating modes are significantly more prone to making errors during the prenegotiation preparation than female agents with the same profile. The odds for making errors increase  $1/0.069 \approx 14.5$  times. However, when both modes are at the low level, males are eight times more accurate than females. In absolute categories, weakly accommodating and competing males are 2.39 times more prone to be accurate than inaccurate in their prenegotiation decision analysis, while the females' odds to be accurate are only  $1/8 \times 2.39 = 0.297$ , that is, they are approximately 3.4 times more prone to make prenegotiation errors. In the bottom-right corner of our matrix, the situation is opposite, yet both genders are nominally more prone to make mistakes. Females' odds for inaccuracy are slightly higher (i.e.,  $1/0.834 \approx 1.19$  times more), while males' odds are  $14.5 \times 1.19 \approx 17.25$  times higher. The antidiagonal of competing–accommodating matrix shown in Table 9 can be considered as a borderline above which the male



| Learning            | Odds ratio |
|---------------------|------------|
| Low (−SD)           | 1.036      |
| Medium low (−SD/2)  | 1.313      |
| Average (0)         | ** 1.665   |
| Medium high (+SD/2) | ** 2.110   |
| High (+SD)          | ** 2.674   |

Low and high levels of learning differ from average by the value of SD = 0.723;

\*\*) significance at  $p < 0.05$

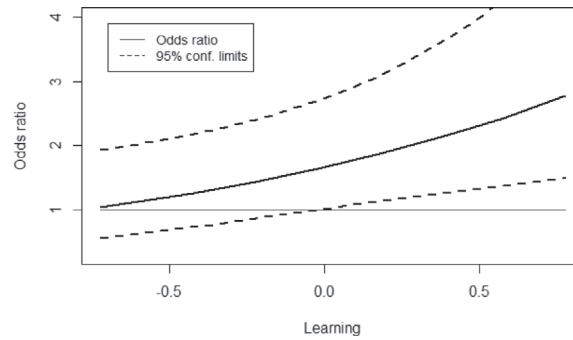


Fig. 3. Estimated odds ratio for female agents with increasing competing mode (+2.93) as a function of learning goals with 95% confidence bands.

| Learning            | Odds ratio |
|---------------------|------------|
| Low (−SD)           | ** 0.329   |
| Medium low (−SD/2)  | * 0.417    |
| Average (0)         | 0.528      |
| Medium high (+SD/2) | 0.670      |
| High (+SD)          | 0.849      |

Low and high levels of learning differ from average by the value of SD = 0.723;

\*\*) significance at  $p < 0.05$ ; \*) significance at  $p < 0.1$

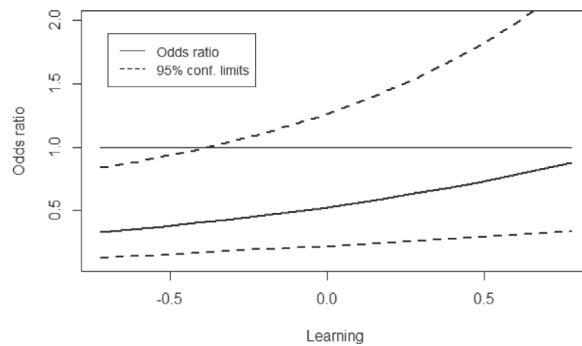


Fig. 4. Estimated odds ratio for male agents with increasing competing mode (+2.93) as a function of learning goals with 95% confidence bands.

agents’ odds for being accurate increase, while below this line they decrease when compared to females.

A separate analysis of potential changes in competing and accommodating modes allows us to capture the impact of social motivation on the accuracy of our agents. For the competing mode, we observed that not only gender but also learning goals from identity motivation interact. We built an analogous formula to (6) to describe formally the changes in odds ratio assuming the competing mode increases of one standard deviation:

$$OR_{COMP} = \exp(0.510 - 1.148 \times GENDER + 0.656 \times cLEARN). \tag{7}$$

We conclude that an increasing competing mode results in opposite effects for female and male agents. Additionally, the competing mode is positively strengthened by learning goals for both groups of agents. The final odds ratios for competing as the function of changing learning goals are shown in Figs. 3 and 4 for female and male agents, respectively.

We appreciate significant differences in the impact of increased competition on the odds ratio of accurate prenegotiation preparation for male and female agents. Increasing competitiveness for female agents with high learning objectives makes them more than two and a half (2.67) times more

| Competing           | Odds ratio |
|---------------------|------------|
| Low (−SD)           | 0.969      |
| Medium low (−SD/2)  | 1.228      |
| Average (0)         | ** 1.556   |
| Medium high (+SD/2) | ** 1.972   |
| High (+SD)          | ** 2.500   |

Low and high levels of competing differ from average by the value of SD = 2.930;

\*\*) significance at  $p < 0.05$

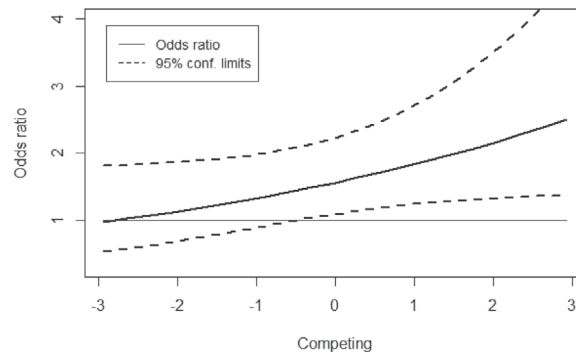


Fig. 5. Estimated odds ratio for agents with increasing learning goals (+0.723) as a function of competing mode with 95% confidence bands.

accurate than female agents of average competing and high learning profile. In absolute categories, their odds to be accurate become slightly higher than the odds for making prenegotiation errors ( $2.67 \times \exp(-0.698) = 1.33$ ). For male agents, we confirm a general negative impact of increased competitiveness on accuracy, which becomes significant if their interest in learning is not higher than mid-low. An increase in the competing value of SD makes male agents with low learning objectives  $1/0.329 \approx 3$  times more prone to make prenegotiation error than male agents with average competing and low learning. Nominally, highly competing and low learning males have nearly 13 times greater odds to make errors.

Changes in accommodating behavior are significant for male agents only. Assuming that accommodating behavior decreases by the value of standard deviation (2.306), males' chances for determining accurate scoring systems increase more than three times ( $\exp(-0.007 + 1.23) \approx 3.40$ ) compared to males with average accommodation. This effect is significant at  $p < 0.01$ . Naturally, an increase in accommodation results in significant opposite effects, that is, resulting in an accuracy drop for males.

With respect to the identity motivation, we found that relational and learning goals have a significant impact on the quality of pre-negotiation preparation regardless of gender. Relational goals affect accuracy negatively. An increased interest in relational goals equal to  $SD = 0.749$  makes the odds for accurate prenegotiation preparation significantly ( $p < 0.001$ ) reduced by  $1/0.739 \approx 1.35$  times. On the other hand, learning goals impact the quality positively and are additionally modified by values of the competing mode. The detailed description of changes in odds ratio for increasing learning goals and accompanied competing levels are shown in Fig. 5.

An increase in the learning objective increases agents' odds to accurately define their scoring systems. The significance of this increase is, however, dependent on the competitiveness of agents. The more competitive the agents are, the stronger effect their interest in learning has on prenegotiation. For highly competitive agents, an increase in learning goals increases their odds for accuracy two and a half times, when compared to their colleagues who are characterized by average learning and high competing profile. This positive effect of increasing interest in learning goals becomes insignificant ( $p \geq 0.05$ ) for agents with competing goals—slightly less than average (0.451). Nominally, an increase in learning (with accompanying high competitiveness), reduces the odds for making errors

by the agents with average profiles; the chances for being accurate are higher for females ( $2.5 \times 0.497 \approx 1.24$ ) and nearly equal for males ( $2.5 \times 0.372 \approx 0.93$ ).

## 8. Discussion and conclusions

The presented logistic regression model allowed us to identify which elements of epistemic, social, and identity motivation differentiate between those negotiators who make and those who do not make the ordinal errors. The study focused on one of the most important prenegotiation tasks, that is, determining the formal scoring systems that can be used to facilitate and support negotiations. Some general conclusions regarding the impact of motivations on agents' accuracy can be drawn based on the model presented in the paper.

We found that the information processing system, as stated by the agents in the REI-20 test, did not affect the accuracy of those agents. This is one of the most surprising findings. Earlier studies reported on the impact of decision-making style on analyzing facts and on operating with their numerical representations (Pacini and Epstein, 1999; Wittman et al., 2009). Maybe, as Novak and Hoffman (2009) suggest, the thinking style should be recognized for a specific situation rather than generally, as in the REI approach. Consequently, the agents' statements from REI-20 on how they usually process information may not reflect their actual behavior in our experiments.

When we look at the differences between genders, we find that male agents may significantly differ from females in the accuracy of prenegotiation preparation depending on the mix of their social motivations. Female agents with dominating accommodating and competing modes have more chances to prepare the scoring systems accurately than males of the same motivational mix which describes people who in some situations may be highly assertive and not cooperating, that is, focused only on achieving their own goals; while in other situations, they can behave in a totally different way, that is, focus on others' goals, not on their own. In our study, there were 44 agents (20%) representing such a mix of motivations. Some studies suggest that the accommodating and competing approaches should be integrated as they appear beneficial for negotiation outcomes (Kulik and Olekalns, 2012). Our study confirms that the combination of both styles differentiates genders. Unlike females, males with nondominating accommodating and competing modes perform significantly better in accurate preparation.

The analysis of changes in social motivation shows that increasing competitiveness and learning reduces the chances of making errors for both genders, but only insignificantly for males. Thus, highly competitive males seem to be interested in behavioral effects of their negotiation, such as satisfaction with winning rather than in precisely measured outcomes. If their focus on learning drops, they are less likely to prepare a scoring system of good quality. This suggests that the lack of motivation to gain new skills and competence has a negative impact on the accuracy of their prenegotiation activities.

In our experiments, an increase in accommodation made male agents prone to make more prenegotiation mistakes. It may be that the accommodating approach makes the agents less interested in precise evaluation of gains and losses. This may also be related to a need for comfort. If you demonstrate an accommodating approach, which is prone to making concessions that are not reciprocated, you may wish not to know precisely how much these concessions cost you, as it can affect your comfort level.

It seems that when agents focus on keeping good relations with counterparts (relational goals), they reduce their interest in the precise evaluation of offers. This may be considered true in negotiation, where relationship is perceived as more important than the contract value (Gelfand et al., 2006; Pauw, 2010). It seems rather intriguing when the quality of prenegotiation preference elicitation is considered. One would expect that the agents with increasing relational goals should be rather willing to know, quite precisely, the costs of maintaining a good relationship with counterparts.

Intuitively, people with higher substantive goals should be interested in measuring precisely the quality of offers submitted to the negotiation table. However, while substantive goals turned out to be insignificant in our multivariate model, they were significant in many univariate models. This may suggest that substantive goals may be represented in the model by mixes of other predictors. Earlier studies showed a positive relationship between substantive and learning goals, and the competing approach (Tasa et al., 2013).

High focus on learning significantly increases precision in defining the scoring systems, especially when accompanied by at least moderate competitive behavior. This positive effect of learning shows that people with open minds for new ideas become more interested in the effects of using new technologies (in our case—the prenegotiation support tool), and therefore pay attention to their adequate implementation in their decision-making context. This may also apply to real-world problems. Giving people an opportunity to learn may increase their accuracy in performing tasks as they may wish to prove (to themselves or their principals) that what they learn brings measurable benefits. Our findings regarding learning goals confirm previous findings related to learning in negotiations, particularly their impact on negotiation outcomes (Seijts and Latham, 2005; Tasa et al., 2013).

To summarize, the results obtained in this study have some practical implications. Within behavioral agency theory, they may help principals to identify agents who will more accurately represent their preferences in negotiations. The knowledge about the motivational profile and its impact on prenegotiation preparation can be used in the design of NSSs. Knowing the motivation profile of NSS users and their predispositions for making prenegotiation errors, the system could offer an adequate user interface and procedure that would limit the odds for inaccurate determination of scoring systems.

There are, however, some limitations to this study. First, our agents were university students with no extensive prior knowledge of electronic procurement, NSSs, and negotiations themselves. Therefore, the learning effect was significant, which may not be true in the case of professional agents, for example, the procurement or sales managers, who may have the necessary skills and knowledge of how to use these support systems. Second, our study focused solely on the intrinsic motivation of agents. We cannot reject the argument that extrinsic motivation is also important in prenegotiation activity. That is why we assigned 25% of the course grade to the performance in this experiment.

Two other issues could be considered in the future redesign of our model. First, using various MCDA techniques for preference elicitation in prenegotiations may influence the quality (and consequently the accuracy) of the scoring system. In our study, a direct rating mechanism was used, which made agents operate with numbers within a predefined scoring system scale. However, other methods may reduce cognitive demand, time, and effort required to elicit the users' preferences (Ekenberg et al., 2017; Carneiro et al., 2018) and reduce the prenegotiation errors. First

experiments in eNego NSS (Wachowicz and Roszkowska, 2021) show that using the preference disaggregation approach, namely the modified UTA\* (UTilités Additives) method, may result, on average, in higher ordinal accuracy than the one obtained by direct rating in the Inspire system. Unfortunately, the eNego study did not analyze the impact of motivational profile on the results. Hence, the comparison of the accuracy of eNego and Inspire experiments in the view of motivational profile could not be done but it could be an interesting future study that would extend our model by another layer representing the type of technology used in negotiation support.

Second, as mentioned in Section 5, for our analysis we selected a group of students representing a homogenous national culture. However, several papers report on the impact of culture on negotiation. For instance, Caputo et al. (2019) show that cultural values such as power distance, uncertainty avoidance, collectivism, and masculinity influence negotiation styles. Effects of culture on the negotiation process and outcomes are also identified in negotiations conducted through NSS (Kersten et al., 2002; Koeszegi et al., 2004). In the future, we could extend our model to include national cultures as well as organizational culture differences.

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## Appendix: The REI-20 and SRL instruments

Table A1  
The REI-20 instrument

| No.        | Item   |
|------------|--|
| 1.         | I try to avoid situations that require thinking in depth about something.            |
| 2.         | I am not that good at figuring out complicated problems.                             |
| 3.         | I am not very good at solving problems that require careful logical analysis.        |
| 4.         | I don't like to have to do a lot of thinking.  |
| 5.         | Thinking is not my idea of an enjoyable activity.                                    |
| 6.         | I am not a very analytical thinker.  |
| 7.         | Reasoning things out carefully is not one of my strong points.                       |
| <b>8.</b>  | <b>I don't reason well under pressure.</b>   |
| 9.         | I enjoy intellectual challenges.   |
| 10.        | I enjoy solving problems that require hard thinking.                                 |
| <b>11.</b> | <b>I don't have a very good sense of intuition.</b>                                  |
| <b>12.</b> | <b>If I were to rely on my gut feelings, I would often make mistakes.</b>            |
| 13.        | I don't like situations in which I have to rely on intuition.                        |
| <b>14.</b> | <b>I think it is foolish to make important decisions based on feelings.</b>          |
| 15.        | I like to rely on my intuitive impressions.  |
| 16.        | Using my gut feelings usually works well for me in figuring out problems in my life. |
| 17.        | I believe in trusting my hunches.  |
| 18.        | Intuition can be a very useful way to solve problems.                                |
| 19.        | I often go by my instincts when deciding on a course of action.                      |
| 20.        | I trust my initial feelings about people.  |

Note: Questions 1–10 refer to rationality, while 11–20 to experientiality; bold questions were removed in CFA.

Table A2  
The SRL instrument

| No. | Item  |
|-----|---|
| 1.  | Trying to achieve the best possible agreement.                              |
| 2.  | <b>Obtaining an agreement which is best for me.</b>                         |
| 3.  | Obtaining the best results for the company that I represent.                |
| 4.  | Achieving as high a rating for the agreement as possible.                   |
| 5.  | Building a good relationship with my negotiation partner.                   |
| 6.  | Establishing friendly atmosphere with my negotiation partner.               |
| 7.  | Making the process as pleasant as possible.                                 |
| 8.  | Achieving results that are good for both my negotiation partner and myself. |
| 9.  | Learning how to negotiate online.   |
| 10. | Practicing my negotiation skills.   |
| 11. | Improving my negotiation skills.  |
| 12. | Learning a new system to do business transactions.                          |

*Note:* Questions 1–4 refer to substantive goals, 5–8 to relationship goals, while 9–12 to learning goals; bold question was removed in CFA.