

IMPACT OF SOCIAL RELATIONSHIP DURING COOPERATIVE NEGOTIATION

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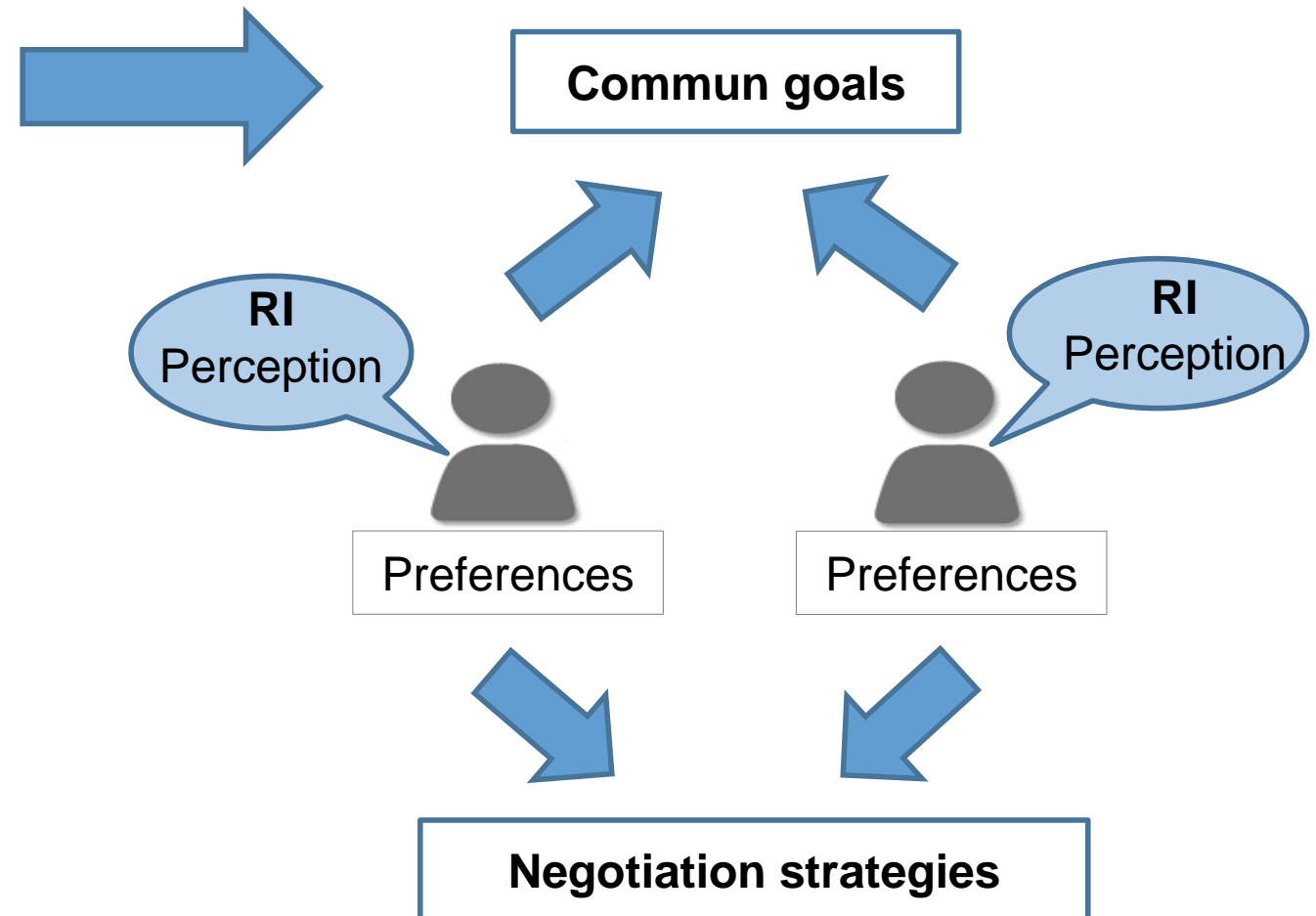


Cooperative negotiation in dialogue

**Cooperative
Negotiation**



**Interpersonel
relationship**



Related works: Social relations in dialogue



Autom (Kidd CD,2008)



REA (Bickmore ,2002)

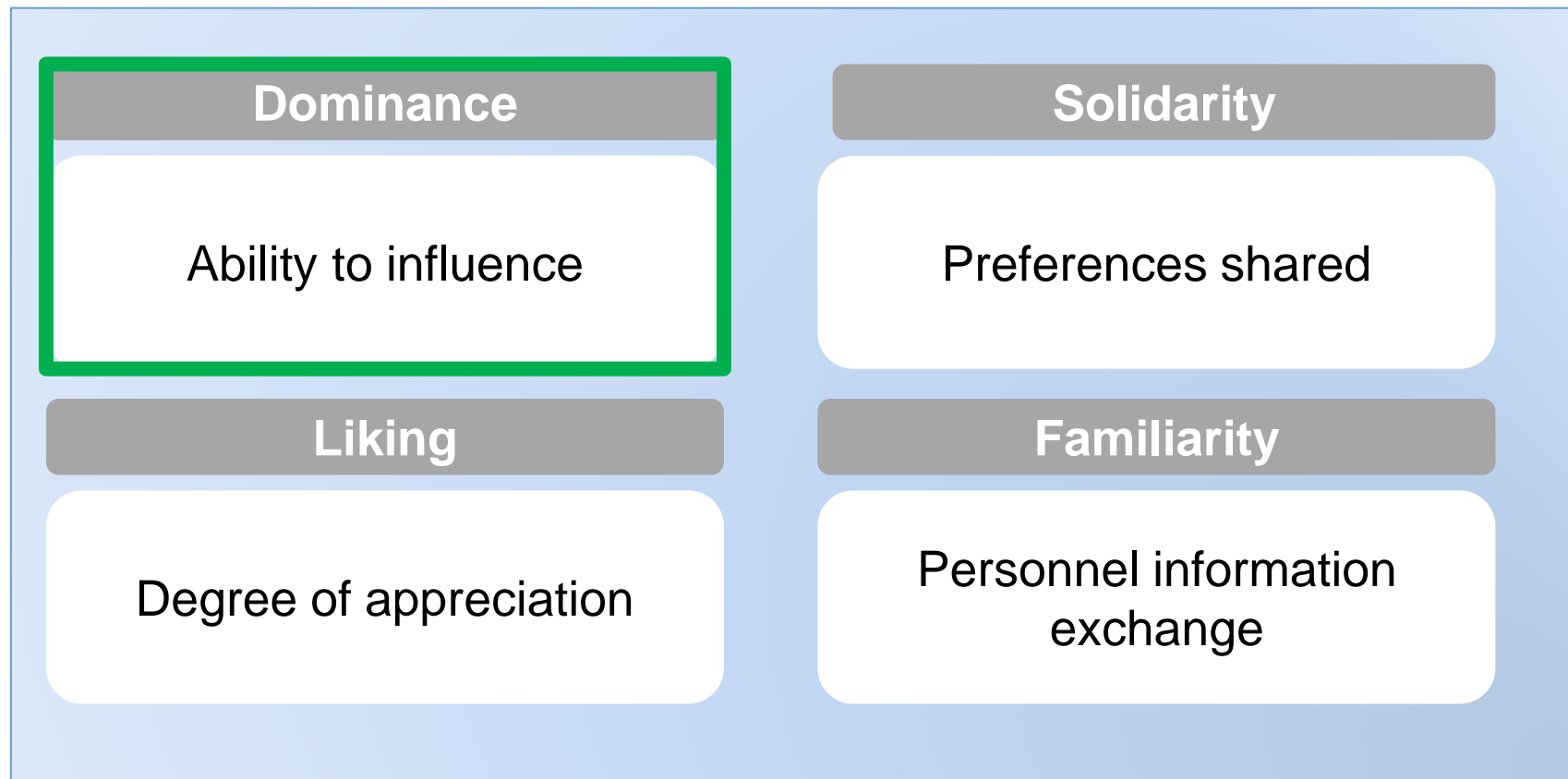


FitTrack (Bickmore,2006)



AlwaysOn (Rich,2013)

Dimensions of interpersonal relationships (Svenning, 1998)



Indicators of dominant behavior in dialogue

Verbal behaviors

- Speaking frequency
- Interruptions
- Suggestions, demands, criticism.
- Changing the topic of conversation

Non verbal behaviors

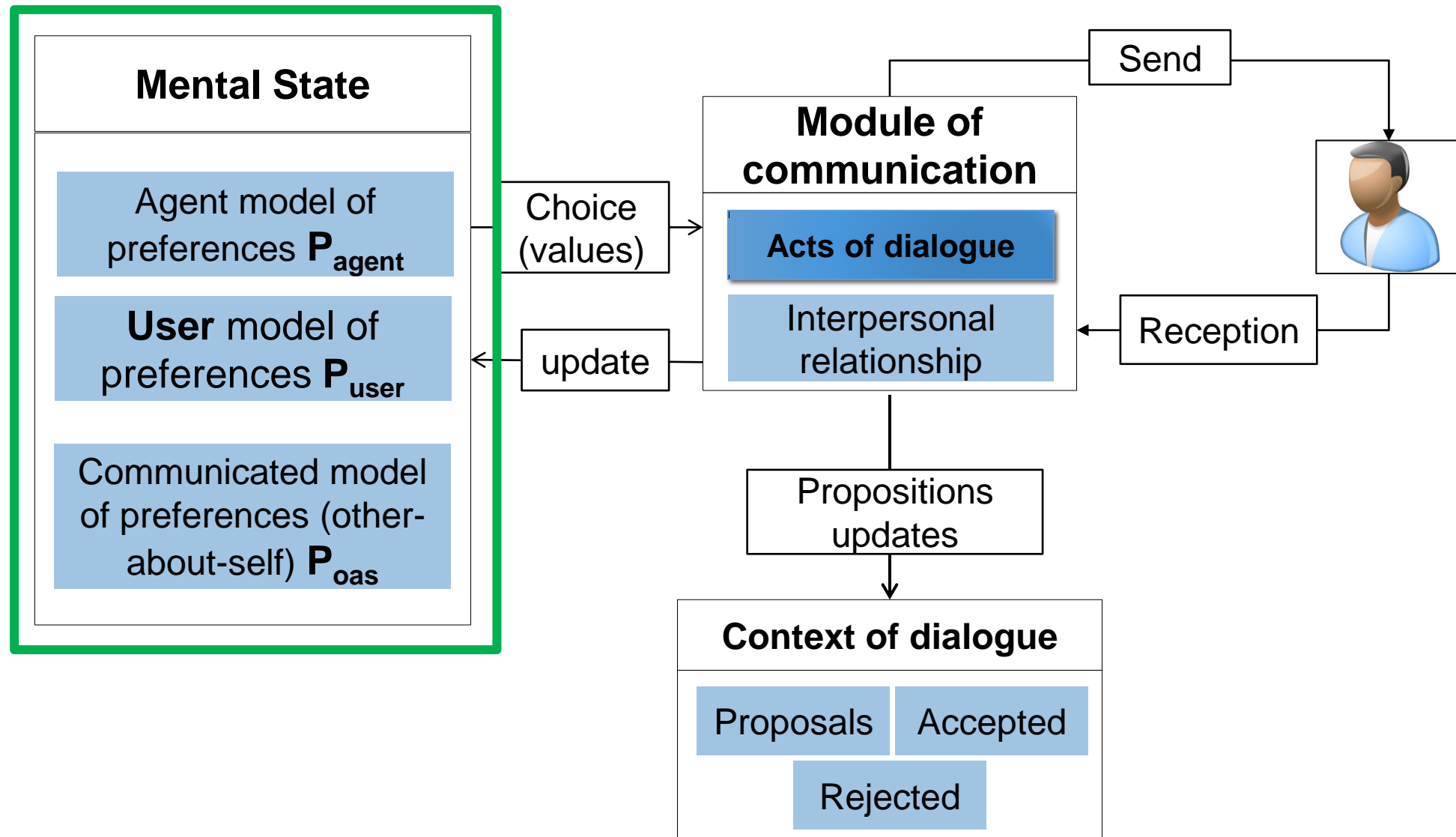
- Posture
- Relative percentage of looking
- Speaking intensity
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Reasoning behavior

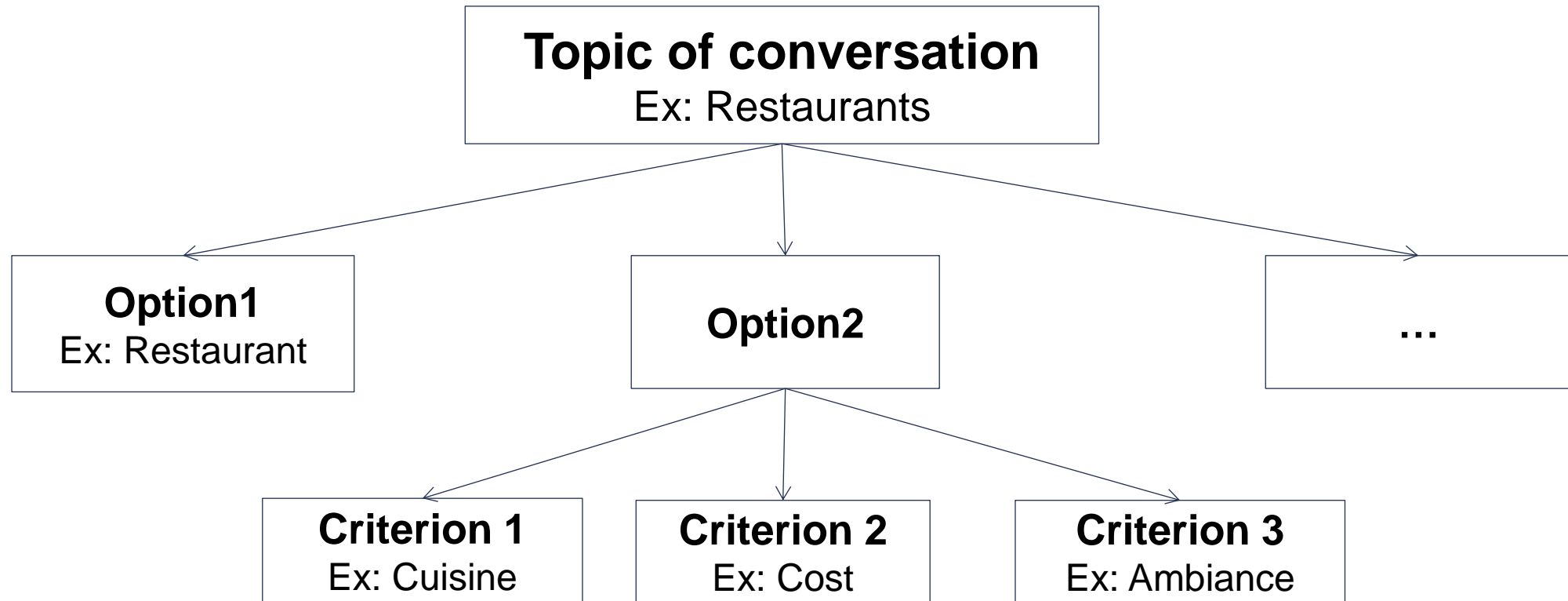
- exert an influence
- Ignore other preferences in decision making.
 - More demands, less concessions

Goal: model **verbal and **reasoning** behavior of dominance for a conversational agent**

Proposed model of dialogue



Model of preferences

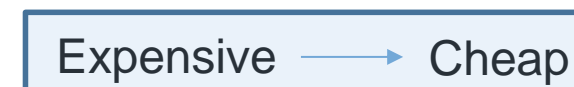
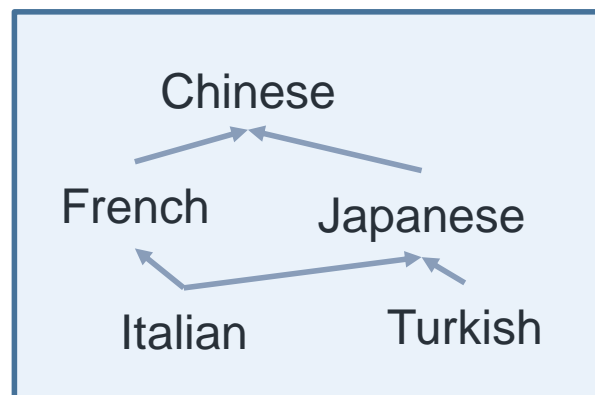
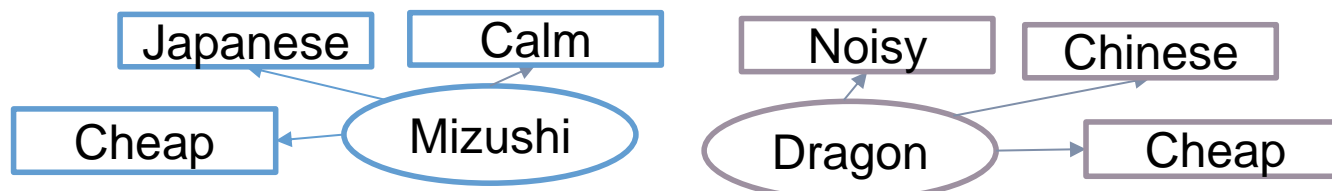


Decision based on preferences

- Notion of preferences:
 - **Preferences on criteria:**
 - P(Less, More): **binary** and **partial** relation
 - **Preferences on options:**
 - Multi-criteria decision.
 - Calculated from preferences on criteria
 - $U(o) = \sum_{c \in C} (rang_c \times scoreDc v(o, c))$

Example: Preference calculation $P(\text{Mizushi}, \text{Dragon})$?

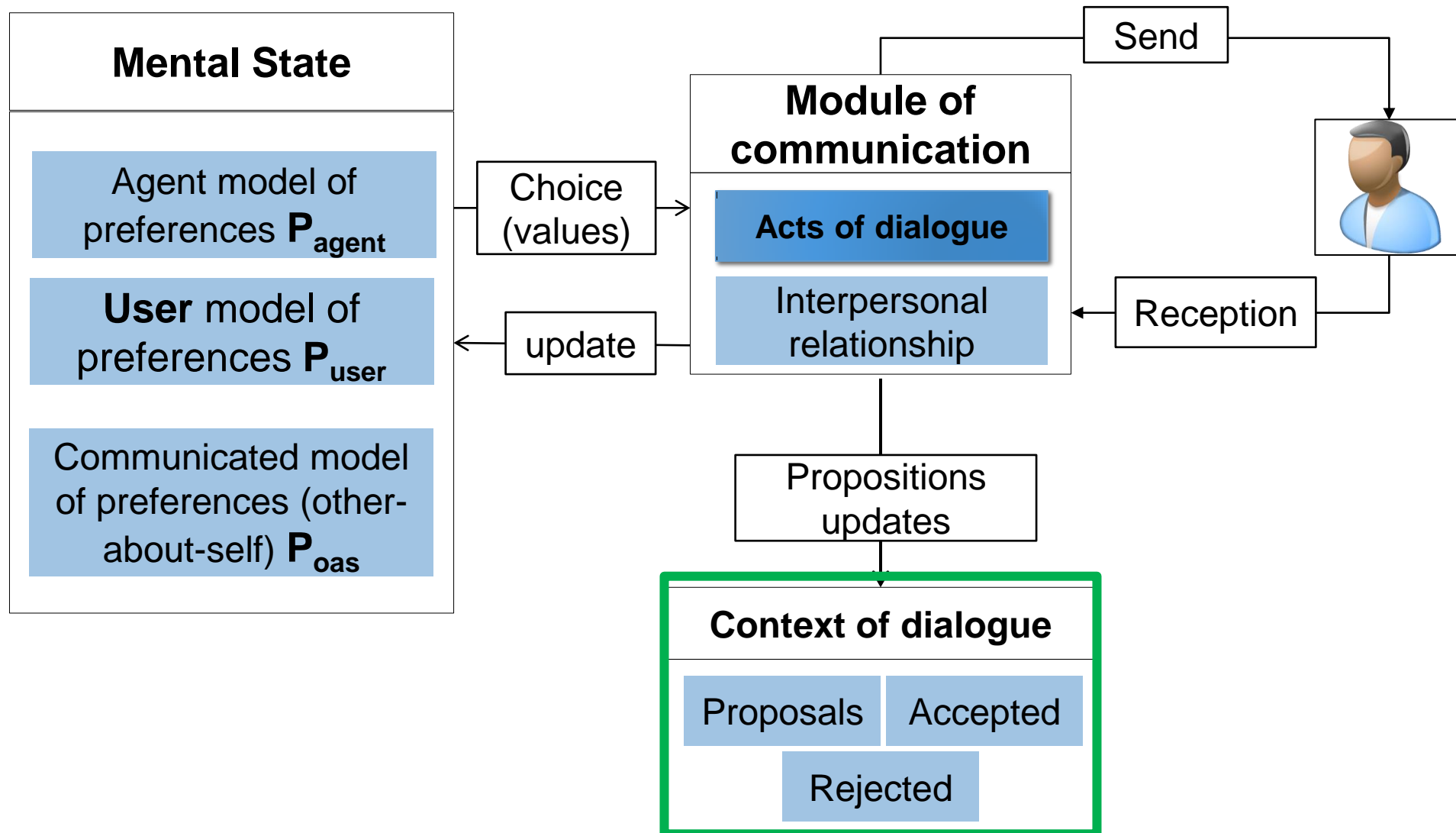
- Criteria= {Ambiance, Cost, Cuisine}.



- $U(\text{Mizushi}) = (3 \times 1) + (2 \times 1) + (1 \times 1) = 6$
- $U(\text{Dragon}) = (3 \times 4) + (2 \times 1) + (1 \times -1) = 13$

- $P(\text{Mizushi}, \text{Dragon})$

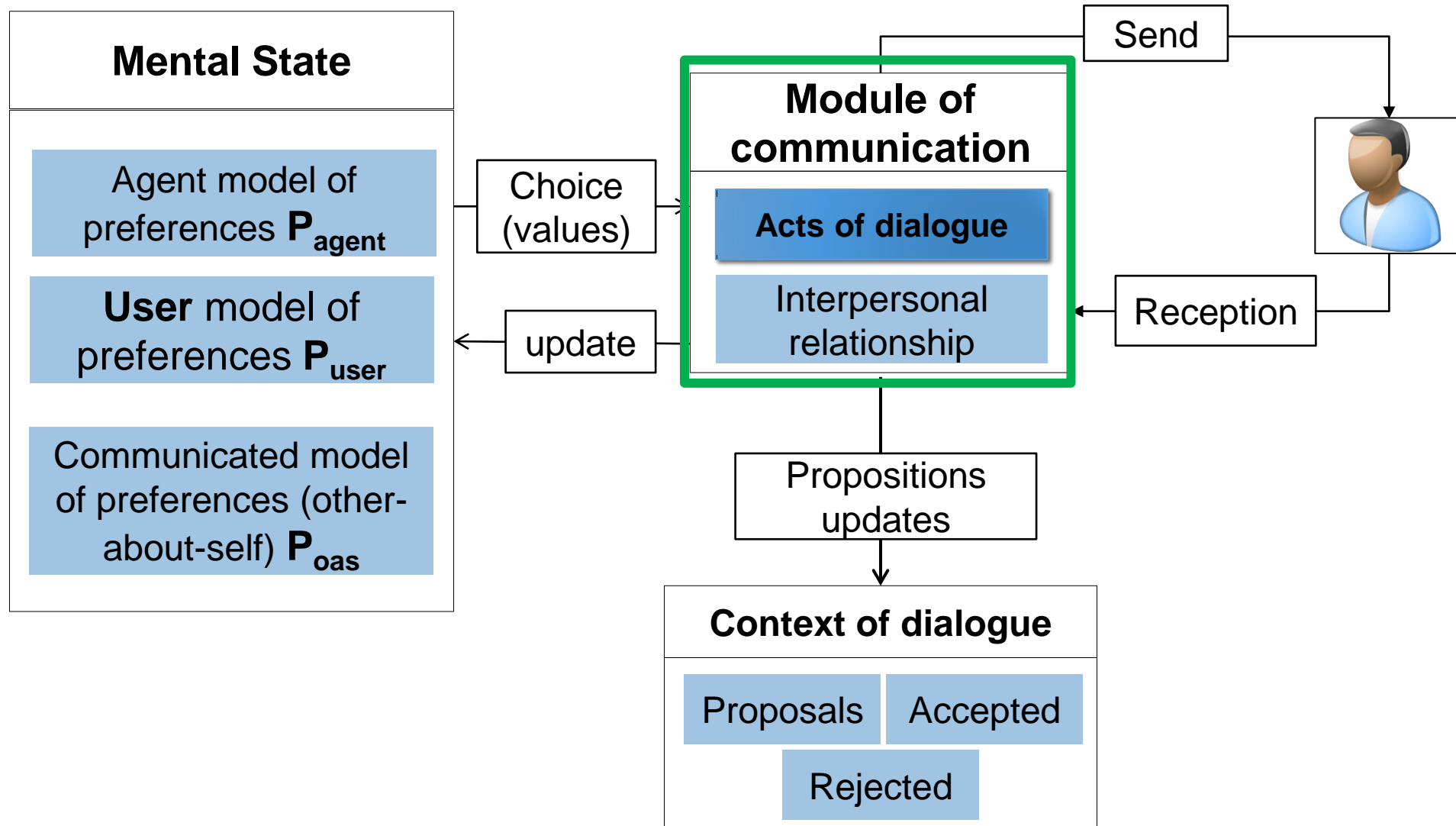
Proposed model of dialogue



Contexte du dialogue

- *Proposal*, is a proposal structure such that
 - $\text{Proposal} = \begin{cases} (\text{Criterion}, \text{value}) \\ (\text{Option}, \text{value}) \end{cases}$
 - Exemple : $\text{Proposal} = (\text{Cuisine}, \text{Japanese})$ or $(\text{Restaurant}, \text{Ginza})$.
- *Proposal status* = {open, accepted, rejected}
- *Historique de la conversation*:
 - Proposed: Les propositions ouvertes
 - Rejected: Les propositions rejetées
 - Accepted: Propositions acceptées

Proposed model of dialogue



Module of communication

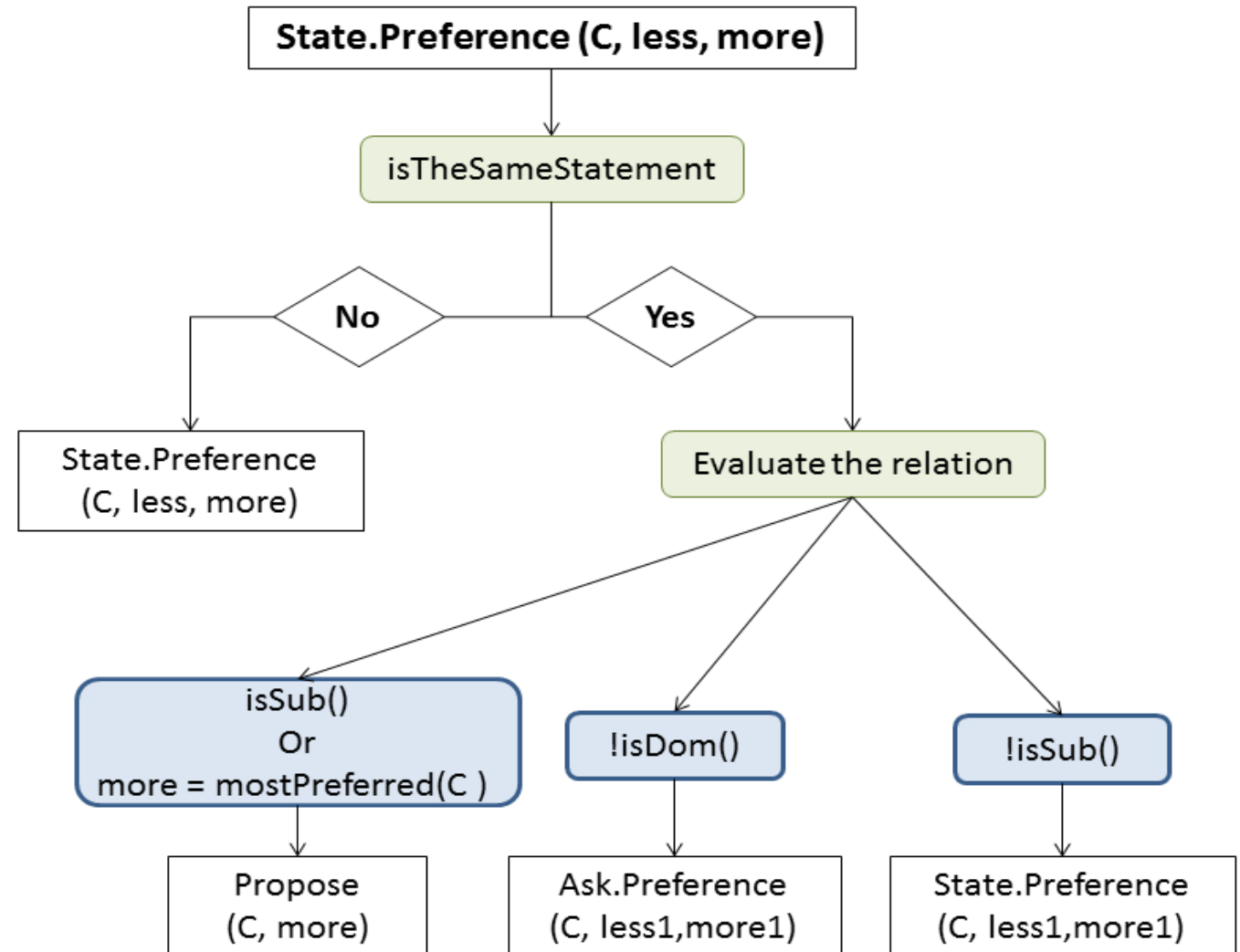
- (Sidner, 1986) : An artificial discourse language for collaborative negotiation
- Observations from recorded dialogues.

Act of dialogue	Preconditions	Effets
StatePreference (a,b) <i>I prefer a over b</i>	$(a, b) \in P_{self}$	Hear: $(a, b) \in P_{other}$
		Speaker: $(a, b) \in P_{oas}$
AskPreference (a,b) <i>Do you prefer a over b ?</i>	$(a, b) \notin P_{other}$	None
Propose(proposal) <i>Lets choose proposal</i>	$Proposal \notin Proposed$	$Proposal \in Proposed$
Accept (proposal) <i>Okay, lets choose proposal</i>	$Proposal \in Proposed$ $Proposal \notin Accepted$	$Proposal \in Accepted$ $Proposal \notin Proposed$
Reject (proposal) <i>I would choose sth else</i>	$Proposal \in Proposed$ $Proposal \notin Rejected$	$Proposal \in Rejected$ $Proposal \notin Proposed$

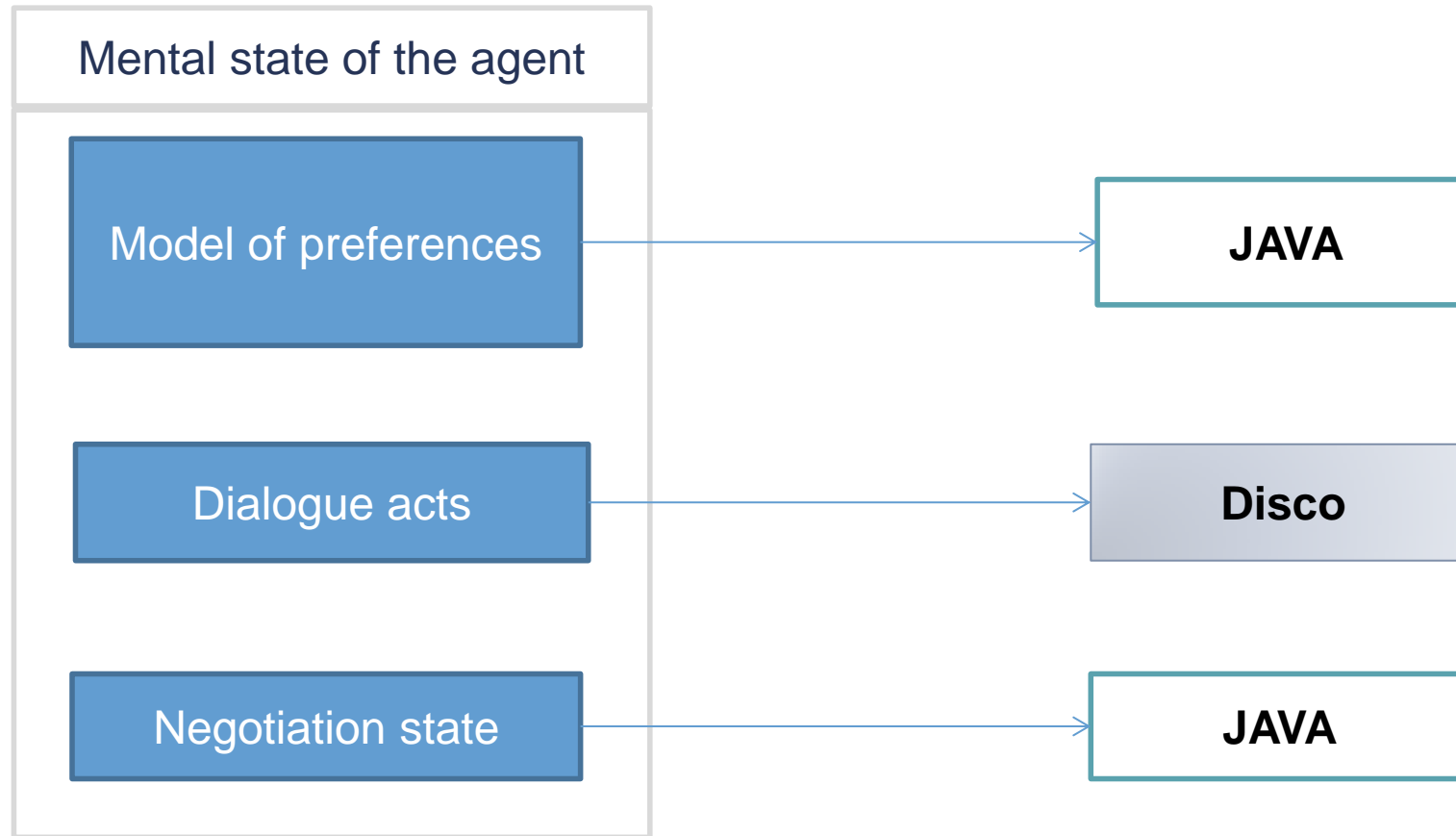
Module of reasoning

Dialogue tree

- Input: act of dialogue chosen by the user
- Output: act of dialogue chosen by the agent.
- Choice of the act de dialogue:
 - Branching of the tree
- Conditions of branching:
 - Current mental state.
 - Interpersonal relationship.



Implémentation Java + Disco



Implementation Java + Disco

RI: Peer / Peer

- **Example of dialogue**

Agent says "What kind of Cuisine do you like?"

User says "TURKISH is my favorite Cuisine."

Agent says "I prefer FRENCH over TURKISH."

User says "FRENCH is my least preferred Cuisine."

Agent says "I prefer CHINESE over FRENCH."

User says "I prefer CHINESE over FRENCH."

Agent says "I propose that we choose CHINESE Cuisine."

User says "Sorry, I'd rather choose something else."

Agent says "I prefer CHINESE over JAPANESE."

User says "JAPANESE is my favorite Cuisine."

Agent says "I propose that we choose JAPANESE Cuisine."

User says "Okay, let's choose JAPANESE."

Agent says "I propose that we choose SAMURA Restaurant."

User says "Okay, let's choose SAMURA."

Perspectives (1)

- **Validation of dominant behaviors**

- Synthetic dialogues agent/agent
- 4 conditions
 - **Social relation** : Dominant / submissive or Peer/ Peer
 - **Preferences** : similar or opposite.
- Questionnaire on the perception of dominant behavior of the agent
 - Perceived dominance
 - Study on the dominant behavior:
 - (Ignore/ take in account) other preferences in decision making. More demands, less concessions