

Making First Impressions: A Playable Model of Cross-Cultural Trust Building

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Abstract

Interactive narrative provides opportunities for facilitating empathy and social skills due to the transportive effects created by roleplay and choice-making. Cross-cultural competency, or interpersonal skills related to navigating the differences between social assumptions and expectations across human cultures, offers a rich case study for these effects. In collaboration with a cultural competency training organization, we developed an interactive story game in which the player adopts the role of a participant in a business meeting among culturally diverse professionals. To meet our design goals, we created an engine that operationalizes a popular theory of cross-cultural differences, using *trust* as the key variable influenced by and influencing player choices. A pilot study of the game revealed its potential for training and suggested several general design principles for training with interactive virtual characters.

1 Introduction

According to Landefeld, there has been a “dramatic increase” in globalization of business [Lan16], especially over the past half-century. Thus, there is a large and growing need for businesses to offer engaging, effective, and economical cultural skills training to their employees. Scholars of cultural differences have observed that culture-related miscommunication typically emerges from conflicting assumptions and expectations about the meaning of verbal and nonverbal cues, starting with a general ignorance of the dimensions along which these expectations may vary [Hof91, Hal89, THT11]. Cross-cultural competency training addresses this gap by explicitly naming and taxonomizing the dimensions of difference. Existing training materials include written explanations and questionnaires that ask the learner to describe themselves in these terms, resulting in a “cultural orientation” profile.

However, this kind of training lacks a mechanism for imparting *procedural* knowledge of communicating across cultures. We predict that interactive narrative as a medium can potentially match this need, especially when supplemented with believable characters who engage in conversation with the player. To examine this hypothesis, we developed a game, *Making First Impressions*, in collaboration with a cross-cultural competency training organization at NC State, The Global Training Initiative.¹ Previously, they developed a virtual reality experience titled *First Impressions* based on a static (linear) script in which the player could opt to hear the thoughts of a character they selected in the beginning. However, the experience lacked any interaction or choice on behalf of the player, and the organization agreed with us that interaction would be key to enabling or observing procedural

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¹See <https://projects.ncsu.edu/gti/>

knowledge in trainees, leading us to develop a “remake” as an interactive narrative in the Ren’Py visual novel engine, using much of the same script material.

Through discussions with our collaborators, we identified *trust* as a key variable on which to model character interactions. We represented trust as a one-way numeric relation between each pair of characters that changes throughout the game based on player decisions, and computed trust changes between each pair of characters based on a cultural similarity metric between attributes of the statement being made and attributes of each character. We used this model to communicate the outcomes of those decisions to the player. We also developed a preprocessor for input to Ren’Py to create flexible interjection points throughout the script.

We conducted a pilot study with 9 participants to understand the effectiveness of *Making First Impressions* as a training and assessment tool and to form an initial understanding of the cognitive processes employed by players to navigate the scenario. The study suggests that the approach holds promise for augmenting current methods of cultural training. We also found that player experience varied significantly in terms of *mode of engagement* [MMWFJ14] with the game, and that players appreciated the sense of autonomy in being able to interject at will.

2 Related Work

We referenced several models of social interaction when creating our game. PsychSim, created by Marsella et al. [MPR04], is a “social simulation tool” that can be used to generate a variety of social situations. Agents in the simulation may communicate with each other and each have their own goals, opinions, and beliefs regarding others. The purpose of this tool is for the user to explore social situations in a casual, low-pressure environment. Fox Harrell et al. [HKL13] created a dynamic model of group interaction that can represent both joining a group and “passing” as a member of a group. This model, the *Chimeria Engine*, was used to simulate a social networking website where users can “simulate and analyze” group interactions. While the interactions in our game are much simpler than those described, we similarly designed agents with opinions of others, and, as with Fox Harrell et al.’s application, our game involves group interactions and intends to allow users to explore these interactions.

There exist many examples of games being used as tools for cultural education. One such example is *Study-Town*, a game created for foreign exchange students moving to Germany [BEBM14]. In *Study-Town*, the player must increase their score in order to win over potential roommates. Players raise their score by playing a series of mini-games, including ones designed to teach the user about German food, politics, famous novels, and popular music. While the goal of our game is similar to that of *Study-Town*, *Making First Impressions* differs from *Study-Town* in several ways. *Making First Impressions* does not consist of many different mini-games but instead offers players the same set of mechanics and goals throughout gameplay. Additionally, in our game, there is less emphasis on cultural knowledge and more emphasis on how those in different cultures may communicate differently.

Zielke et al. ([ZED⁺09]) created a serious game that allows the player to “increase their cultural expertise in simulated Afghan rural and urban environments.” Players interact with agents who were programmed to take into account salient aspects of the culture’s communication, such as “close interpersonal standing distance, small talk preceding serious conversations, the topic of women being taboo, and indirect communication being preferred over directness” when conversing with the player. The player’s goal is to maintain good relationships with both individual Non-Player Characters and the community as a whole. *Making First Impressions* is simpler than Zielke et al.’s work. Our game is more linear with a much smaller set of potential outcomes. This linearity enables players to reach multiple endings quickly, allowing them to experiment with their choices and learn from different outcomes.

Aylett et al.’s ORIENT project [AVA⁺09] is a game that uses a model of cultural dimension theory similar to the one we use to create fictional cultures. As with *Making First Impressions*, their goal is training and facilitation of cross-cultural empathy. However, the focus of ORIENT is the interaction between one character from an out-group with the majority in a cultural in-group, whereas our experience focuses more on a more heterogeneous and symmetric scenario where no culture is “default.” Our analog to ORIENT’s agent architecture (based on FAtiMA [DP05]) is our trust model, which is a much simpler approach designed for transparency to players; however, our model does not (yet) yield emergent behavior from game characters.

3 Background: Cultural Orientations

The interactions of the characters in our game are primarily informed by Putz et al., who define a cultural orientations model (COM) that is “a framework for exploring and mapping cultural variables at any level of human organization” [PSW14], based on Hofstede’s empirically-validated cultural dimensions [Hof91]. The COM defines 17 “continua” divided between 3 “dimensions”—interaction style, thinking style, and sense of self—that distinguish cultures from one another. Our collaborators selected 4 continua as the most significant of the group. These continua are:

- The **Fluid/Fixed** continuum represents how one views time. Someone with a very fluid view of time has a looser definition of punctuality, and doesn’t follow schedules strictly. Someone with a very fixed view of time is punctual and sticks closely to the schedule.
- The **Being/Doing** continuum represents how one prioritizes social relationships. Someone who is very Being-oriented places a high value on building trust and understanding with their colleagues. Someone who is very Doing-oriented prioritizes task completion over building relationships.
- The **Low-context/High-context** continuum represents how explicit one is with communication. Someone who is strongly low-context openly, explicitly communicates issues. Someone who is strongly high-context relies on implicit meaning in communication, and may be seen as too subtle by someone who is more of a low-context communicator.
- The **Hierarchy/Equality** continuum represents how one responds to distributions in power. Someone who is strongly Hierarchy-oriented may expect distinct separation between how those in different levels of authority behave and interact with one another. Someone who is strong Equality-oriented puts less emphasis on status.

4 Game

Making First Impressions puts the player in the role of Diya, an engineer attending a business meeting. She is accompanied by her boss, Kaushal, the head of an Indian engineering firm. Also attending the meeting are Tony, a Chinese businessman, and Jackie and Kip, two American colleagues eager to form a partnership, with Jackie heading the project. Each character has their own cultural values and expectations. For example, Jackie is strongly Equality-oriented, while Kaushal is strongly Hierarchy-oriented. The stated goal of the player is to raise trust that non-player characters (NPCs) have in each other, including but not limited to their trust in Diya herself. The player’s choices also determine whether the meeting ends in a deal, or whether the partnership between the characters falls apart before it has a chance to begin.

We developed the game with the Ren’Py Visual Novel Engine [Rot04] due to its relatively low learning curve and appropriate affordances for character-based interactive narrative: Ren’Py centers the construction of a story around characters, dialogue, and visual poses and gestures.

Making First Impressions employs several game mechanics that allow it to be a unique educational experience. These include the ability for the player to interject at nearly every statement, make explicit choices that affect the story path (in the manner of traditional branching narrative), and view cultural characteristics of statements and how they affect the trust between characters.

4.1 Interjection and Explicit Choices

Most of the decisions that players can make are not explicitly stated. As shown in Figure 1, players may nearly always interject after any statement an NPC has made. Doing so might change the course of the conversation by playing an entirely separate piece of the script. Ill-timed interjections (those with no scripted outcome) will cause Diya to create an awkward pause in the conversation, slightly lowering others’ trust in her, but remaining quiet throughout the conversation may also harm Diya’s standing with the other characters. For example, at the start of the game, Diya’s boss mistakenly assumes that Kip is Jackie. Diya can choose to interject and correct him; this will increase Jackie’s trust in Diya, but lower Kaushal’s. If Diya does not speak up, her relationship with Kaushal will stay positive, but Jackie will immediately begin the meeting with an unfavorable view of Kaushal. Another example of the importance of the interjection mechanic is that, to get the game’s good ending, the player character must notice another character’s hesitance at the proposed time table and have Diya interject, pointing out the reason why he is hesitant.

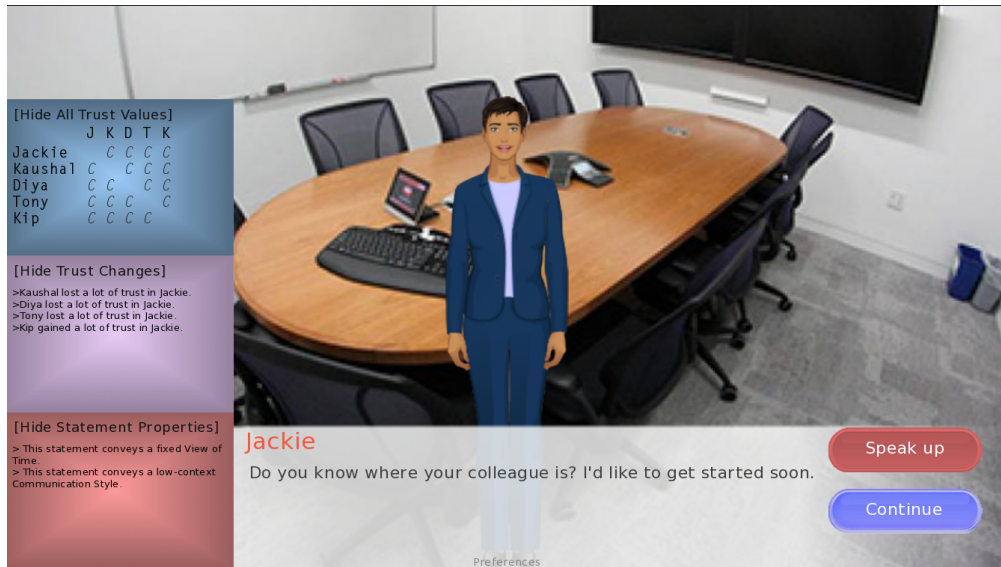


Figure 1: A screenshot of the game. The player, at nearly every statement, has the option to “Speak Up”. Players may click the blue, lavender, or red buttons to check their performance or view statement information at any time.

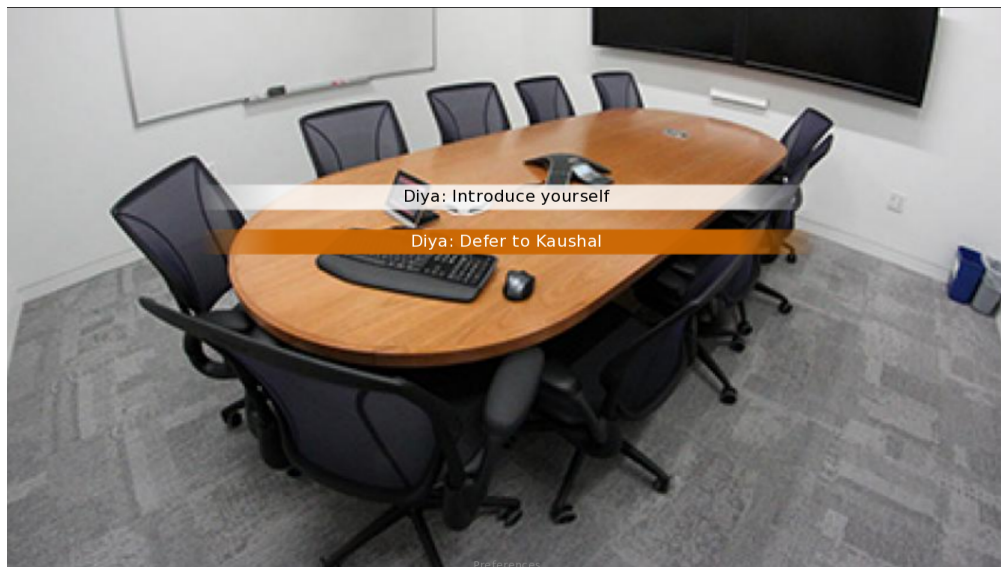


Figure 2: A screenshot of the game in which the player is forced to make a choice.

There are a few points in the game where the player is forced to make a decision about Diya’s behavior. For example, early in the game, one of the NPCs signals to Diya that it is her turn to introduce herself, but her boss has not yet given his introduction. As shown in Figure 2, Diya may either introduce herself at this point or invite Kaushal to introduce himself first. The latter decision is encoded as hierarchy-oriented; it would slightly raise Kaushal’s trust in Diya, while slightly lowering Kip and Jackie’s trust in her. Since the outcomes of these choices usually please some NPCs and displease others, the player must navigate them carefully.

4.2 Character Trust

The user interface of *Making First Impressions* allows for the user to check how they are performing during the meeting and understand the cultural values expressed through the statements that characters are making. This information is computed by the model described in the Engine section. Throughout the game, there are 3 panel buttons present on the screen (as seen in Figure 1). The top one reveals the relationship standings between the characters; relationships are represented using a grading system where ‘A’ means the character trusts the other character significantly, and ‘F’ means the character does not trust the other character at all. The middle button shows how the statement that has just been uttered affected the trust between characters. The bottom button shows the cultural properties of the statement. All the buttons’ text may be toggled as shown or hidden. This allows the user to challenge themselves to complete the game without any hints if they choose, enabling the user to test their cultural competency. However, since the game is primarily a teaching tool, we expect most players will check the values regularly, using the information provided to alter their behavior and see the effects of these behavioral changes.

The goal of including these buttons was to facilitate learning about cultural differences through the reactions of the game’s characters. Players can view the cultural values expressed by a statement and how the statement that was just uttered affected the trust of the characters. Players can also see the overall trust values that the characters have for one another.

4.3 Endings

There are three endings that the player can attain: the Good, Neutral, and Bad endings. Unlike the trust outcomes between the characters, these endings result from a hand-authored narrative branching structure and hinge on two key decisions: one explicit choice posed to your character, and one implicit choice. These decisions are (1) how to respond to your boss agreeing to an impossible timeline, and (2) how to handle Tony’s hesitance about the milestone date. These decision points were selected as high-stakes decisions that hinge on mediating between cultural differences: in the first case, navigating Kaushal’s strong hierarchy orientation and Jackie’s task orientation, and in the second one, picking up on Tony’s indirect communication style where Jackie and Kip’s direct style would miss it.

5 Engine

In order to implement the interjection mechanic and trust model, we created a conversation engine built on top of Ren’Py, consisting of algorithms to generate valid Ren’Py based on authors’ scripts that give cultural orientations for characters and statements, as well as conversation flow for interjections. These two mechanics are hand-authored additions to Ren’Py.

The engine requires 4 inputs from the author: orientations, characters, interjections, and the script. The orientations file declares the available orientation axes, and the characters file defines each character’s orientation, as described below. The interjections file specifies lines of dialogue that characters may utter if the player chooses to interject at certain points. These lines of dialogue are also assigned a vector of numerical values representing their cultural alignment in each dimension. Finally, the script contains the lines of dialogue that characters will say, defines the default and optional paths that the discussion can take, and assigns each line an orientation vector.

5.1 Character Orientations

Each character in the conversation is encoded with a vector of numeric assignments to traits, akin to aspects of personality, corresponding to the cultural orientation values explained in the Background section. When agents are defined, they can be given specific values on each axis, which can inform their personality. For simplicity, we

assigned these values on a range from 0 to 100, where 0 is one extreme of the pre-defined scale and 100 is the other.

5.2 Utterance Orientations

When a character speaks, it's possible for them to convey elements of their personality in their speech (derived from their values on the orientation axes). Other participants in the conversation who hear this statement may consequently gain or lose trust in the speaker. Following Byrne's Similarity Principle [Byr71], which says that people are more likely to develop trust towards one another if they exhibit similarity, we implemented our procedure such that the more similar the conveyed personality is to the listener's personality, the more trust the listener will gain in the speaker. Occasionally, statements' values might be separate from the personality of the agent saying them; for example, Diya is encoded as having a middling preference between hierarchy and equality, but may ask her boss to introduce herself before she does; this is an example of a strongly hierarchy-oriented statement.) In this case, the default of statements taking their speaker's orientation values can be simply overridden by the programmer. For example, an interjection that appears in the beginning of the game, when Diya can attempt to explain why her boss shows up late, taking a phone call, is declared in our code as: `(label diya_apologize: Diya "My apologies. I believe Mr. Behal may be attending to some important office matters." time_view=5 exclude=Tony $ interjectable = False return)`

5.3 Trust Model

Each agent has a specific trust value for every other agent, which represents the level of trust in that agent. The engine provides a default formula for calculating trust changes based on statements, although these may be hard-coded by the programmer. We allow for trust to be asymmetric; e.g., Diya's trust in Kip might not be the same as Kip's trust in Diya. The change is calculated based on the difference between the listener's orientation and the statement expressed by the speaker, as well as the existing amount of trust the listener has in the speaker. Whether or not the statement directly addresses the listener also factors into the trust change.

The engine calculates trust using the following algorithm, where *so* is the statement's orientation value, *lo* is the listener's orientation value, *mid* is the midpoint of the range of trust values, *current* is the current trust value that the listener has for the speaker, *g* and *l* are arbitrary thresholds used to determine whether the statement causes the listener to gain or lose trust in the speaker, and *modifier*'s value depends on whether the listener is the intended target of the statement:²

```
diff ←  $\sqrt{so} - \sqrt{lo}$ 
offset ←  $(current + mid) / (2 * mid) * modifier$ 
if diff < g then
  current ← current +  $(g - diff) * offset$ 
else
  current ← current -  $(l - diff) * offset$ 
end if
```

This trust change is calculated for each orientation that the statement has. The reason we calculated *diff* as we did above is because we wanted each individual statement (unless it holds values that are vastly different than the listener's) to have a relatively small effect on the overall trust level: over time, these small differences add up to a larger change in trust values. The characters' trust level in one another does not currently affect gameplay outcomes³; however, this feature allows the player to, at any time, see how their actions as Diya impact the relationship that other characters have with her.

We plan to open-source our engine upon publication; due to its flexibility, we believe it could be generally useful for developing games of conversational interaction.

²In our program, *mid* is set to 50, *g* is set to 3, *l* is set to 5, *modifier* is set to 1 if the listener is the target of the statement, .25 if the listener is not the intended target of the statement, and .75 if the statement has no intended target and is addressed to everyone in the vicinity.

³That is, players can damage their relationships with the non-player characters and still achieve the good ending and salvage these relationships.

Competency Statement	Beginning Competency Level					Ending Competency Level				
	Low				High	Low				High
I am able to articulate the general cultural values held by US Americans.	1	2	3	4	5	1	2	3	4	5
I recognize how values influence behaviors.	1	2	3	4	5	1	2	3	4	5
I understand the ways in which different cultural values can contribute to unmet expectations.	1	2	3	4	5	1	2	3	4	5

Figure 3: The self-assessment administered to participants after they played the game.

6 Evaluation

We had two goals in our evaluation of *Making First Impressions*. First, we wanted a summative evaluation of how well we met our design goals, i.e. created an engaging experience with a goal that participants are compelled to achieve and that fosters understanding of the key dynamics of cross-cultural communication. Second, we wanted to formatively evaluate which components of the game contributed or detracted from our design goals and to understand other factors involved in player experience and decision-making. Below we describe the design and results of a pilot study.

6.1 Experiment Setup

We recruited 9 participants, all undergraduate students at North Carolina State University, from in-class announcements. Participants were incentivized with ice cream coupons, including an extra coupon for reaching the good ending on the first try. After briefing participants, they played the game with their screens recorded during play (with the awareness and consent of participants). We then asked them to complete a standard assessment in cross-cultural training. This assessment asks participants to rate their competency, on a scale of 1 to 5, in two areas both before and after playing the game: the ability to recognize how cultural values influence behaviors, and the ability to understand the way in which different cultural values can contribute to unmet expectations (see Figure 3). We also interviewed participants using a questionnaire; the following questions are a representative subset:

- Did you enjoy the game? What did you enjoy/not enjoy about it?
- Were you pursuing a specific goal when making your decisions?
- How did you decide when to intervene?
- Did you find the game educational?
- Do you have suggestions to improve the game?

We also asked participants whether they had previously played visual novels or other games similar to this one.

6.2 Educational Outcomes

The first questionnaire asked participants to rate their aptitudes in areas relating to cultural competencies before and after playing the game. We performed a paired t-test on these before and after scores to determine whether or not the *before* and *after* ratings differed (rose) significantly. The analysis showed, with 95% confidence, that these ratings were significantly different for both questions ($p < 0.01$).⁴ It can be concluded from these results that participants believe that they can better “recognize how values influence behaviors” (question 1) and “understand the ways in which different cultural values can contribute to unmet expectations” (question 2) after playing the game. The average before and after scores for question 2 were 3.2 and 3.9 respectively, and the average before and after scores for question 3 were 2.9 and 4 respectively.

When asked if they found the game educational, 7 out of 9 participants said that they did. One participant said “I feel like if you did it with [more cultures] you could become more conscious just by practicing it in this

⁴ $p = 0.00395$ for the first question and $p = 0.0005429$ for the second question.

way.” Another said “It’s interesting to see the different cultures working together and ... trying to get people from different cultures to work together. It was interesting and educational.” Several participants mentioned, in particular, learning about Chinese New Year (a salient point in the game’s plot). Those who did not find the game educational said that they already “knew the big thing” (the cultural importance of Chinese New Year) or that they had never been in a business meeting and thus couldn’t have any educational takeaway from playing the game.

6.3 Enjoyment Outcomes

4 out of 9 participants got the good ending on the first try; 3 of the 5 who didn’t opted to continue playing until they got the good ending, including one participant who made 3 attempts. This data suggests that participants found the game engaging enough to replay, even when the extrinsic reward (the extra ice cream coupon) was no longer available.

Participants said that they enjoyed the primary challenge of the game (to ensure a business meeting runs smoothly) and enjoyed its conversational aspects. One said “I liked how it puts you in an office environment and you got to see how people from different cultures are interacting and you had to pick up on others cultures and mannerisms and interject.” Another stated that they liked that “it seemed realistic” and that “there were a lot of details that seemed to change depending on when you spoke up in the game.” Another said that they liked “how different decisions can cause the conversation to go in completely different directions.”

Some participants found the implicit choice of being able to interject at nearly any point to be confusing or overwhelming. One stated, “It was a little bit difficult in the beginning to figure out where I could and couldn’t interject [and have something to say.]” Another said, “I was expecting sometimes when I pressed speak up that there would be something [but there wasn’t.]” However, most participants echoed the sentiment, as one said, that “I think it’s good that you can interject pretty much any time because if it came up at the right time it would defeat the purpose.”

On average, the game took between ten and fifteen minutes to complete on the player’s first run. Subsequent playthroughs, once players were aware of the game mechanics, were under ten minutes. This allows for the player to quickly view all the game’s outcomes.

6.4 Modes of Engagement

Through qualitative analysis of our interviews, we also extracted a few additional themes that will guide subsequent investigation. For instance, we asked players to explain how they made certain decisions in the game, such as when to speak up and which option to select during explicit choices. How players responded revealed varying *modes of engagement*, a term we adopt from [MMWFJ14] referring to players’ stances toward the relationship between player and game. Notably, we identified players using avatar play (playing “as themselves”), role play (adopting the identity of the player character), and power play (playing to win), based on their responses to this question. A few players also adopted exploratory play (playing “to see what would happen”).

One player who adopted avatar play, for example, said “I would look at what I would do if I was actually inside that meeting,” and gave “I just really value honesty” as the reason that they contradicted Kaushal. This participant also remarked that their last and successful playthrough “took me away from my comfort zone in order to please them.”

6.5 Conflict Management

Among those who adopted a role play mode of engagement, their approaches further broke down in terms of their approach to conflict that arose between NPCs. Two of our participants exhibited a mode of engagement that was **conflict-avoidant**, trying to deflect conflict from the player character. When asked whether they were pursuing a specific goal, one such participant said that they were “trying to please everyone,” and another said “I knew I was trying to get good impressions from everybody so I was trying not to annoy someone or make someone mad.” A participant said that they decided to intervene “when it seemed like things were heading somewhere where there could be conflict, or someone kind of seemed annoyed already.” When asked how they decided to answer questions posed directly to their character, one said “I always chose to agree with the person who asked me.”

Four participants adopted a stance that was more **mediating**, identifying and defusing conflict between other characters rather than protecting their own character. One participant stated that they were pursuing the goal “to facilitate between the person who was your boss and the leader of the meeting” and intervened “if it seemed like there was something that would make one of the parties angry or dislike each other.” Another player described

the following approach to decision making: “It feels like I’m the secretary, so I have to give the rough estimates. Not disagree with the guy who is my boss, but there are things you need to consider when we’re doing this. So, hedge, basically.” Another said that they were “trying to get people to work better together and understand each other more, get on the same page.” Another said “mainly I was trying to figure out when I would need to encourage someone or when... [Tony] got interrupted, I wanted to make sure that he was taken care of.” All players who adopted this mediation stance eventually reached the good ending.

6.6 Discussion

This analysis reveals that, although the game seems to have improved self-assessed cultural awareness and skills, some important changes will be necessary to more successfully impart procedural knowledge. Notably, very few participants actually examined the cultural orientation data or trust changes for statements, and perhaps as a result, they often seemed surprised by the outcomes of their decisions. Some participants did not observably adopt the role of mediator, instead choosing to engage in avatar play or avoid conflict. Taken together, this information suggests that we need to incorporate more guidance and reminders for the tools available to players to make informed decisions, and perhaps more explicit instruction on mediation. If we incorporate this feedback, we are hopeful that the game could be a fruitful educational instrument.

Players who role-played as mediators and picked up on social cues from the characters did best. We believe that this strength of the game generally speaks to the power of simulating group discussion, which asks players to consider the inter-NPC relationships and needs in addition to the player character’s.

7 Conclusion

We presented *Making First Impressions*, a game that allows players to practice interacting with potential business partners from several different cultures. A study with 9 participants suggests that the game is successful in its goal of giving players an engaging way to improve their understanding of differing cultural values. This work also contributes a new challenge (mediating between cultures) to the field of interactive experiences used for cultural skills training, and contributes evidence for this approach. We also contribute a novel operational model of a presiding cultural orientation theory, systematizing the choices made by players in terms of the predicted effects of the theory. We address the theme of situated entertainment by addressing a concrete training need and working within the constraints and assessment measures of our collaborators.

Our research yields two takeaways for designers of interactive training scenarios. First, it is important to coach players on making use of information computed by system models or otherwise make it more salient to their gameplay experience. Second, the mode of engagement selected by each player will change their experience of the game, so it may be important to coach players on how to “get into character” for an intended roleplaying engagement in order to achieve consistent effects.

In future work, we hope to integrate the NPC interaction design more deeply into the gameplay and narrative, using the trust model to generate dialogue and story events, which we believe will help the player make more systemic predictions about the outcomes of their choices. We also plan to apply these ideas to other settings, such as business negotiation.

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