Common Strategy Patterns of Persuasion in a Mission Critical and Time Sensitive Task

Claire To, Setareh Nasihati Gilani, David Traum
Institute for Creative Technologies
clairt2@uci.edu, sngilani@ict.usc.edu, traum@ict.usc.edu

1 Introduction

We investigate different styles of approach to persuasion in high-stakes, time-critical interactions. In human dialogue, there are generally multiple motivations underlying choices of specific utterances and higher-level strategies in approaching an interaction. These can include achieving the speakers' own goals, helping the interlocutor achieve theirs, opening, and maintaining conversation, and maintaining interpersonal relations. People differ in terms of their weight on each of these goals, but decisions about what and how to say things also depends on the situation itself, e.g., what is at stake in the conversation and how urgent is a resolution needed. Differences in these factors may result in very different kinds of dialogues even when undertaken for the same purposes.

We examine a set of short dialogues (2-16 turns, average 7.62) all concerned with the same high-stakes, urgent goals. A disaster relief manager needs to communicate with people in the town who are in danger from an out of control forest fire. The manager wants to convince them to leave, and if necessary, offer resources to help them accomplish that. We look at how different experimental participants playing the manager role approach this situation, specifically what kinds and ordering of speech acts they perform in the initial stages of the dialogues. We look at whether and how proposals to act are presented, for example do they get right to the point, or first greet the other and ask after their interests before presenting their proposal.

We annotated the manager's turns with a high-level set of speech acts (Searle, 1969; Bunt et al., 2012) (a turn can realize multiple acts). We then categorized the dialogues with respect to position of greetings and proposals, looking at the trade-off between politeness and focusing on addressee's concerns vs getting to the point quickly. Finally, we looked at the number and types of proposals

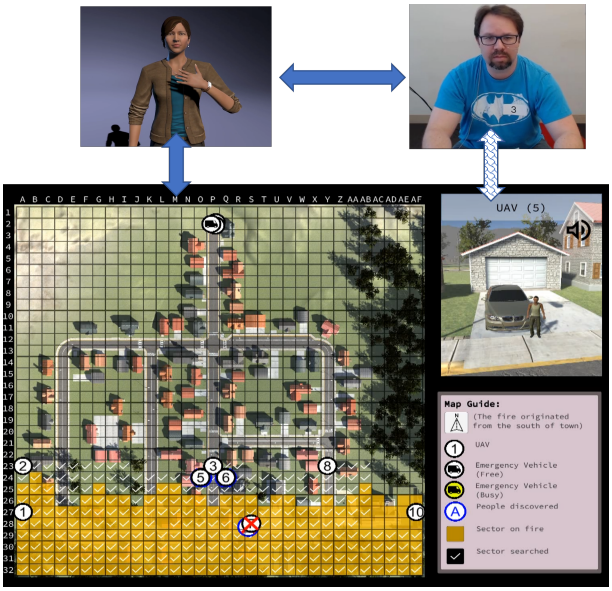

Figure 1: Overview of the simulation environment, the spokesperson, and the operator (aka the user)

that were made. We are currently examining which situational factors are related to different types of approaches, taking into account factors of the participant, their interlocutor type and style, and urgency of the situation.

2 Data

The data used is from an experiment first introduced by Chaffey et al. (2019), and illustrated in Figure 1. In this simulation, the human participant (shown top right) plays the role of a disaster relief manager, operating a swarm of robots and assisted by a virtual human spokesperson (Julie) for the swarm (shown top left). The manager (also called "operator") must deploy robots to track a forest fire that is spreading towards the town, search for residents within the town, establish communications with the residents, and rescue residents. Robots are of two types: flying drones, and ground transport vehicles. The spokesperson can be seen as an assistant, who can inform the operator about the sit-

Proceedings of the 27th Workshop on the Semantics and Pragmatics of Dialogue, August, 16–17, 2023, Maribor.

uation with the swarm, but can also autonomously take on some tasks to relieve the operator's burden. In the lower part of the figure, the operator's view of the simulation is shown. They have a high-level map of the town, broken into grids that can be used for communicating locations to the drones. The current state of the fire is shown in orange. Robots are represented as circles (with numerical ids for individual drones). When residents are located (as shown in top right pane of the operator view), the operator tries to save them, sometimes engaging in dialogues with them or sometimes delegating this task to the virtual spokesperson.

There were five different residents in the simulation, representing different individuals or small groups, with different concerns about leaving, and different requirements to be able to leave (e.g. needing guidance or a transport vehicle). They were placed randomly within the environment, and the fire spread following a stochastic distribution. Resident utterances were pre-recorded by actors, and triggered using a Wizard of Oz interface by an experimenter, following a protocol for which concerns would be brought up and what would convince them to comply.

31 participants each participated in two runs of the simulation. Thus, the maximum possible number of distinct dialogues between the operator and a resident was 310. However, not all residents were discovered in each simulation run, and some residents were handled by the spokesperson rather than the operator. Eight participants delegated all interactions to the spokesperson. Only one participant had all 10 possible resident interactions. A total of 104 dialogues (average length of 34.68 seconds and 85% success rate) between a participant and a resident were identified and transcribed.

2.1 Speech Act Annotation

We annotated operator turns for the presence or absence of each of the following speech acts:

Greeting refers to the initiation of conversation. Opening remarks serve as a polite and friendly way to acknowledge the presence of the resident and establish the beginning of the conversation. (e.g., "Hello." "Are you there?" "Yes...")

Statement refers to providing insight, reason, justification, or information to the resident. (i.e., "It's an emergency." "There is an evacuation." "The vehicle is on the way.")

Question refers to inquiring the current status or information from the resident. (i.e., "Are you okay" "How are you?" "Do you need assistance?")

Proposal refers to presenting a course of action or plan to the resident. (i.e., "We need you to leave right now." "Can you guys please just get out of there as quickly as possible?" "You should probably try to get out there as quickly as possible.")

Concession refers to withdrawing a proposal. (i.e., "Okay, that's your choice." "Do understand that I did try to evacuate you.")

Closing refers to end of the conversation. (i.e., "Okay. Thank you." "Bye.")

We classified proposals based on who would do the proposed action and the strength of the commitment or obligation, yielding five types: command, request, suggestion, offer, and commitment.

3 Analysis

We identified 4 initiation patterns, based on the combination and positioning of greetings and proposal speech acts in the dialogues. These are from most to least urgent (or least to most polite):

1. **proposal in the first turn, no greeting** (14 dialogues, 8 with just a proposal, 6 also including a statement).
2. **proposal in the first turn with a greeting or question** (40 dialogues, some also including questions or statements in the 1st turn).
3. **proposal occurring after an initial greeting exchange** (44 dialogues)
4. **no proposal presented** (6 dialogues)

Of the 98 dialogues with proposals, 33 contained only a single proposal, 40 contained 2 proposals, 21 contained 3 proposals, 3 contained 4 proposals, and 1 contained 5 proposals. Concerning the first proposal type, 43 were commands, 25 commitments, 16 offers, 8 suggestions, and 6 requests.

3.1 Next Steps

We are currently examining patterns involving the relationships between proposals and other actions, and how they are distributed across the above initiation patterns. We will also look at correlations between types of patterns and several factors including individual operator participants and residents, correlations with facial expressions (Nasihati Gilani and Traum, 2023), success at saving the residents, and the simulation state to see whether the proximity of the fire to the resident makes a difference in the distribution of patterns.

4 Acknowledgements

The first author was supported by the NSF REU program, award 1852583, during her internship at the USC Institute for Creative Technologies. The second and third authors were sponsored by the U.S. Army Research Laboratory (ARL) under contract number W911NF-14-D-0005. Statements and opinions expressed and content included do not necessarily reflect the position or the policy of the Government, and no official endorsement should be inferred.

References

Harry Bunt, Jan Alexandersson, Jae-Woong Choe, Alex Chengyu Fang, Koiti Hasida, Volha Petukhova, Andrei Popescu-Belis, and David R Traum. 2012. Iso 24617-2: A semantically-based standard for dialogue annotation. In *LREC*, pages 430–437.

Patricia Chaffey, Ron Artstein, Kallirroi Georgila, Kimberly A Pollard, Setareh Nasihati Gilani, David M Krum, David Nelson, Kevin Huynh, Alesia Gainer, Seyed Hossein Alavi, Rhys Yahata, and David Traum. 2019. Developing a virtual reality wildfire simulation to analyze human communication and interaction with a robotic swarm during emergencies. In *Workshop on Human Language Technologies in Crisis and Emergency Management*.

Setareh Nasihati Gilani and David Traum. 2023. Analyzing user's mental state and facial expressions in interaction with different personalities in a critical situation. In *1st International Multimodal Communication Symposium (MMSYM 2023)*.

John R. Searle. 1969. *Speech Acts*. Cambridge University Press, New York.