

Why (pre)closing matters

The case of human robot interaction

Nicolas Rollet

Dep. of Economics and Social Sciences, Télécom Paris
Institut polytechnique de Paris,
France
nicolas.rollet@telecom-paris.fr

Christian Licoppe

Dep. of Economics and Social Sciences, Télécom Paris
Institut polytechnique de Paris,
France
christian.licoppe@telecom-paris.fr

ABSTRACT

Using a conversationalist (CA) approach to study social interactions with artificial agents, we've collected « face-to-face » interactions between humans and the robot Pepper. As part of the topic of (dis)engagement, our attention has been focused on the last seconds of exchanges, namely the way humans manage to leave or close the interaction. The data revealed how much sequential issues, accountable actions as well as ritual considerations matter in many cases.

CCS CONCEPTS

•law, social and behavioral sciences •Human computer interaction • Human robot interaction •

KEYWORDS

Conversation Analysis, Human-Robot Interaction, sociality, closing, greetings, farewell, ritual, gesture, categorization, tact

INTRODUCTION

Following the conversationalist's issue that « the way of closing matters », especially in a categorial point of view (Button 1991 ; Zimmerman 2006), we focus on a salient phenomenon in our data, that is closings and pre-closings performed by humans in the frame of an interaction with the humanoid robot Pepper.

We've been interested in first encounter interactions between humans and the robot Pepper, and especially the last few seconds of interaction, that is when the human participants display some orientation towards ending the interaction.

Usually in human-human interactions this problem is solved through a step-by-step organization, making visible a relevant opportunity to say goodbye, move away, and so on. This organization is accomplished in support with considerations

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related to tact, benevolence, politeness. This organization refers to the fact that people treat the meeting as a unit delimited by terminal exchanges (Goffman 1973).

STUDY SETUP

As part of a collaboration with Softbank Robotics, the humanoid robot Pepper was placed in a hall of the engineer school Telecom Paris, France. The interactions with the robot were filmed either by the sensors in Pepper's orbits or via a CCTV camera on one side of a glass furniture (figure 1.). This set up lasted three months at the rate of eight hours of recording five days a week.



Figure 1: Pepper and the delimited 'engagement' zone on the floor.

The principle of participation is mainly based on two modalities: either people come on their own (majority of cases) or, in the lobby, they come to Pepper following a verbal and gestural request from him. On the floor an 'engagement zone' was delimited through adhesive strips (see Figure 1).

The main format of the interaction is a question-answer, invitation-response game initiated by Pepper (Ben-Yousef et al. 2017). The design of the script, deliberately long, was such that it made the issue of disengagement and the way to bring the interaction to a close problematic. Hence, at varying moments of the interaction people manifest their orientation towards a departure. This can happen in the "middle" of the interaction (after a question from Pepper for example) or when it is

perceived as complete. This raises the question of how these people leave the interaction, that is what kind of know-how are accountably mobilized – knowing that obviously the robot can't leave the place.

DATA AND METHODOLOGY

People engaged in the interaction were massively students, but also staff members and children.

We have collected 63 workable human-robot interactions, in which people not only show an orientation towards a departure (instead of leaving without warning, or 'dashing-out'), but also employ methods that are for the most part similar to what the literature in conversational analysis (CA) described as pre-closing and closing (Sacks, Schegloff 1973; Button 1991). Each of the 63 interactions is performed with a different person.

On the workable video-recorded interactions, we found a third of analyzable turns as pre-closing lines (in any case morphosyntactically). Moreover, in almost two-thirds of the data we observed at least one closing behavior with a farewell gesture, or a verbal closing such as "goodbye", "see you" and the like.

This supports that we are dealing with a phenomenon that is not isolated to one or two people. Here is an example (R is the robot, P the human participant) :

(Extr1)PepperHIV198¹

1. R j'ai faim (...) [peux tu me dire quel est &
(L1-4) *I'm hungry, can you tell me what's the best place nearby ?*
2. P [bon
well / ok
3. R & le meilleur endroit pour manger près
4. d'ici /
5. (3s)
6. P <((pointing, Image 1.1)) au self service \>
to the cafeteria
7. (1,3s)
8. P <((with greeting gesture)) je dois y aller\ >
I have to go
9. (0,4s)
10. P <((with greeting gesture, Im.1.2)) à bientôt\ >
see you

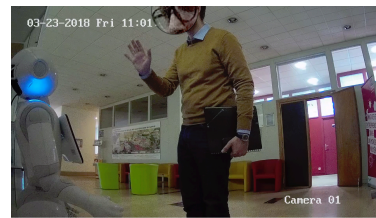
¹ Conventions:

[notes speech overlap
& / stand for falling or raising intonation
<((comments)) à bientôt > notes transcriber commentaries bounded for some stream of speech
: or :: note vocalic stretches (depending on the length)
& notes that due to spatial constraints the transcriber artificially cut the turn which resumes further lines below beginning with another « & »
> au revoir < bounds sudden quick speech
(.) or (..) notes very short pauses (0,1 or 0,2s)
#greeting ----> describes action bounded with two sharp signs, where the second one appears further line below

(Image 1.1)



(Image 1.2)



In line 8, P produces a typical pre-closing "I have to go" (Sacks, Schegloff 1973: 311) after a question-answer sequence completion (L1-4 to L6). Following a (0,4s) pause he produces a typical closing (L10), co-expressive with a greeting gesture (Image 1.2).

On this first observation we undertook a more in-depth study of the ways in which participants prepare for their departure. If the question of the *in situ* evaluation of the competence of an artificial agent is undoubtedly crucial in this kind of interaction, those of procedural confidence, sequential benevolence, authority (on the future of the interaction) or of the categorization of the artificial agent [robot], appear equally characteristic.

If one of the promises of the sociability of the robots is to show communicational and interactional skills leading to foster engagement (Fong et al. 2003; Pitsch et al. 2009; Foster 2015), the presence of pre-closings (or apparent) in our data is a fact to be analyzed in detail. Indeed, one can discuss the pre-closing with a Goffmanian look by suggesting that the breaking of the co-presence requires attention to the respect of the faces - attention which results in preparatory and benevolent conducts when the interaction goes to, must, or should end (Goffman 1973).

The fact that preparatory, attenuating behaviors such as pre-closings are addressed by a human to an artificial agent echoes a social robotic aim, namely that it can be considered as a partner. This precise point refers to an interrogation on the *in situ* accomplishment of the category [robot] - hence the bracketing according to the ethnomethodological mentality (Garfinkel, Sacks [1970] 2007: 450-2).

The analysis draws on the existing literature on CA to show how people mobilize resources similar to those that everyone mobilizes in everyday life, by updating them for the occasion -

be it from a sequential, morphosyntactic or multimodal point of view. It detaches from it to show the massively unilateral character in the handling of the interaction and the fluctuating character of the sequential processing in relation to an unstable categorization of the artificial agent.

RESULTS

The results may be summarized as follows :

- a) there is a remarkable (accountable) character of some robot's actions regarding their sequential relevance;
- b) in this respect closings pose a practical difficulty for the human participants;
- c) there are different ways to bring the interaction to a close, especially we observed 'rushed (pre)closing' which shows a sensitivity to the fragility of the interactional framework with the robot.

One can easily imagine, since the robot is a machine, that "exit" strategies, in which the human participant merely stops interacting and moves away, are frequent. We observed about ten occurrences of this type out of the 63 workable interactions. Apart from those, we observed three great ways of producing recognizable closings between the human participants and the robot, all of which show a sequential orientation : "machinic" instructions ; standard closing behaviors (such as extract 1) ; accelerated closing packages.

Machinic instructions are participant's turns like "stop" or "close application" which are the kind of turns one could expect when a human wants to stop the interaction with a machine : he produces an on-off utterance, and waits for the robot to treat this instruction. We found only five of those behaviors in our data.

The accelerated form of closing is maybe the most surprising case in our data. Here is an example. Pepper asks a question (L1-2), the participant accountably aligns himself with an answerer's stance (L4-5) but attaches his answer with a mitigated announcement of departure (L5-6) directly followed by a greeting gesture (L7-10) and a closing (L9):

(Extr2)PepperHIV133

1. R je prévois d'aller au cinéma ce soir quel &
2. film me recommandes tu /
- (L1-2) I'm going to the cinema tonight, any film you would suggest ?
3. (2,3s)
4. P euh: je sais pas c'qui y a en ce
5. moment au cinéma mais: en fait il
6. [faut que j'y #aille (.)
7. Pg #greeting gesture, Image2.1----→
- (L4-6) euh, I don't know what is currently playing but I have to go
8. R [tu es encore là/
are you still there ?
9. P >au #revoir<
10. Pg ----#
goodbye

(Image 2.1)



Indeed, as in extract 2, there is an effect of breaking the current framework in which the artificial agent is not (anymore) endowed with a sequential role, but where a standardized mitigation formula traditionally linked to the threat of the faces (Goffman 1974, Quéré 1989) is however produced. We found a dozen of those *rushed closings*. The participants impose at the same time an end of interaction while robbing the robot of an agentive quality, through the denial of a sequential opportunity to answer.

DISCUSSION

We examined how the human-robot interaction can be considered as a social interaction, that is to say a hand-to-hand arrangement which encompasses not only a turn-by-turn accomplishment, but also a ritual equilibrium such as it is observed in human-human interactions. Indeed, especially in face-to-face, the interaction is not only a strict corporeal issue, but also a problem of deference and demeanor (Goffman 1956), that is to say of (interactional) tact. To answer this is to ask what is the sociality of a robot, and how to foster it.

The vision that we put forward is that the sociality of a robot is not so much a set of ingredients to implement in a machine, than a phenomenon, that is to say, an apparent quality emerging in the interaction (Rollet et al 2017). Sociality is not a quality decided by the researcher, rather it is a feature categorically and interactively attributed in the interaction being done. (Robot) Sociality is a practical problem.

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