Laughing at the robot:

Incongruent robot actions as laughables

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ABSTRACT

Laughter is a common occurrence when people interact with social robots. Among the many reasons for the production of laughter, one phenomenon is when the robot responds inadequately and or in a contextually inappropriate manner to the ongoing interaction. This paper is grounded in studies from a semi-experimental setting in which course participants naturally interact with the humanoid robot Pepper in a Danish context. Building upon video recordings and ethnomethodological conversation analysis, the paper explores situations where the robot produces an action that somehow diverges from the expected trajectory of social actions and consequently establishes an incongruency. This research contributes to our understanding of the finetuned nature of human sociality and hence requirements for Human-Robot-Interaction.

CCS CONCEPTS

Human-Computer-Interaction • Empirical Studies in HCI • Robotics • External Interfaces for Robotics • Cooperation and Coordination • Discourse, Dialogue, and Pragmatics.

KEYWORDS

Social interaction, HRI, ethnomethodology, multimodal conversation analysis, laughter, turn taking, gaze,

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1 Introduction

While the majority of research in social robots is still done in laboratory environments that develop and test robotic technologies, people in institutional settings are beginning to put these robots to use, and new methodological approaches are emerging [1]. This paper reports from a study of such interactions with the robot Pepper and focuses on the production of laughs and laughables.

This paper departs from the overall research question: Why do people laugh at the robot? Pepper produces designed jokes and funny movements, which often receive laughs. However, human participants also laugh at the robot in non-humoristic contexts. Why is this the case? Research into laughter in interaction has shown that laughter is finely organized and embedded in social activities, not part of a linguistic code, may be an action in itself and produced at different sequential positions [2]. This paper aims to show 1) the systematics of laughs as a response to non-humoristic but incongruent robotic actions, 2) how this laughter may be caused by the fact that Pepper has humanoid features, 3) the crucial role played by bystanders, and finally discuss how this insight may inform future development in social robots.

2 Study setup and participants

The empirical data for this study is a research project in Denmark conducted in collaboration with a company offering courses (Teknologisk Institutet). When entering the building, course participants are greeted by Pepper, and they can talk with the robot about locations, the program, etc. No developers were involved in this project. Pepper had already been set up with standard functionalities. In order to video record the interactions, we had to designate an area and equip it with four cameras. The researchers secured written confidentially agreements from all participants.

3 Methodology and data corpus

This approach is based on praxeological, ethnomethodological multimodal conversation analysis [3], an approach that studies participants' situated practices and sequentially emerging actions in the accomplishment of whatever activity they are undertaking [4]. Twenty-one participants were video recorded over the course of five days in 2018. Data was transcribed, and a collection of 12 non-humoristic laugh situations in total from the corpus was composed. I will show one example in this paper. Transcription follows Mondada conventions [5].

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4 Observations and Results

The example shows a typical situation from the data corpus. It reveals how laughs are sequentially and socially accomplished and tied to specific types of laughables in the Robot-action.

Transcription key	
Par1:	Man talking with Pepper. + indicates his body action
Par2:	Woman in black, tr. % indicates her body action
Par3:	Woman in grey
PEP:	Pepper. Δ indicates its machine actions
Res:	Researcher in black, tl.

```
1 PAR1    can you remind me in ten minutesΔ that I have to (.) go↑
    pep   >>lowering arm-------------------------Δ
2 PEP     ((beeping)) bye Δ↑bye #((beeping))Δ
    pep                   Δraising arm----------Δ,,,,,,,,,,,,,,--->
    fig                         #fig1, 2
```

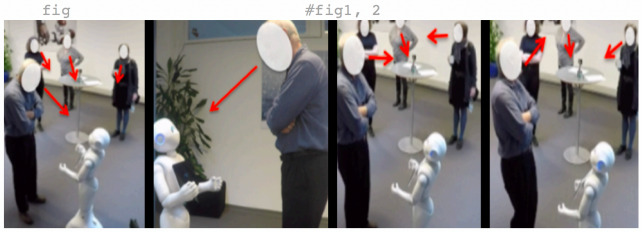

fig1 fig2 fig3 fig4

```
3 PAR1    +hh% hhh.#+[%ha#haha]
4 RES               [hahahaha]
5 PAR3              [hahahaha]
6 PAR2              [hahahaha]
    par1  +leans backwards--------------------------->
    par1            +look to the left--->
    par2     %look tr.%
    pep   Δ,,,,,,,,,,,,,,,,lowers arm,,,,,,,,, Δ
    fig             #fig3 #fig4
```

4.1) The laugh is a response to a non-humoristic but incongruent robotic action. In line 1, Par1 asks Pepper a question. Pepper interprets the completion of the turn and responds at the sequentially relevant next slot. However, Pepper does not respond to the turn as being designed as a question but as a declarative. Although Pepper does in fact adequately respond with a second pair part to the first turn, it does not conform to the adjacency pair type [6], i.e. it is not producing an answer to the question. Instead, Pepper is only responding to the second part of Par1's turn, which is: "I have to (.) go↑" (l. 1). Pepper responds: "bye bye" (l. 2), which is a very nicely fitted response to the last part of the turn but completely misfitted as a response to the turn as a whole. This verbal action from Pepper prompts immediate laughter, first from the interacting participant. As he looks leftwards, at the bystanders, they also produce laughs. The laughs are thus sequentially produced in a third position as an immediate response to Pepper's verbal action as non-conforming, sequentially misfitted, and hence incongruent with the emerging activity. Incongruity is a well-known aspect in humor research [7], and it functions as a laughable, as a source for a laughing response, precisely because it is incongruent with the unfolding interaction.

4.2) The laugh may be caused by the fact that Pepper has humanoid features. In order for Pepper's utterance to be understood as a laughable, Pepper needs to be treated as a serious and relevant conversational participant in the first place. This short excerpt does not reveal how the interaction also progresses in an orderly manner, but this is the case over short periods. The excerpt does show how the human participant orients towards Pepper as a relevant conversational partner that follows normal interactional rules by: a) maintaining "eye contact", b) embodied positioning in a face-formation, and c) producing relevant questions. We may stipulate that this orientation towards Pepper may be grounded in the fact that Pepper a) has a humanoid shape, b) is able to maintain "face contact" and "eye contact", and c) is able to sometimes produce relevant conversational content.

4.3) Bystanders play a crucial role. Although Pepper is treated as a relevant conversational partner, we can observe that it is not included in the laugh, i.e. it is the reason for the laugh and is being laughed *at* openly to its "face". No facework is occurring in order to save Pepper's "face", as people would normally do [8]. Additionally, the human "need" for establishing intersubjectivity is not accomplished in collaboration with Pepper. We notice that Par1 initiates laughing particles while leaning back and then uses other multimodal resources as he turns his head and looks at the bystanders, who start laughing and look back at him, as he orients towards them (l. 3-6). We notice how he keeps his lower body oriented towards Pepper while turning his torso towards the bystanders. The accomplishment of the laugh is thus not only an individual achievement but is socially organized and produced as a shared laughter that includes the humans while at the same excludes Pepper from the sense-making (but not the spatial) framework.

5 Discussions: Future developments

We know from prior research that digital conversational agents that are designed to fit nicely within the turn-taking machinery may get completely off-track due to lack of context understanding, semantic interpretations, and timing on the microscale [9]. This reveals aspects of the extremely detailed construction of human interaction and hence provides perspectives for future constructions of social robots. According to Breazeal et al. [10], social robots should be able to "interact with people in a natural, interpersonal manner" (p. 1935). The current study on why people laugh at the robot Pepper has shed light on how a minimal divergence from a current unfolding activity and conversation has enormous consequences for the ability to interact naturally with Pepper.

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