A Model for Context-sensitive Interpretation of Communicative Feedback

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A prevalent and important coordination mechanism in dialogue is communicative 'listener feedback' in form of short verbal-vocal signals (e.g., 'uh-huh', 'yeah', 'huh'), head gestures (e.g., nodding, wiggling) or facial expressions. Listeners' feedback signals are indications of their cognitive state and communicate whether listeners and speakers are in contact, whether listeners perceive, understand and accept the speakers' utterance as well as whether they agree to or which attitude they have towards the speakers' utterance (Allwood et al., 1992).

Feedback signals are rich in their form – enabling a fine-grained expression of subtle differences in meaning –, multi-functional, and interact heavily with their dialogue context. Consequentially, feedback is only conventionalised to a certain degree. Speakers are nevertheless able to interpret communicative feedback, use it to reason about the listener's cognitive state as well as their common ground, and adapt their language accordingly (Clark, 1996).

Our objective is to model this ability of human speakers for artificial conversational agents (e.g., dialogue systems, embodied conversational agents), making them attentive to their users' needs as expressed in their feedback behaviour (Buschmeier & Kopp, 2011).

Here we present an agent-centric cognitive model for the interpretation of feedback signals in their dialogue context. It uses features of the feedback behaviour observed by the agent as well as the agent's utterance, expectations and knowledge about the task to reason about an 'attributed listener state' (ALS; the agent's reconstruction of the user's cognitive state) and the grounding status of information. Using the framework of Bayesian networks, the model represents ALS and common ground probabilistically in terms of degrees of belief. Because of this, it is straightforward to deal with the uncertainties inherent in the observations, the form-meaning relation of a feedback signal and the user's behaviour.

References

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The Revision of Spatial Mental Models – Does Distance Matter?

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The revision of mental representations is necessary whenever reasoners encounter conflicting, yet trustworthy information. The aim of such a revision process is to regain consistency of the mental representation with the new information about the state of affairs. In the spatial domain it is assumed that resolving such a conflict of information by reestablishing consistency is achieved by modification of the initially held spatial representation. Little is known about the nature of this modification process. Even though a great deal of research has been concerned with the construction and inspection of mental representations in the spatial domain, there is basically no research investigating the processes underlying the revision of such representations. The aim of our research is to present a first insight into these processes. In our experiments we operationalize "revision" as the relocation of an object in a given spatial layout. After learning a visually presented linear spatial layout of different objects (e.g. peach – pear – kiwi – apple) participants get a verbal piece of information about the spatial relation of two of the layout's objects (e.g., the kiwi is to the left of the peach) that is inconsistent with the arrangement of the objects in the initial layout. The participants' task is to integrate the new information by modifying the initial layout so that a revised layout, consistent with the verbal information, results (e.g., kiwi – peach – pear – apple). This paradigm allows us to systematically vary certain aspects of the task, such as the distance the to-be-relocated object has to be "moved" within the layout as well