

Feedback Relevance Spaces: A Dynamic Syntax account of dialogue data

Dialogue is co-constructed by multiple interlocutors with frequent feedback demonstrating whether utterances are taken as understood (Clark, 1996). To achieve this grounding, we produce relevant next turns, or feedback ('mm', 'yeah'), with some feedback indicating difficulties ('huh?'). This feedback does not just occur at the ends of turns – grounding occurs incrementally, before a complete proposition has been processed (Eshghi et al., 2015). However, although feedback can occur anywhere (Howes et al., 2011), it typically does not – randomly placed backchannels disrupt the flow of dialogue, are rated as less natural and decrease rapport (Poppe et al., 2006).

Here, we present a corpus study of acknowledgements and clarifications, and describe how the Dynamic Syntax (DS) model of ‘feedback relevance spaces’ (FRSs; Howes and Eshghi, 2017) accounts for feedback placement in low-level, semantic processing terms. The model trivially accounts for 85% of cases where feedback occurs at FRSs, but also describes how it can be integrated or interpreted at non-FRSs using the predictive, incremental and interactive nature of DS. For feedback at non-FRSs, our DS model makes the following predictions, borne out by the corpus data: (1) Late feedback addresses an earlier semantic unit, and is thus more disruptive due to the backward and forward search required to integrate it. (2) Early feedback indicates that the speaker's truncated semantic unit was locally predictable enough to be already understood without having been fully articulated.

Our model shows how feedback serves to continually realign processing contexts and thus manage the characteristic divergence and convergence that is key to moving dialogue forward. We discuss the implications for Dynamic Syntax as a grammar of dialogue, and for the production and interpretation of feedback in dialogue systems (Eshghi et al., 2017).

Clark (1996). *Using Language*. Cambridge University Press.

Eshghi A, Howes C, Gregoromichelaki E, Hough J, Purver M (2015). Feedback in conversation as incremental semantic update. *Proceedings IWCS*.

Eshghi, Shalyminov, Lemon. (2017). Bootstrapping incremental dialogue systems from minimal data: linguistic knowledge or machine learning? *Proceedings EMNLP*.

Howes C, Eshghi A (2017). Feedback relevance spaces: The organisation of increments in conversation. *Proceedings IWCS*.

Howes, Purver, Healey, Mills, Gregoromichelaki (2011). On incrementality in dialogue: Evidence from compound contributions. *Dialogue and Discourse* 2(1).

Poppe, Truong, Heylen (2011). Backchannels: Quantity, type and timing matters. *International Workshop on Intelligent Virtual Agents*.