Linguistic routines in joint problem-solving respond to environmental factors

Jonas Nölle
Aarhus University
jonas.noelle@live.de

Language plays a predominant role in social interactions where communities of agents face collective problems (Tylén et al. 2010). It has thus been argued that linguistic meaning is grounded in concrete usage situations and continuously evolves as it is coordinated between agents (Steels 2008). It has been repeatedly observed how shared task-specific linguistic strategies emerge and stabilize in experimental contexts, where agents have to solve joint coordinative tasks (Garrod & Doherty 1994). In such usage situations, the task environment provides agents with a set of affordances that call for different types of actions (Gibson 2013). From this follows the prediction that different communicative strategies will evolve adaptively in response to varying environmental affordances.

The hypothesis was addressed in an experiment, where subjects had to communicate positions to guide each other through virtual mazes. In three conditions, these varied in their layout (e.g., being highly regular or resembling figural shapes) and afforded different conceptual strategies. Results indicate that, as predicted, different linguistic strategies became routinized in response to these environmental conditions. This suggests that linguistic interactions and routines are not only the result of automatic priming mechanisms as suggested in the Interactive Alignment Model (Pickering & Garrod 2004). Rather, linguistic adaptations between interlocutors are highly sensitive to factors of the shared task environment. This is in line with empirical findings suggesting correlations between linguistic features and ecology (e.g., Everett, Blasi & Roberts 2015; Lindsey & Brown 2002; Majid et al. 2004). It is therefore conceivable that grammars, just like routines in an existing language, are also motivated by external factors. Some possible future experiments to assess this role of the environment in cultural language evolution will be discussed.

Everett, C., D.E. Blasi & S.G. Roberts. 2015. Climate, vocal folds, and tonal languages: Connecting the physiological and geographic dots. *Proceedings of the National Academy of Sciences*, 201417413.

Garrod, S., & G. Doherty. 1994. Conversation, co-ordination and convention: An empirical investigation of how groups establish linguistic conventions. *Cognition* 53(3): 181–215.

Gibson, J.J. 2013. *The ecological approach to visual perception*. Psychology Press.

Lindsey, D.T., & A.M. Brown. 2002. Color naming and the phototoxic effects of sunlight on the eye. *Psychological Science* 13(6): 506–512.

Majid, A., M. Bowerman, S. Kita, D. Haun & S.C. Levinson. 2004. Can language restructure cognition? The case for space. *Trends in cognitive sciences* 8(3): 108–114.

Pickering, M.J., & S. Garrod, S. 2004. Toward a mechanistic psychology of dialogue. *Behavioral and brain sciences* 27(2): 169–190.

Steels, L. 2008. The symbol grounding problem has been solved. so what's next. M. de Vega (ed.), *Symbols and Embodiment: Debates on Meaning and Cognition,* 223–244. Oxford University Press.

Tylén, K., E. Weed, M. Wallentin, A. Roepstorff & C.D. Frith. 2010. Language as a tool for interacting minds. *Mind & Language* 25(1): 3–29.