

## ABSTRACTS

### Plenary speakers

**Pius ten Hacken,**

Leopold-Franzens-Universität Innsbruck, Austria

#### HOW PRODUCTIVITY FACILITATES ANTICIPATION

Linguistic communication depends on anticipation. Anticipation is necessary, because there are just too many possible linguistic expressions that can be used. For comprehension, they have to be matched with the grammar and lexicon in the hearer's or reader's competence. In fluent communication, there is not enough time for a systematic search, so the mind has to use shortcuts. One of the effects that can be observed in daily life is that in cases where we do not expect being addressed, it is often difficult to understand what is said.

Productivity is a property of rules and processes. For Chomsky, the observation that we can produce new linguistic expressions (e.g. sentences), which have never been used before, and hearers can understand them was one of the triggers for the notion of generative grammar. The observation implies that the language system must be productive.

As a topic of discussion, productivity is especially connected to morphology. An influential early definition of morphological productivity was put forward by Schultink (1961). In his definition, productivity requires that a rule is applied without conscious intention and in an in principle unlimited number of cases. The precise meaning of these conditions has given rise to some debate, leading to different, competing interpretations of productivity. A useful analysis of the different interpretations is presented by Corbin (1987). She distinguishes *disponibilité* ('availability'), *rentabilité* ('profitability') and *régularité* ('regularity'). Availability is a binary property of a rule, stating whether it is possible to use the rule for new formations. Profitability addresses the number of formations in which the rule is involved. Regularity concerns the extent to which the form and meaning of the result is predictable on the basis of the input and the rule.

Whereas productivity is first of all linked to rules, anticipation is a property of language processing, i.e. the retrieval of information from the lexicon and the grammar. A central aspect is priming. Priming means basically adapting a hierarchy of prominence to linguistic items. Linguistic items are lexicon entries or grammar rules. As argued by Jackendoff (2002), there is no crucial difference between these two and there are many cases, e.g. idioms, where an item has properties of both. The problem of being addressed unexpectedly is that no priming is in place, so that one tends to be too slow in activating the relevant linguistic items. Priming is based on connections between linguistic items. It is triggered by any cognitive process, i.e. visual, acoustic or other sense-based input, including linguistic input, as well as inferences.

Whereas productivity is first of all a property of rules, i.e. the content of the language system, anticipation is the consequence of priming, which is a property of the state of the language system. As such, they operate at different planes. Still, they are intimately connected. Both address the relative prominence of linguistic items. The different aspects of productivity each have their own role in the activation of priming.

A discussion of a number of examples will demonstrate how the three types of productivity distinguished by Corbin (1987) correspond to factors that influence anticipation and how the two properties of unintentionality and non-finiteness identified by Schultink (1961) can be used in this context.

#### References

Corbin, Danielle (1987), *Morphologie dérivationnelle et structuration du lexique*, Tübingen: Niemeyer (2 vol.).

Jackendoff, Ray (2002), *Foundations of Language: Brain, Meaning, Grammar, Evolution*, Oxford: Oxford University Press.

Schultink, Henk (1961), 'Produktiviteit als morfologisch fenomeen', *Forum der Letteren* 2:110-125.

## HUMAN-MACHINE SPOKEN INTERACTION AND LINGUISTICS

Nowadays, we can observe the rapid growth of applications, which enable spoken interaction, thanks to new types of devices, e.g. virtual assistants, household devices, robots, chatbots etc. Speech-based interaction with mentioned devices has a form of some “dialog” between human and machine. In the case of virtual assistants like Apple Siri, Google Now, Amazon Echo, this interaction can have a form of relatively simple question-answer sequences or simple task-oriented dialogues. The primary technology group that enables human-machine spoken interaction (HMI) consists of automatic speech recognition, natural language understanding, dialogue management, natural language generation and speech synthesis. In the case of humanoid robots, social and family robots people tend to expect more natural interaction, often called “conversation”. Conversational interfaces involve more advanced versions of mentioned technologies, to be a human-like conversational partner. Moreover, behinds the capability of a person to be an interlocutor of a conversation lies a lot of critical human capabilities, many of which are carried out unconsciously and very naturally. People are easily able to track the content and history of interaction (including long-term and short-term interaction history) to detect a speech act (dialogue act) behind a speaker’s turn, to perform effective and rapid turn-taking, to provide feedback in the role of listener, or incrementally construct their turns. Human-like turn-taking in the human-machine interactions can be seen as a critical issue to achieve natural conversational interaction in HMI. An essential aspect of the HMI is rapid speaker changes, which means that there are no or minimal gaps (<200msec) between the speaker’s turns (Stivers et al. in [1]). However, several other studies (e.g. [2], [3]) shown that human language production takes more than 600msec to produce output utterance (see [4]. [5]). It means that the production of the listener response starts before the speaker turn is finished, which means, that listener is often able to anticipate the remaining content of unfolded speaker turn. The ability to anticipate can be identified as a very important human capability, which supports rapid turn-taking. This anticipation process, which occurs during listening carefully relates to sentence comprehension and turn-taking. The ability to anticipate the content of the speaker turn and turn-end was researched and confirmed in several studies. Magyari et al. in [6] observed changes in EEG, which shows that the estimation of turn durations is based on anticipating the way the turn would be completed. They founded a neuronal correlate of turn-end anticipation and a beta frequency desynchronization as early as 1250 msec, before the end of the turn. Described anticipation phenomenon on the human-listener side, brings new questions related to the machine’s anticipation in an HMI: Would machines let their “predictable” turn unfinished when they observe a comprehension on the side of a human listener? Alternatively, would machines be able to interrupt the human speaker turn and if yes, in which situations?

### References

- [1] T. Stivers, N. J. Enfield, P. Brown, C. Englert, M. Hayashi, T. Heinemann, et al. (2009). Universals and cultural variation in turn-taking in conversation. *Proceedings of the National Academy of Sciences, U.S.A.*, 106, 10587–10592.
- [2] P. Indefrey, W. J. M. Levelt, “The spatial and temporal signatures of word production components”. *Cognition*, 92, 101–144, 2004
- [3] T. T. Schnurr, A., Costa, A. Caramazza, “Planning at the phonological level during sentence production.”, *Journal of Psycholinguistics Research*, 35, 189–213, 2006.
- [4] J. Holler, K. H. Kendrick, M. Casillas, S. C. Levinson, eds. (2016). *Turn-Taking in Human Communicative Interaction*. Lausanne: Frontiers Media. doi: 10.3389/978-2-88919-825-2, 2016
- [5] M. Heldner, and J. Edlund, “Pauses, gaps and overlaps in conversations.” *J.Phon.* 38, 555–568, 2010 [6] L. Magyari, M.C. Bastiaansen, J.P. de Ruiter, and S.C. Levinson, “Early Anticipation Lies behind the Speed of Response in Conversation”, *Journal of Cognitive Neuroscience*, pp. 2530-2539, 2014.

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**Renáta Gregová,**  
Pavol Jozef Šafárik University in Košice, Slovakia

### **Anticipation, Simultaneity/Consecutivity and Distinctive Features in Phonology**

The notion of distinctive features has its firm position in phonology since the time of the Prague Linguistic Circle and especially one of its representatives, Roman Jakobson, whose well-known delimitation of a phoneme as “a bundle of distinctive features” (Jakobson 1962: 421), that is, as a set of simultaneous distinctive features, has inspired many scholars. Jakobson’s attempt “to analyze the distribution of distinctive features along two axes: that of simultaneity and that of successiveness” (ibid.: 435) helped cover several phonetic and/or phonological processes and phenomena. Distinctive features, although, theoretical constructs (Giegerich 1992: 89), reflect phonetic, that is, articulatory and acoustic properties of sounds. In the flow of speech, some features tend to influence the neighbouring phonemes. There are situations where it seems as if the successive organization of phonemes went hand in hand with the simultaneous nature of the certain articulatory characteristics of those phonemes (transgression of consonants and inherence of vowels in Romportl’s theory), or the given feature seems to be anticipated by the preceding segment. This is the case of nasalization and/or anticipatory coarticulation, as well as regressive (anticipatory) assimilation. In addition, simultaneity/consecutivity is a criterion decisive for the difference between the so-called complex segments as specified in Feature Geometry and simple segments (Duanmu 2009). Moreover, the phonological opposition simultaneity – successivity (that is consecutivity) itself functions as a feature making a difference between segmental and suprasegmental elements in the sound system of a language as first mentioned by Harris (1944), later indicated by Jakobson (1962) and fully developed by Sabol (2007, 2012).

#### **Selected references:**

- Duanmu, San. *Syllable Structure. The Limits of Variation*. Oxford: Oxford University Press, 2009.
- Giegerich, Heinz J. *English phonology. An introduction*. Cambridge: Cambridge University Press, 1992.
- Hardcastle, William J. – Hewlett, Nigel (eds). *Coarticulation. Theory, Data and Techniques*. Cambridge: Cambridge University Press, 2006.
- Harris, Z.: Simultaneous components on phonology. In: *Language*, 1944, roč. 20, č. 4, s. 181 – 205.
- Jakobson, Roman. *Selected Writings, I: Phonological Studies*. The Hague: Mouton, 1962, x. 678 pp.
- Král, Ábel – Sabol, Ján. *Fonetika a fonológia*. Bratislava: Slovenské pedagogické nakladateľstvo, 1989.
- Romportl, Milan. *Studies in Phonetics*. Prague: Academia, 1973.
- Sabol, Ján: Syntagmatický a paradigmatický princíp v konexii fónických prvkov. In: *Koreferencia a konexia textu. Acta Facultatis Philosophicae Universitatis Prešovensis. Jazykovedný zborník*, 48 (AFPh UP 96/178). Ed.: J. Sabol – L. Sisák. Prešov: Filozofická fakulta Prešovskej univerzity 2007, s. 13 – 20.
- Sabol, Ján. Semiotické pozadie segmentov a suprasegmentov. In *Jazykoveda v pohybe*. 2012, s. 59 – 69.