Susanne Fuchs, Melanie Weirich, Daniel Pape and Pascal Perrier (2012, eds.), *Speech Planning and Dynamics* (*Speech Production and Perception, 1*), Peter Lang, Frankfurt am Main-Berlin-Bern-Bruxelles-New York-Oxford-Wien, ISBN 9783631614792, pp. 1-277, € 51,40.

Susanne Fuchs, Daniel Pape, Caterina Petrone and Pascal Perrier (2015, eds.), *Individual Differences in Speech Production and Perception* (*Speech Production and Perception, 3*), Peter Lang, Frankfurt am Main-Berlin-Bern-Bruxelles-New York-Oxford-Wien, ISBN 9783631665060, pp. 1-284, € 56.

The issues addressed in both volumes vastly increase our present understanding of the immensely complex process of speech communication.

Speech Planning and Dynamics consists of eight chapters written by leading scientists, internationally renowned researchers, and young researchers, in the area of speech planning, both from a cognitive-linguistic and from a motor control perspective. Since Smith and Goffman (2004) and Smith (2006) the two perspectives appear to be strongly intertwined, being evidences that prove bottom-up influences from the dynamics of the motor control system to the cognitive-linguistic system (*contra* Willem J. M. Levelt's psycholinguistic model of language production).

The volume begins with a concise preface written by the editors, Susanne Fuchs, Melanie Weirich, Daniel Pape and Pascal Perrier. As indicated in the introductory notes, the book has its roots in the third summer school on 'Speech Production, Perception and the Production-Perception Interaction', organized in Berlin in the context of the PILIOS project, in September 2010. PILIOS is the abbreviation for 'sPeech as the Interaction between LInguistics, cOgnition, and physicS', a funded project carried out by the Centre for General Linguistics in Berlin and the Gipsa-lab in Grenoble (Fuchs and Perrier, 2008).

In the first chapter, Pierre Hallé and Alejandrina Cristia (*Global and detailed speech representations in early language acquisition*) address the question of how phonetically detailed the speech representations used by children are when they are acquiring their mother tongue, and whether such

representations change throughout children's development. In the lexical representations for speech production, phoneme-like units emerge after a whole-word stage at around 2 years of age. Vowels and consonants play different roles within the developmental path, there being an asymmetry in terms of the level of their specification: high sensitivity to consonantal phonetic detail is observed in children from an early age, whereas vowel information is coded in a more flexible way.

Sound change in progress is the theme of the paper by Jonathan Harrington, Felicitas Kleber, and Ulrich Reubold, *The production and perception of coarticulation in two types of sound changes in progress*. The fronting of high back vowels in Standard Southern British and the post-vocalic stop voicing in Franconian are the two phenomena under investigation, according to the apparent time paradigm: the authors aim at modelling both changes in progress in terms of decontextualization of speech and imitation. In both cases, coarticulation produces synchronic variation, which appears to be enhanced during a sound change in progress. The paper enlightens the complex nature of sound change, which involves different components: the initial phonetic conditions, «the development of the change through the entrainment of different speaker groups in contexts to which the diachronic change is related synchronically, its spread to other contexts possibly in perception ahead of changes in production, and the development in certain cases of trading relationships» (p. 57).

The gestural theory of syllable structure (Browman and Goldstein, 1988) is discussed in the first part of the paper by Marianne Pouplier, *The gestural approach to syllable structure: Universal, language- and cluster-specific aspects*. As it is widely known, the model aimed to draw a direct link between physiological and grammatical principles of syllabic organization. The second part of the text investigates how cluster-internal timing differences and syllable-position timing effects may interact in both onset and coda, testing the articulatory organization of German syllable onset and coda clusters. Syllabic structure is expressed in articulatory timing: with respect to codas, articulatory data confirm the predictions proposed by Browman and Goldstein 1988 (that is, the timing of the vowel-adjacent consonant is the same regardless of coda structure); as for the onset, the results confirm the predominance of the in-phase coordination.

Advanced planning in spoken language production is the topic of Linda Wheeldon's paper, *Producing spoken sentences: The scope of incremental planning*. According to the most recent models of language production, processing occurs in an incremental fashion. The incrementality of the process may

explain the speech fluency and speed, and may reduce the need for temporary storage of completed chunks of the utterance (Levelt, 1989). The experiments carried out by the author and colleagues investigated the scope of advanced planning during spoken sentence production and proved that (i) «more processing time is devoted to the beginning of an utterance prior to speech onset, than to the utterance as a whole» (pp. 114-115), (ii) the minimal planned speech unit is a phrasal chunk. Crucially, such unit seems to correspond to a thematic unit in the message.

How speakers produce prosodic structure is the general theme of the next two papers. Sam Tilsen's contribution, *Utterance preparation and stress clash: Planning prosodic alternations*, offers an introduction to the stress-clash phenomenon and its phonological interpretations. One of the novelties of the paper concerns the development of an experimental paradigm suitable for investigating the effects of planning time, in which two different styles are elicited (contrary to the most part of the studies, almost exclusively focused on prepared utterances). The experimental analysis proved that a prominence-reducing effect of clash was present in prepared speech only, providing empirical evidence for the models of speech planning and production in which utterances are produced before prosodic structure is fully built. Hence, the effect of clash on segmental duration differs on the extent to which an utterance was prepared or not. The following chapter, *Prosodic planning in speech production*, by Jelena Krivokapic, investigates the role of prosodic phrasing in speech planning, which appears to be a rather underinvestigated topic. The author presents four different studies analyzing the effect of phrase length and prosodic phrasing on speech planning. Her results prove that speakers have a large scope of planning and that both local and distant prosodic phrases have an effect on the speech planning process, thus suggesting that prosodic structure could determine the chunk to be planned by speakers. The results are therefore compatible with Keating and Shattuck-Huknagel's (2002) 'prosody-first' model, not with Levelt's (1989) 'prosody-last' approach.

The contribution by Pascal Perrier, *Gesture planning integrating knowledge of the motor plant's dynamics: A literature review from motor control and speech motor control*, offers a literature review on dynamic internal models on the Central Nervous System (from the original proposals made at the end of the eighties to more recent research programs). Experimental studies from the motor control and speech motor control literature are discussed, showing the paucity of experimental support in favor of the motor sequence planning based on optimality control and learned generalized internal models in the brain.

In the last chapter, *A survey of methods for the analysis of the temporal evolution of speech articulator trajectories*, by Leonardo Lancia and Mark Tiede, a selection of methods for the description and comparison of movement data are presented. They focus in particular on techniques able to capture the temporal characteristics of the signal under investigation (Functional data analysis, Wavelet transform, Recurrence and cross recurrence analysis). The paper ends with two useful Appendices describing further readings, tutorials, and software products.

The second volume contains nine papers dealing with speaker idiosyncrasies, inter-individual variation, and individual behavior in speech production and perception. As indicated in the preface, this book was inspired by the project 'SPEECHart – Speaker-specific articulation as adaptation to individual vocal tract shapes' and the fourth summer school on 'Speech production and perception: Speaker-specific behavior', organized in Aix-en-Provence in September 2013.

The opening chapter by Rachel Smith, *Perception of Speaker-specific phonetic detail*, introduces the reader to different perception theories, and provides evidence that processing of the linguistic message is affected by inter-speaker variation in a number of aspects of phonetic detail – the so called 'speaker-specific phonetic detail' –, ranging from the extent of coarticulation to articulatory setting, to speech rate, clarity and phonetic reduction. According to the 'Polysystemic Speech Perception Model' (Polysp) of Hawkins and colleagues (Hawinks and Smith, 2001; Hawkins, 2010), such patterns of individual variation can be learned about, and can facilitate performance in various laboratory tasks.

The paper by Frank Eisner, *Perceptual adjustments to speaker variation*, deals with listeners' ability to adapt to inter-speaker variation, which is ubiquitous in the speech signal. The investigation of the cognitive mechanisms allowing the high plasticity in the perceptual system outlines the presence of «learning processes that can act fast and induce long-lasting changes in the mapping of acoustical cues onto linguistically meaningful units» (pp. 39-40). Learning helps listeners to deal with speakers' variation and to adjust their perceptual categories to idiosyncratic properties of individual speakers.

Perceptual learning is addressed also in the next chapter, with a particular focus on spoken language acquisition. Marieke van Heugten, Christina Bergmann, and Alejandra Cristia (*The effect of talker voice and accent on young children's speech perception*) review how infants and toddlers overcome

language variation and idiosyncratic variation when acquiring their mother tongue. After explaining the milestones of infants' linguistic processing, the paper presents an overview of empirical results testing the effects of speakers' differences and variability in young children and proving how children's early spoken language processing appears to be highly sophisticated in nature. The appendix provides a useful summary of the main experimental techniques used to investigate infant behavior.

The paper by Benjamin Swets, *Psycholinguistics and planning: a focus on individual differences*, deals with the cognitive architecture of language, with a focus on systematic variance in language processing among individuals. The experimental findings he presented demonstrated that individual differences research can help explain variance in the scope of planning in language production.

The next two chapters deal with the prosodic domain. Francesco Cangemi, Martina Krüger, and Martin Grice, *Listener-specific perception of speaker-specific productions in intonation*, explore the interaction between speaker-specific behaviours in the encoding and decoding of prosodic categories. While in Perkell *et al*. (2004a; 2004b) it was proved that some speakers might generally be more accurate and thus more intelligible than others, the present authors aim at proving that «some speakers might produce contrasts in a way that make them easily intelligible to *some particular listeners*, but not to others» (p. 126, italics in the text). Their experimental findings are relevant to both intonation research and linguistic theory in general, underlining the impossibility of conceptualizing phonological categories in a monothetic sense.

The paper by Iris Chuoying Ouyang and Elsi Kaiser, *Individual differences in the prosodic encoding of informativity* investigates the interaction between the prosodic realization of information-structure (new-information and corrective focus) and information-theoretic factors (e.g. lexical frequency and contextual probability). Particular attention is given to individual differences in the overall prosody of utterances and in the prosodic encoding of informativity. Certainly, prosody exhibits speaker-specific behavior but at the same time apparent differences among the participants in a particular study do not necessarily represent stable speaker-specific patterns.

The chapter by Melanie Weirich, *Organic sources of inter-speaker variability in articulation: insights from twin studies and male and female speech*, deals with organic sources (e.g., biomechanics of the tongue muscles, palatal shape and vocal tract dimension) of idiosyncratic variation. The study of the impact of organic factors on inter-speaker variability in German is carried

out by investigating two groups of speakers in which biological variation is a central issue: twins and male/female speakers. Her investigation proves that individual differences in articulation are partly explained by idiosyncratic physiological restrictions.

The biomechanical properties of the orofacial system is addressed in the paper by Pascal Perrier and Ralf Winkler, *Biomechanics of the Orofacial Motor System: influence of speaker-specific characteristics on speech production*. By means of simulations performed with two kinds of biomechanical models, they demonstrate that speaker-specific biomechanical properties can influence the production of speech gestures: «inter-speaker differences in muscle anatomy can generate inter-speaker differences in motor control strategies or/and in articulatory and acoustic variability» (p. 248).

The book ends with an applied topic, stemming from the domain of forensic speaker recognition. Jean-François Bonastre, Juliette Kahn, Solange Rossato, and Moez Ajili (*Forensic speaker recognition: Mirage and reality*) introduce the reader to some controversial issues involved in forensic linguistics, underlining some key aspects: i) the fact that acoustic signal of a speaker cannot be interpreted as physical biometrics, ii) the lack of shared approaches and techniques together with the existence of some charlatanry in the field, iii) the importance of the Bayesian decision framework; iv) the weakness of automatic speaker recognition algorithms in the evaluation protocol.

To conclude, these are both worthy volumes, impeccably written and edited. Written by internationally reputable scholars in the field, they clearly accomplish their main goal: to present an illustration of the progress that speech planning, speech production and speech perception have achieved over the last decade. They have much to offer to readers from a variety of disciplines. They will undoubtedly inspire future collaboration between several fields, with a hope of eventually enriching our understanding of speech communication. Two shortcomings of the work can be identified in the limited set of languages under investigation (English for the most part of the papers, along with German, French, Dutch, and Japanese), and in the lack of an author, keyword, or subject index, which makes consultation somewhat uncomfortable.

Bibliography

Browman, C.P. and Goldstein, L. (1988), *Some Notes on Syllable Structure in Articulatory Phonology*, in «Phonetica», 45, pp. 140-155.

Fuchs, S. and Perrier, P. (2008), *Understanding speech production: The* PILIOS *approach*, in «Revue française de linguistique appliquée», 2, pp. 35-44.

Hawkins, S. (2010), *Phonetic variation as communicative system: Perception of the particular and the abstract*, in Fougeron, C., Kühnert, B., d'Imperio, M. and Vallée, N. (2010, eds.), *Laboratory Phonology 10: Variability, Phonetic Detail and Phonological Representation*, Mouton de Gruyter, Berlin, pp. 479-510.

Hawkins, S. and Smith, R. (2001), Polysp*: A polysystemic, phonetically-rich approach to speech understanding*, in «Italian Journal of Linguistics - Rivista di Linguistica», 13, pp. 99-188.

Keating, P. and Shattuck-Hufnagel, S. (2002), *A Prosodic View of Word Form Encoding for Speech Production*, in «UCLA Working Papers in Phonetics», 101, pp. 112-156.

Levelt, W.J.M. (1989), *Speaking: From intention to articulation*, MIT Press, Cambridge (MA).

Smith, A. and Goffman, L. (2004), *Interaction of motor and language factors in the development of speech production*, in Maasen, B., Kent, R., Peters, H., van Lieshout, P. and Hulstijn, W. (2004, eds.), *Speech motor control in normal and disordered speech*, Oxford University Press, Oxford, pp. 225-252.

Smith, A. (2006). *Speech motor development: Integrating muscles, movements, and linguistic units*, in «Journal of Communication Disorders», 39, pp. 331-349.

Perkell, J.S., Matthies, M.L., Tiede, M., Lane, H., Zandipour, M., Marrone, N., Stockmann, E. and Guenther, F.H. (2004a), *The Distinctness of Speakers'* /s/-/ʃ/ *contrast is related to their auditory discrimination and use of an articulatory saturation effect*, in «Journal of Speech, Language, and Hearing Research», 47, pp. 1259-1269.

Perkell, J.S., Guenther, F.H., Lane, H., Matthies, M.L., Stockmann, E., Tiede, M. and Zandipour, M. (2004b), *The distinctness of speakers' productions of vowel contrasts is related to their discrimination of the contrasts*, in «Journal of the Acoustical Society of America», 116, pp. 2338-2344.

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