

# Introduction

Chiara Celata and Silvia Calamai

## *1. Sociophonetics and the articulatory perspective*

From a functionalist point of view, speaker-specific variation is conceived of as a systematic source of indexical information for both the speaker and the hearer, and directly reflects the ‘structured heterogeneity’ (Weinreich et al. 1968) affecting the transmission of sound change. Focusing on the relationships between phonetic/phonological form and social, regional and interactional-communicative factors, sociophonetics deals with the implications of speech variation on theories of language change. Beside the variationist approach to speech production, recent sociophonetic studies are also concerned with the effects of variation on speech perception, phonological categorisation, speaker identification, and perceptual dialectology (Thomas 2002, Foulkes 2005).

Sociolinguistic research in the speech production domain is traditionally based on auditory and acoustic analysis of segmental properties. Groundbreaking work by William Labov and colleagues has popularised the use of spectrographic analysis in the study of accent variation, focusing mostly on formant analysis of vowels in some dialects of English (e.g., Labov et al. 1972, Labov 1994-2001, Milroy & Gordon 2003). Acoustic analysis has also been extended to other aspects of vocalic quality such as duration (e.g., Scobbie et al. 1999), as well as consonantal variables (e.g., Docherty & Foulkes 1999, Lawson et al. 2008) and suprasegmental features (e.g., Stuart-Smith 1999). On the other hand, the contribution of instrumental articulatory research has been relatively scarce until recently. Considering only some of the most popular scholarship providing a general account of sociophonetics, no mention of articulatory phonetics is contained in the survey by Thomas (2002), and there is only a relatively short mention in the Di Paolo & Yaeger Dror (2010) student’s guide; none of the seventeen contributions included in the volume edited by Preston and Niedzielski deals with articulation (Preston & Niedzielski 2010). Finally, within the seven workshops “Towards best practices in sociophonetics” organized within NWAV 33 to 39 (2004-2010), articulatory issues were never touched upon; a few references to aerodynamics were introduced in 2011 (NWAV 40).

On the contrary, socially structured variation offers considerable opportunities for experimental phoneticians to exploit the instruments' sensitivity to the fine granularity of those subtle variations that function socially. For example, electropalatography is able to show that the articulatory constraints on speech production have a large explanatory power with respect to phenomena of connected speech such as palatalizations, place assimilations, segmental reductions etc., that are very often shown to be determined or influenced by socially structured variation. Early electropalatographic approaches to coarticulation have fostered the fine-grained analysis of subsegmental variations and indirectly supplemented important research chapters regarding the impact that such variation exerts on the perception and transmission of sound change (e.g., Hardcastle & Roach 1979, Nolan & Kerswill 1990, Barry 1992, Byrd 1994, Hardcastle & Hewlett 1999).

Dynamic electropalatography boasts the longest tradition in studies and the widest popularity in laboratories worldwide; it may also benefit from a relatively large body of criticism concerning its practical and methodological characteristics. Three papers of this collection – Katerina Nicolaidis on Greek, Laura Colantoni and Alexei Kochetov on two American Spanish varieties, and Marko Liker and Fiona Gibbon on Croatian – are all good examples of a critical approach to EPG data in light of the current theoretical debate on the complex production-perception relationship and the extent to which the articulatory output may provide useful information about how speech is cognitively represented in the mind of the speakers.

Yet other techniques besides electropalatography are clearly coming to the fore. Ultrasound tongue imaging has been said to fulfil most requirements of sociolinguistic fieldwork, being appropriate for the elicitation of vernacular speech and relatively cost effective if considered on a per-subject basis (e.g., Gick 2002, Lawson et al. 2008). The paper by Scobbie, Stuart-Smith and Lawson on Scottish English is aimed to demonstrate that UTI may serve the purposes of detailed sociophonetic research, also revealing subtle and unexpected differences in vowel production, provided it is practiced under scrupulous control of the very large amount of methodological and implementation issues that it generates.

Electromagnetic articulography is also a renowned technique for recording small and fast speech movements, particularly of the tongue and the jaw. The paper by Jonathan Harrington, Phil Hoole and Ulrich Reubold shows that, once the individual variations have been mathematically compensated through appropriate data reduc-

tion procedures and the physiological output is transformed into relative distance measures on a bi-dimensional vowel space, EMA may be used gainfully to quantify phenomena of fundamental importance for sociophonetic and diachronic research, such as vowel overlap or vowel perturbation.

Finally, it is directly or indirectly argued in all the papers collected in this volume that the possibility of combining more techniques into the same research project, time and resources permitting, certainly will lead to major progress in this particular domain of experimental linguistic research.

## 2. *Articulatory analyses of rate and style variation*

One frequently criticised area of articulatory phonetics concerns the limits of the experimental settings connected to the relative invasiveness of articulatory techniques. This may in fact hold true for particularly sophisticated and costly techniques (such as magnetic resonance imaging). Yet the papers collected in this special issue clearly demonstrate that several technologies may be (or are expected to be) tailored to the paradigms of sociophonetic research; some practical limitations are however present and these are overtly discussed in the papers.

The manipulation of speech rate and style represents one crucial aspect of experimental sociophonetics. Speech rate has been one of the most relevant dimensions investigated in pioneering EPG studies (e.g., Kerswill 1985, Wright & Kerswill 1989, Nolan & Kerswill 1990, Barry 1992, Nolan 1996, Ellis & Hardcastle 2002). The interest in speech rate variations derives from a fundamental tenet of articulatory research, i.e., the hypothesis that speakers adjust their speech along a ‘hyper-hypo’ *continuum* in accordance with the perceived interactional needs of the interlocutor (Lindblom 1990). Nevertheless, speech rate is not a univocal concept and does not correlate unambiguously with care and style, since it is possible for a person to speak rapidly but explicitly, or to speak slowly but with low phonetic explicitness (e.g., Nolan 1996).

Both articulatory phonetics and variationist sociophonetics are interested in the effect of speech style in the modulation of connected speech phenomena. To put it simply, the phonetician finds his stylistic investigations on the “hyper-hypo” dimension, while the sociolinguist is interested in the “standard-vernacular” dimension. The two dimensions certainly have something in common; yet they do

not overlap. Several procedural shortcomings or theoretical misinterpretations may derive from underestimating the difference between these two dimensions.

For example, while “hyperspeech” and “hypospeech” tokens can be informally observed in everyday life, it is very difficult to manipulate this dimension in experimental contexts; in doing so, we tend to ignore the degree of reduction produced by the speakers during an experimental recording session, and, at the same time, “we tacitly hope that there is some ‘default mode’ of pronunciation which every subject will adopt and which will make data from different talkers comparable” (Lindblom & Moon 1988: 30). Similarly, vernacular speech is generally supposed to be in some way equivalent to casual conversational style and therefore to occupy the opposite pole of the stylistic *continuum* with respect to minimal pair style or word-list style (e.g., Labov 1972). Nevertheless, opposing read speech to non-read speech is not as trivial as normally assumed in experimental investigations, since it is not always the case that “people use a specially ‘correct’ kind of speech for reading” (Milroy 1987: 171 ff.); rather, it is possible that the individual strategies are less uniform than Labov’s traditional model implies, being based on an interpretation of stylistic variations as the result of different amounts of attention paid to speech.

While these problems have long been known by sociolinguists (Schilling-Estes 2002), a true experimental alternative is still missing; current sociophonetics, combining the traditional concerns of sociolinguistics with the perspectives of the experimental phonetician, will provide opportunities to address stylistic manipulation in a new way.

In the papers collected in this special issue, most of the speech material comes from read speech. The papers by Liker & Gibbon and by Harrington, Hoole & Reubold present data for nonsense VCV and CVC sequences respectively. In the paper by Harrington and colleagues the dimension of rate is present (slow speech and fast speech are compared). Read speech is also used in Nicolaidis’ paper but the focus here is on the communicative situation (Lombard speech vs. speech in quiet conditions). In Nicolaidis’ paper, the communicative situation – often ignored in articulatory phonetics – appears to play a relevant role even though the analysis is restricted to a rigorously controlled task; the comparison between a neutral situation and the Lombard speech condition may help to understand the dynamics of speech production in several comparable communicative contexts (e.g., infant-directed speech, shouted speech, speech produced during simultaneous communication, speech produced under stress). For this reason, the so-called ‘clear speech’ is an additional challenge for socio-

phonetic research, and particularly in the articulatory domain, where investigation has been scanty so far. Once again the problem concerns the relationship with other styles (in particular, conversational speech and citation form speech), since “for whatever measure chosen [...], clear speech is described *relative to* the same measures found for conversational speech” (Uchanski 2005: 208).

The papers by Scobbie, Stuart-Smith and Lawson and by Colantoni & Kochetov compare read speech and vernacular or semi-spontaneous speech. The paper by Scobbie and colleagues provides important evidence on how the use of ultrasound tongue imaging may not alter the linguistic behavior of the participants whose vernacular speech appears to be preserved. On the other hand, the three speech styles investigated in the Colantoni & Kochetov’s paper (e.g., wordlist, reading passage and semi-spontaneous speech) illustrate the difficulty of making clear predictions about the effects of style variation in the speech of different individuals. The authors find no difference between the wordlist and the reading task in most of the speakers; moreover, phonotactic contexts vary across speech styles and this poses further problems for the quantification of stylistic effects.

To conclude, all the papers collected here agree with the need of enlarging the stylistic spectrum of the speech material under investigation in order to better understand the dynamics of intra-speaker stylistic variation and its relationship with cross-subject variations.

### *3. Contents of this volume*

The papers address different topics in a variety of perspectives.

Laura Colantoni and Alexei Kochetov provide a cross-dialectal EPG investigation of word-final nasals for two varieties of American Spanish in three different speech styles. Nasal coarticulation and word-final nasals are among the best studied sociolinguistic variables, nevertheless they still present aspects of underestimated variability such as style-dependent variability or the articulatory variations related to velarization and elision. The paper offers a valuable contribution to our knowledge of Spanish velarizing dialects inasmuch as it addresses the problem of variation in semi-spontaneous speech from an instrumental point of view; the qualitative and quantitative inspection of EPG patterns across different styles suggest that several stylistic and contextual effects play decisive roles in the speech of the speakers, thus attenuating to a certain extent the distinctions usually referred to when comparing velarizing and non-velarizing dialects.

The paper by Marko Liker and Fiona Gibbon combines EPG and perceptual investigations of a current sound change in Croatian that involves the apparent neutralization of palatal and postalveolar affricates, and that appears to be driven by sociolinguistic pressures (the adoption of a new regional ‘norm’). Electropalatography allows the authors to provide convincing evidence that the assumed neutralization does not involve a proper merger of two places of articulation towards an intermediate place of articulation; rather, there is a difference related to the extent of the linguo-palatal contact (i.e., the contacted surface area), which seems to reflect a difference between an apical and a laminal articulation. The perceptual experiment confirms that the Croatian speakers are able to distinguish the two affricates despite their remarkable similarity in articulatory terms. In conclusion, the paper shows how the study of sociophonetic changes in progress may benefit from fine-grained analyses of articulatory patterns such as those related to the linguo-palatal contact, where gradient movements from one place of articulation to another can be instrumentally documented.

Katerina Nicolaidis investigates the articulatory effects of Lombard speech on the production of /t k s x n l r/ in Greek. The EPG study of Lombard speech appears to be a relevant issue to the expanding agenda of sociophonetic research by examining variation in a particular case of contextual interaction, i.e., during communication in adverse conditions. With respect to speech produced in quiet situations, speech produced in noise shows spatio-temporal modifications. In particular, all consonants show an overall tendency to be shorter, while coronals show more lingual-palatal contact, a more advanced place of articulation and reduced contact in the palatal region; smaller coarticulatory effects are also found. The gender factor also proves to be significant, especially in the temporal domain, which may function to enhance the intelligibility of Greek female (but not male) speakers in the noise condition.

Besides consonants, vowels are also addressed in this special issue. Vowels provide an excellent test case for reckoning with the relationship between ‘standard’, acoustic-based sociolinguistic methodologies and articulatory research. In the paper by James Scobbie, Jane Stuart-Smith and Eleanor Lawson ultrasound and formant data are used to assess the relative degree of /u/-fronting in Scottish English. The vowel /u/ is in fact classed as high and back in most phonological descriptions, while in phonetic realisation it is widely accepted to be relatively central or even fronted. The analysis is based on a socially stratified corpus of 15 speakers, according to the tradi-

tional distinction between working class and middle class; nevertheless, the social factor appears not to be significant, in that the location of /u/ in the vowel space is similar in both groups. From a methodological point of view, the paper also explores the possibility of using the UTI output to simulate (or, better, to articulatorily substantiate) the acoustic ‘metaphor’ of the quadrilateral vowel space, with particular reference to tongue movements.

Finally, Jonathan Harrington, Phil Hoole and Ulrich Reubold depart from a central purpose of much of ‘labovian’ sociolinguistics (i.e., how to quantify differences between two varieties of a language according to their vowel systems) and develop a sophisticated EMA-based analysis of /i:/ and /i/ tensity in the speech of Standard Austrian and Standard German speakers. The physiological account is shown to provide interesting data to complement traditional acoustic analyses of vowel formant structures, inasmuch as it allows the derivation of a quadrilateral-like vowel space from tongue data that can be used to evaluate the sparseness vs. density of sub-areas in the vowel spaces of different varieties. The results show that the two varieties differ in the relative degree of vowel overlap, with Standard Austrian more overlapping than Standard German. The authors go deeply into the discussion of how much of the observed variability may be referred to the characteristics of the technique proposed, thus indicating among the most desirable development of EMA-related technologies, the possibility of collecting data from larger groups of speakers to approximate the average size of traditional, acoustic-based sociophonetic investigations.

Taken together, the papers raise significant questions and challenges for furthering the study of articulatory sociophonetics, and point in a variety of directions for what the best way forward could be. We believe that this volume is likely to benefit sociolinguists as well as experimental phoneticians who are interested in understanding the potential of different techniques for the study of the dynamics of language variation and change.

In closing, we would like to thank all of the contributors to this special issue for the enthusiasm with which they welcomed this editorial project and their collaborative aptitude during all phases of the work, including the cross-reviewing procedure. We also acknowledge Pier Marco Bertinetto for having invited us to organize a special issue of *Italian Journal of Linguistics* on sociophonetics, and for the interest that he immediately manifested when we proposed to deal with articulatory sociophonetics in particular.

*Addresses of the Authors*

Chiara Celata, Laboratorio di Linguistica, Scuola Normale Superiore di Pisa, piazza dei Cavalieri 7, 56126 Pisa, Italy <c.celata@sns.it>

Silvia Calamai, Dipartimento di Scienze della Formazione, Scienze Umane e della Comunicazione Interculturale, Università degli Studi di Siena, viale Cittadini 33, 52100 Arezzo, Italy <silvia.calamai@unisi.it>

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