Editors' Introduction and Review: Sociolinguistic Variation and Cognitive Science

Jean-Pierre Chevrot, Katie Drager, Paul Foulkes

HAL Id: hal-01969828
https://hal.science/hal-01969828

Submitted on 4 Jan 2019

Word count (without the ref. section): 5610 words

EDITORS' INTRODUCTION AND REVIEW: SOCIOLINGUISTIC VARIATION AND

COGNITIVE SCIENCE

Jean-Pierre Chevrot

Lidilem, Univ. Grenoble Alpes, F-38040 Grenoble, France

jean-pierre.chevrot@univ-grenoble-alpes.fr

Katie Drager

Department of linguistics, University of Hawai'i at Mānoa, United States

kdrager@hawaii.edu

Paul Foulkes

Language and linguistic science, University of York, United Kingdom

paul.foulkes@york.ac.uk

Key words: sociolinguistics; sociophonetics; variation; cognition; modeling; language usage

Address correspondence to:

Jean-Pierre Chevrot

Université Grenoble Alpes

Bâtiment Stendhal

CS40700

38058 Grenoble cedex 9

France

jean-pierre.chevrot@univ-grenoble-alpes.fr

SOCIOLINGUISTIC VARIATION AND COGNITIVE SCIENCE

Abstract

Sociolinguists study the interaction between language and society. Variationist sociolinguistics – the subfield of sociolinguistics which is the focus of this special issue – uses empirical and quantitative methods to study the production and perception of linguistic variation. Linguistic variation refers to how speakers choose between linguistic forms that say the same thing in different ways, with the variants differing in their social meaning. For example, how frequently someone says *fishin'* or *fishing* depends on a number of factors, such as the speaker's regional and social background and the formality of the speech event. Likewise, if listeners are asked to use a rating scale make judgements about speakers who say *fishin'* or *fishing*, their ratings depend on what other social characteristics are attributed to the speaker. This special issue aims to reflect the growing number of interactions that bring variationist sociolinguistics into contact of different branches of cognitive science. After presenting current trends in sociolinguistics, we identify five areas of contact between the two fields: cognitive sociolinguistics, sociolinguistic cognition, acquisition of variation, computational modeling, and a comparative approach of variation in animal communication. We then explain the benefits of interdisciplinary work: fostering the study of variability and cultural diversity in cognition; bringing together data and modelling; understanding the cognitive mechanisms through which sociolinguistic variation is processed; examining indexical meaning; exploring links between different levels of grammar; and improving methods of data collection and analysis. Finally we explain how the articles in this special issue contribute to each of these benefits. We conclude by suggesting that sociolinguistics holds a strategic position for facing the challenge of building theories of language through integrating its linguistic, cognitive and social aspects at the collective and individual levels.

1. Sociolinguistics and language variation

Knowing a language involves both the cognitive representation of the language's sounds and grammatical structures and also the ability to use linguistic resources for the purpose of achieving a wide range of communicative goals. The demands of different contexts and communicative needs lead speakers to make a variety of (mostly subconscious) choices, including which pronunciation variants, lexical items, morphosyntactic structures, and, for multilingual speakers, language(s) to use.

This assertion is not controversial, with claims to this effect made by many leading figures since the very start of modern linguistics (Saussure, 1916 [1995]). However, many types of variation have largely been eliminated from serious study by the dominant approaches to linguistics in the structuralist-generative tradition of the twentieth century (Chomsky, 1965), where the principal focus has been on homogeneity – properties shared by all speakers of a given language, or, at an abstract level, by all languages. In contrast, sociolinguistic work has made the heterogeneous dimensions of language a central focus, making considerable advances in understanding how and why language varies, and how human beings learn and process information about variation. This work reveals that variation is a key property of both linguistic usage and linguistic knowledge, and is therefore important for linguistic theory and language cognition.

In this editors' introduction, we discuss the heterogeneity of language, and current trends in both sociolinguistics and cognitive science, in order to demonstrate the ways in which our understanding of human cognition can be further developed through a better understanding of sociolinguistic variation.

1.1 Language heterogeneity and variation

Languages are not homogeneous entities. Speakers vary the way they talk depending on a large number of factors. Some of these factors are language internal, where speech production and perception are influenced by e.g. the phonology, grammar, lexicon, or pragmatics of the speaker's language, dialect, or utterance. For

example, the pronunciation of English plural morpheme *–s* (*The cat*[s] *and dog*[z] *are climbing into box*[z]) depends on the sound that immediately precedes it: the morpheme is realized as [s] if preceded by a voiceless sound (the vocal folds are not vibrating, such as the [t] in *cat*), [z] if preceded by a voiced sound (the vocal folds are vibrating, e.g. [g] in *dog*), and a vowel is inserted before [z] if it is preceded by a sibilant (an /s/-like sound, e.g. [s] in *box*).

In addition to language internal factors, speech is influenced by factors that are external to language, such as the speaker's regional background (Chambers, 2000), sex and gender (Cheshire, 2004), ethnicity (Fought, 2004), socioeconomic status (Ash, 2004), and social network structure (Milroy, 1987), as well as factors pertaining to the context of speech, such as the degree of formality of the interaction (Coupland, 2007). For example, in a hospital clinic a doctor might inform a patient: "you have a mild case of gastro-enteritis, sir". The choice of vocabulary is formal, as appropriate for the setting; the polite address form suits the formality of the situation and difference in power relations between the speakers; and the whole utterance is delivered in standard grammar and pronunciation. It is perfectly possible, however, that the same two people could have a parallel conversation later that day in a less formal situation such as a party. As befits the change in social setting, conversational purpose, and power relations, the off-duty doctor might utter, possibly in his local dialect, "you've got a bad tummy, mate".

It can therefore be argued that linguistic variation carries multiple forms of *indexical meaning*: information pointed to by a linguistic variant which includes details about the speaker, the greater context of the speech act, and the fleeting interactional moves taken by the speakers in conversation. Speakers build knowledge of how to encode indexical meanings as part of their language development. Listeners in turn learn to exploit such meanings in interpreting the speech that they hear.

In principle, indexical meanings are diverse and can be encoded at any level of linguistic structure (e.g., sounds, words, grammar). However, in many languages a broad distinction can be drawn between *standard*

variants – generally associated with social prestige, high education level, professional ambition and professional effectiveness – and *non-standard* or *vernacular* variants – often linked to social skills, solidarity and loyalty towards the local group. When listeners are asked to rate or classify voices that differ only in terms of the presence or absence of a non-standard variant, there is a considerable degree of uniformity across the judgments (Labov, 2001). For example, if listeners are asked to judge speakers who say *fishin'* versus *fishing* on a predetermined scale, they tend to rate the speakers who produced *fishin'* as more informal and less educated. This provides evidence that the link between social information and linguistic variants is stored and used by listeners.

Although the distinction between standard and non-standard variants has been repeatedly observed, the indexical values of variation are not limited to this normative dimension. Rather, a single social variant can index different social meanings for different people, and at different times and in different contexts (Eckert, 2008). For example, releasing /t/ in positions where it is most commonly unreleased or produced as a glottal stop can index both prissiness (Podesva 2004) and geekiness (Bucholtz 2001), depending on who is speaking, what other variants are used, and the greater context of the conversation. Variation thus may be seen as a resource for achieving individual communicative goals, such as manipulating the social distance between a speaker and interlocutor (Giles & Powesland, 1975), accommodation to one's actual or imagined audience (Bell, 1984), or expressing aspects of social identity (Le Page & Tabouret-Keller, 1985). Thus, our understanding of language and cognition is incomplete if it fails to account for the myriad and nuanced ways in which social factors are linked with the production and perception of speech.

In summary, variation in language and speech is ubiquitous and its link with different social and contextual factors is extremely complex. Despite such variation being widely acknowledged, it is largely dismissed as theoretically peripheral or irrelevant by most of the dominant paradigms and theories in linguistics. As such we have only a limited understanding of how sociolinguistic variation is represented and processed

cognitively. Before addressing its interfaces with cognitive science, we first present the objective of sociolinguistics and its research tradition.

1.2 Sociolinguistic research traditions

Sociolinguistics is an interdisciplinary enterprise focused on the interplay between language and society. It is made up of three major subfields: linguistic anthropology, the sociology of language, and variationist sociolinguistics. This special issue focuses on variationist sociolinguistics, but we begin by describing the latter two subfields in an effort to provide a broad picture of the field.

Linguistic anthropology studies language as a "cultural resource" and speaking as a "cultural practice" (Duranti, 2002). Through documenting linguistic diversity, studying language use in context, and using language for addressing larger anthropological issues (Duranti 2003), work in linguistic anthropology provides insight into how language is important for understanding culture and society, and how cultural and social facts are important for understanding the nature of language (Shibamoto-Smith & Chand, 2013). For example, studies on language socialization examine the contribution of language to the lifespan process of becoming a member of a community and how this process influences language acquisition and usage (Ochs, 1999). Linguistic anthropology generally uses qualitative methods (ethnographic participant observation, audiovisual recording, interviews, etc.) to observe intrinsically social and cultural speech events, endowed with their own internal dynamics and emergent properties resulting from the interaction between speakers and the context. From this view, as conversation analysis reveals, sociolinguistic variation is one of the resources that speakers use to achieve their communicative goals (Local, 2003; Selting & Couper-Kuhlen, 2001).

The sociology of language (Bernstein, 1971; Fishman, 1972) aims to observe both language and society at the macro level, focusing on the way collective language behaviors and attitudes pattern with broad social

entities such as nation states or social classes. The methods are diverse, from census and broad surveys describing the state of sociolinguistic diversity and inequality (e.g. the number of indigenous languages in South America) to more dynamic observation exploring the factors of language maintenance and change. This view is implemented through several themes, such as societal multilingualism and language status, language and ethnicity or religion, language policy and planning, and spread of world Englishes. The sociology of language gives priority to social organization, without describing linguistic units in detail, whereas the primary focus of the variationist inquiry is linguistic form.

Variationist sociolinguistics – the subfield which is the focus of this special issue and one that is informed by work from linguistic anthropology and the sociology of language – uses empirical and quantitative methods to study the links between linguistic variation and social factors (Labov, 1972). Adherents of variationist sociolinguistics argue that the understanding of language includes its variable aspects as well as its categorical ones (Bayley, 2013). At all linguistic levels, sociolinguistic variables enable speakers to say the same thing in different ways, with the variants being ''identical in reference or truth value, but opposed in their social and/or stylistic significance'' (Labov, 1972: 271). This general framework is applicable to communities where several languages are used, as both bilingual and monolingual speakers are constantly confronted with choices between linguistic forms that share the same referential meaning or the same function in particular contexts (Poplack, Zentz & Dion, 2012). Sociolinguistic variation thus both reflects social organization and contributes to its formation. Moreover, the alternation between variants is held to be the starting point of diachronic change in language (D'Arcy, 2013; Weinreich, Labov & Herzog, 1968). From this perspective, languages are heterogeneous and evolving systems, due to their internal dynamics, contact with other language varieties, and their links with social organization, which is itself evolving, composite and multi-layered (Laks, 2013).

The methods and research questions of variationist sociolinguistics lie firmly within linguistics as a cognitive science. In the next section, we outline recent trends in sociolinguistics and we highlight some of the major insights this subfield has recently contributed to our understanding of cognition.

1.3 Recent trends in sociolinguistics

In recent years three new and important themes have emerged within sociolinguistics: improved understanding of indexical meaning, exploitation of new methods and technology, and exploration of new languages and cultural contexts.

Convergence between variationist and anthropological sociolinguistics has led to a better understanding of the relationship between linguistic variation, indexical meaning and identity, at the level of both the individual and the groups in which the individual is situated. Through combining the quantitative approach of variationist sociolinguistics with the ethnographic (participant observational) methods of linguistic anthropology, researchers now consider the ways in which broad social categories (e.g. ethnicity, class and gender) are linked with more fine-grained, locally-constructed categories (e.g. membership of a local group such as a gang or school friendship network) (Eckert, 2000; Mendoza-Denton, 2008; Zhang, 2005). The work is conducted with an eye toward local values, culture, and practices in order to address the role of the individual in the construction of social meaning, rather than accepting researcher-imposed categories, and also to avoid the assumption that broad collective categories directly influence the actual individuals during their everyday interaction. For example, Eckert's (2000) work demonstrates how correlations between linguistic variables and broad social categories arise via the ideologies associated with both the linguistic variables and the social categories.

The second change in the field concerns the diversification of methods and use of new technologies. Although experimental methods (e.g., subjective reaction, matched guise or minimal pair tests) have been

used since the earliest studies in sociolinguistics, attempts to overcome the observer's paradox (observing how people talk when they are not being observed; Labov, 1972) resulted in a balance between two objectives: recording natural speech and controlling the context of speech production as much as possible (Nagy, 2006). Recently, experiments have become more common and the experimental paradigms have become more diverse (Bayley, Cameron & Lucas, 2013). Experimental sociolinguists creatively combine tools from psycholinguistics (forced choice categorization, priming, eye-tracking; Koops, Gentry & Pantos, 2008), social cognition (social priming, Implicit Association Test; Babel 2009; Campbell-Kibler, 2012), speech sciences (manipulated synthesized speech; Strand, 1999), and cognitive neuroscience (event-related potentials; Loudermilk, 2013; Dufour, Brunellière & Nguyen, 2014). In a different but complementary direction, the nascent field of computational sociolinguistics gains a better understanding of the large-scale relations between language and society by analyzing and modeling massive datasets collected from social media (Nguyen, Doğruöz, Rosé & de Jong, 2016).

The third development is the extension of sociolinguistic inquiry to languages and areas of the world that have previously been under-explored. The emphasis on research in largely monolingual European or North American contexts is giving way to a broader view including multilingual contexts (Erker & Otheguy, 2016), sign languages (Stamp, Schembri, Evans & Cormier, 2016), endangered languages (Hildebrandt, Jany & Silva 2017), and a focus on geographical areas in other parts of the world (Bayley et al., 2013; Stanford & Preston, 2009). As a result, sociolinguists are taking into account a much wider range of linguistic and cultural diversity.

In the context of these new directions, it is perhaps not surprising that *Language, Computation, and the Mind* constitutes one of the most fertile zones of interdisciplinary inquiry, where sociolinguistics joins forces with different parts of cognitive science for a better understanding of language as a phenomenon located at the intersection of culture, society, and cognition (Mallinson & Kendall, 2013). Through adopting some of the techniques that are widely used by cognitive scientists, through accounting for a greater range

of linguistic and cultural diversity and through understanding the ways in which individuals manipulate language in the construction of their identities, we can uncover how the linguistic and social are represented in the mind, and we can identify issues that are problematic for both current models of cognition and models of language.

2. Interfaces between variationist sociolinguistics and cognitive science

Since its very inception the sociolinguistic enterprise has combined concepts and methods from sociology, anthropology, linguistics, and speech sciences. More recently, the already interdisciplinary nature of sociolinguistics has been further expanded through the adoption of additional methods and research questions from cognitive science. In this section, after having proposed a broad definition of cognitive science, we will examine more precisely how variationist sociolinguistics comes into contact with this field.

2.1 A broad definition of cognitive science

Cognitive science aims to observe, understand, model, simulate and improve the ability of living systems to perceive, communicate, interact, and learn in contact with their physical or social environment. This area of study is devoted to the mental functions in humans or animals including perception, action, memory, reasoning, language, communication, and emotion. Since its inception cognitive science has positioned itself as the convergence of different disciplinary areas: linguistics, philosophy of mind and analytical philosophy, cognitive psychology, neuroscience, computer science, and anthropology, focusing on how the mind functions in terms of information flow and knowledge organization. The transition from the isolated cognitive agent to the social dimension of cognition (Andler, 2006) reinforced the emergence of new contributing fields such as cognitive economy, social cognition, and social cognitive neuroscience. The recent development of cognitive approaches to sociolinguistic issues is a manifestation of this more general convergence between social science and cognitive science.

2.2 Areas of contact

We identify five main areas of research in which the convergence between cognitive science and variationist sociolinguistics takes place: cognitive sociolinguistics, sociolinguistic cognition, computational modelling of language variation and change, the study of language acquisition, and comparison of variation in human language with that observed in animal communication.

Kristiansen & Dirven (2008) consider that the most prototypical contributions to the field of cognitive sociolinguistics share three features. The first two of them are principles of the variationist approach: exploring language-internal or cross-linguistic variation linked to social dimensions, and grounding on solid empirical methods, with a preference for corpus-based studies. The third feature is more distinctive of cognitive sociolinguists. It consists of drawing on the three working hypotheses of cognitive linguistics (Croft & Cruse, 2004), a branch of linguistics that studies how language interacts with cognition. First, language is processed via the same mechanisms as other aspects of cognition. Second, grammar is a conceptualization of the world. Third, linguistic knowledge results from an emergent conventionalization of language usage. Cognitive sociolinguistics extends the framework of cognitive linguistics by adding that languages and conceptualization of the world both vary across cultural and social diversity.

Sociolinguistic cognition (Campbell-Kibler, 2010; Loudermilk, 2013), on the other hand, explores the cognitive and cerebral mechanisms underpinning the ability to encode sociolinguistic variation, to implement it during speech production, and to process it during speech perception. The methods used in sociolinguistic cognition work (e.g., elicitation tasks, reaction time and eye-tracking experiments, neuroimaging, social priming) are largely based on those used in psycholinguistics and social cognition. This line of research is rooted in sociophonetic studies which have established that the categorization of speech sound variants is mediated by the (real or perceived) social characteristics attributed to a speaker (e.g. Johnson, Strand & D'Imperio, 1999; Niedzielski, 1999). For example, Strand (1999) showed that

perception of a sound such as [s] or [ʃ] is not simply the automatic consequence of decoding the acoustic properties of the sound; it is also mediated by the listener's belief of whether it is a man or a woman who is speaking. The listener makes allowances for differences in the acoustic properties typical of a male or female voice, and perception of acoustically ambiguous signals shifts in line with the social judgment. Work within sociolinguistic cognition explores diverse research avenues, from the cognitive representation of linguistic variables and social meaning to the retrieval and influence of indexical meaning during on-line perception of variation.

Computational modelling is another development that anchors the sociolinguistic field in a long-standing practice that is typical of cognitive science (Mallinson & Kendall, 2013: 154-157). Understanding the links between society, sociolinguistic variation and language change benefits in particular from the insights of the dynamic modelling of populations of 'agents' interacting with one another and sharing simulated linguistic cues under social and cognitive constraints (Hruschka et al., 2009; Stanford & Kenny, 2013). Some of these models explore the conditions under which the fundamental properties of language (phonology, syntax, and the lexicon) emerge. Others observe the dynamics of variation and change in already established languages. These latter models directly address sociolinguistic issues. The available simulations have tested the effect of numerous social and cognitive factors on language usage: for example, structure and size of the social network, social status of the agents and social distance between them (Nettle, 1999), attentional bias toward leaders (i.e. better connected agents; Fagyal, Swarup, Escobar, Gasser & Lakkaraju, 2010). The major value of computational modeling is that it allows us to test, in a concentrated time frame, the long-term effect of parameters that are hard to control in experiments or in the usual conditions of language use.

Linguistics and psycholinguistics have long held a shared interest in language acquisition, but without paying much attention to sociolinguistic variation. In recent years, however, sociolinguists and psycholinguists have started to join forces to promote research on the acquisition of sociolinguistic variation

in first and second language. Researchers working in this new field emphasize that the child or adult learner participates in a language environment that is variable, and where variation is organized by contextual and social factors (Anderssen, Bentzen & Westergaard, 2011; Chevrot & Foulkes, 2013; De Vogelaer, Chevrot, Katerbow & Nardy, 2017; Lacoste & Green, 2016). This stance enables us to explore how learners acquire sociolinguistic patterns and indexical meanings, and how they stabilize linguistic knowledge by combining linguistic and social information encountered in the variable environment. This line of inquiry raises an important question about the autonomy of linguistic knowledge and the degree to which it interacts with social cognition.

The final area of contact between variationist sociolinguistics and cognitive science compares dialects in human language to variation in animal communication. In the vocalization of certain species (birds, non-human primates, marine mammals, *inter alia*), ethologists have identified and described varieties that were previously referred to as "dialects" by Darwin (1859 [2004]). Varieties are often shared by individual animals who frequent the same space (a 'dialect area'). In addition, variation in animal communication depends heavily on social factors (e.g. frequency of interaction between individuals), and the varieties function as 'social passwords' that indicate belonging to a group (Payne, 1981). These observations of animal communication present strong analogies with the development and uses of sociolinguistic variation in humans, suggesting that communication-related variation could help ensure adaptive benefits through group cohesion and social recognition in different species (Henry, Barbu, Lemasson & Hausberger, 2015). Since animals exhibit considerable diversity in the forms of social cognition (Andler, 2004), comparing variation in human language with variation in the communication systems of many different animal species presents an especially promising way to improve our understanding of sociability and its links with communication and cognition.

3. What can sociolinguistics and cognitive science bring to each other?

As variationist sociolinguistics becomes more firmly integrated within cognitive science, we foresee a number of strides that both cognitive science and variationist sociolinguistics stand to make as a result of that integration. In this section, we outline six of the benefits that we believe working at the intersection of variationist sociolinguistics and cognitive science will bring, and we explain how the articles in this special issues of *Topics in Cognitive Science* contribute to each of these benefits. We first discuss how a sociolinguistic perspective offers cognitive scientists further insight into cognition, leading to exciting new research questions surrounding the effects of variability and cultural diversity on cognition (section 3.1). In Section 3.2, we discuss the benefits to computational modelling of sociolinguistic facts of using the types of spoken and signed language corpora that are common in sociolinguistics. Next, we present promising new directions in sociolinguistics that arise from taking a cognitive perspective, exploring the mechanisms that underlie sociolinguistic cognition (section 3.3) and shedding light on indexical meaning from a cognitive perspective (section 3.4). A question that naturally arises from a sociolinguistic and cognitive science approach is the extent to which different levels of the grammar are linked (section 3.5). Finally, we explore the ways in which an integrated approach can improve methods of data collection and analysis used by both sociolinguists and cognitive scientists (section 3.6).

3.1   Investigating variability, cultural diversity, and cognition

Together with anthropology (Levinson, 2012), sociolinguistics can help renew interest among cognitive scientists in understanding the cognitive consequences of variability and cultural diversity within and between communities. Sociolinguistic variation highlights both the probabilistic nature of human cognition (Mallinson & Kendall, 2013) and the need to reexamine a central postulate put forward by the founders of the language sciences: the idea that there is a clear separation between linguistic knowledge and social knowledge (Saussure, 1916 [1995]; Chomsky, 1965).

In the present volume, Lev-Ari, Ho & Keysar (2018) provide evidence that exposure to non-native speech affects processing of speech in general as opposed to only the speech of the non-native talker. They conclude that the study of the cognitive processes underpinning language should integrate listeners' sociolinguistic expectations on the speaker. Using agent-based modelling, Cuskley, Loreto & Kirby (2018) document the linguistic niche hypothesis (Lupyan & Dale, 2010), which relates the diversity of linguistic systems to the diversity of human groups: the morphology (e.g. plural -s or past tense -ed) of languages used in larger groups including more non-native speakers is less complex and Cuskley et al.'s (2018) model supports this hypothesis.

3.2 Bringing together modelling and empirical data

A sociolinguistic perspective can also enrich computational linguistics; the dynamic modelling of populations of agents interacting with one another is a powerful way to understand the connections between language, sociolinguistic variation, and society. One obstacle that impinges this area is the sensitivity of the modelling to the parameter values set by the researcher (e.g. function of decay of the memory traces or coefficient of convergence). For constraining the modelling, one solution is to use real data for running the system and setting its parameters.

In this volume, Kleinschmidt, Weatherholtz and Jaeger (2018) do just this, using distributions of sociolinguistic variables from annotated corpora of spontaneous speech to train and test computational models. Their findings support the hypothesis that - when exposed to talker variability - the same kind of statistical knowledge seems to be at play for both social inferences and speech perception. In turn these findings support the development of a unified theoretical framework for social and linguistic knowledge, and the interactions between them.

3.3   Understanding mechanisms of sociolinguistic cognition

Since the founding work of Durkheim and Weber, social science has used concepts that refer to mental entities: ideologies, collective representations, and subjective experience (Morgan & Schwalbe, 1990). Within sociolinguistics, concepts having to do with cognition include mental representations, such as indexical meanings and ideologies, and cognitive processing, such as the mechanisms through which sounds, words, syntactic variants, and social information are accessed. Adopting a variety of theoretical lenses and methodological apparatuses from psycholinguistics and social cognition provides fresh insight on these sociolinguistic concepts (Campbell-Kibler, 2010; Chevrot, 1994; Trude & Brown-Schmidt, 2012; Dufour, Brunellière & Nguyen, 2014).

The work in the current volume contributes to this line of inquiry, using corpus and experimental methods to shed light on the ways in which social and linguistic information are represented and accessed during speech production and perception. Through an analysis of a sociolinguistic variable in a spoken language corpus of monologues, Clark (2018) demonstrates how which variant a speaker produces is predictable based on which variant they previously produced, an effect which dissipates as time between the tokens increases. This result has implications for how sociolinguistic variables are accessed during speech production, providing evidence that an individual's own speech affects their production in real time and raising questions about how these productions affect the speaker's mental representations of the variable.

The interactive-phonetic sound change model of Harrington, Kleber, Reubold, Schiel & Stevens (2018) aims at unifying theories of sound change based on cognitive processing of human speech and theories focused on how social factors constrain its spread throughout the community. Using agent-based modeling, they conclude that many types of sound change result on how biases in the phonetic distribution of phonological categories pass from one agent to another during interaction as a result of automatic speech accommodation between individuals coming into contact.

3.4   Examining indexical meaning

The concept *of indexical meaning* has recently given rise to much debate in the fields of sociolinguistics (Eckert, 2008) and sociophonetics (Foulkes, 2010). Indexical features in speech are "those aspects of linguistic structure which correlate with non-linguistic factors" (Foulkes, 2010). The relation between the speaker's gender and voice, or the link between his or her social profile and the use of certain linguistic traits ("cultured", "rural", "American", "non-native speaker"), are widely studied examples of indexical information. The social dimensions that are evoked by such linguistic traits can be relatively stable speaker characteristics (e.g., gender, socio-economic status, ethnicity, regional origin, group affiliation) or more temporary (e.g., pertaining to emotions, attitudes, state of health, and choice of a style or register). Among the dimensions of indexicality, some are said to be socio-indexical in that they refer to groups of individuals (e.g. gender, socio-economic status (SES), regional origin, ethnicity). This type of indexicality challenges the idea of a clear-cut separability between social and linguistic knowledge (Clark, 2009). In recent years, new approaches including neuroimaging (Van Berkum, Van den Brink, Tesink, Kos & Hagoort, 2008; Tesink, Petersson, Van Berkum, Van den Brink, Buitelaar & Hagoort, 2009), experimental designs (Campbell-Kibler, 2010) and developmental consideration (Foulkes, 2010; Munson, Edwards & Beckman, 2012) have begun to mark the route in this largely uncharted territory.

In this special issue, Docherty, Foulkes, Gonzalez & Mitchell (2018) argue in favor of a more complex and socially-informed conception of 'style' in work on language and cognition. They criticise standard methodologies, both of conceptualizing vowels and vowel variation in a two dimensional space, and also of modelling sound change in phonemic terms, showing that dynamic properties of vowels reveal significant social patterning.

3.5   Exploring links between different levels of the grammar

Increasingly, scholars working on sociolinguistic cognition are exploring the link between different levels of the grammar. The question how different levels of the grammar are linked in the mind arises naturally

from work on sociolinguistic cognition when we consider that sociolinguistic variables co-occur with one another regardless of which level of the grammar they are situated in, and they are, in turn, linked with social groups, individual speakers, and the styles employed by individuals in interaction. Of particular interest has been the link between sounds and words, with evidence that sound change is linked with the frequency of words (Hay & Foulkes, 2016), the frequency of lexical neighbors (words that share many of the same sounds) (Cohen Priva, 2015, Shaw and Kawahara, 2018), and change in word use (Walker & Hay, 2011).

Through synthesizing a range of work, Hay (2018) argues in this volume that the cognitive representations of sounds and words are linked with one another, and that their representations and subsequent processing of those representations are affected by experience with the sounds in the contexts in which they frequently appear. Results from two further papers in this special issue lend further support to Hay's arguments: Sóskuthy, Foulkes, Hughes & Haddican (2018) demonstrate that the realization of one phonetic variable is linked with the word it occurs in and whether a second phonetic variable can be found in that word. Likewise, Kim & Drager (2018) provide new evidence confirming that lexical access is assisted by socio-indexical cues in the speech signal.

3.6   *Improving methods of data collection and analysis*

Through taking a cognitive approach, sociolinguists stand to benefit from the rigorous experimental and analytical methods employed by cognitive scientists in psycholinguistics, experimental phonetics, and beyond. Likewise, cognitive scientists stand to benefit from sociolinguistic methods that provide opportunities to examine the complexity of social relations and ways of being.

Along these lines, Buson et al. (2018) present the sociolinguistic repetition task, an experimental method that can be used to test the extent to which different sociolinguistic variables are linked in the mind. Findings from studies that use this method could inform our understanding of attention and sociolinguistic

salience, and they could help illuminate the ways in which sociolinguistic variables are organized in memory and then produced in various combinations with one another.

The contributions to this special issue emphasize the way cognitive science and sociolinguistics interact, exchanging objects, methods, models and theories. Such interdisciplinary interactions between areas from distant scientific traditions are becoming increasingly frequent, as evidenced by an expansion of the number of researchers who cite work from disciplines and specialties that differ from their own (Van Noorden, 2015). This general trend is seen in the convergence between social science and cognitive science on one hand (Kaufmann & Clément, 2011; Sun, 2012) and social science and computational science on the other (Lazer et al., 2010). Sociolinguistics fully participates in these convergences, through the areas of contact presented in section 2.2 and through the recent birth of computational sociolinguistics (Nguyen, Doğruöz, Rosé & de Jong, 2016). The inherent interdisciplinarity of sociolinguistics and its numerous connections with other fields documented in this special issue (anthropology, computational modeling, cognitive psychology, phonetics, etc.) place it in a strategic position for facing the challenge of building models and theories of language through integrating the linguistic, cognitive and social aspects of language both across groups and within individuals.

List of references

Anderssen, M., Bentzen, K., & Westergaard, M. (Eds.). (2011). *Variation in the Input*. Dordrecht: Springer Netherlands.

Andler, D. (2004). Les sciences cognitives à l'aube de leur deuxième demi-siècle. In D. Andler, *Introduction aux sciences cognitives* (pp. 699–714). Paris: Folio.

Andler, D. (2006). Sciences cognitives. *Encyclopaedia Universalis en ligne*, Retrieved September 29, 2015, from http://www.universalis.fr/encyclopedie/sciences-cognitives/

Ash, S. (2004). Social Class. In J. Chambers, P. Trudgill, & N. Schilling-Estes, *Handbook of Language Variation and Change* (pp. 402–422). Oxford: Blackwell.

Babel, M. (2009). Phonetic and social selectivity in speech accommodation. Unpublished PhD dissertation, University of California, Berkeley.

Bayley, R. (2013). Variationist Sociolinguistics. In R. Bayley, R. Cameron, & C. Lucas, *The Oxford Handbook of Sociolinguistics* (pp. 11–30). Oxford University Press.

Bayley, R., Cameron, R., & Lucas, C. (2013). The Study of Language and Society. In R. Bayley, R. Cameron, & C. Lucas, *The Oxford Handbook of Sociolinguistics* (pp. 1–7). Oxford University Press.

Bell, A. (1984). Language Style as Audience Design. *Language in Society*, 13 (2), 145–204. DOI: 10.1017/S004740450001037X

Bernstein, B. (1971). *Class, Codes and Control: Theoretical Studies Towards a Sociology of Language*. London ; New York: Routledge.

Bucholtz, M. (2001). The whiteness of nerds: Superstandard English and racial markedness. *Journal of Linguistic Anthropology* 11: 84-100. DOI: 10.1525/jlin.2001.11.1.84

Campbell-Kibler, K. (2010). New directions in sociolinguistic cognition. *University of Pennsylvania Working Papers in Linguistics*, 15 (2), 31–39.

Campbell-Kibler, K. (2012). The Implicit Association Test and sociolinguistic meaning. *Lingua*, 122 (7), 753–763. DOI: 10.1016/j.lingua.2012.01.002

Chambers, J. (2000). Region and language variation. *English World-Wide*, 21 (2), 169–199. DOI: 10.1075/eww.21.2.02cha

Cheshire, J. (2004). Sex and Gender in Variationist Research. In J. Chambers, P. Trudgill, & N. Schilling-Estes, Handbook of Language Variation and Change (pp. 423–443). Oxford: Blackwell.

Chevrot, J.-P. (1994). La variation phonétique: un point de vue cognitif. *Langage et Société*, 70(1), 5–33.

Chevrot, J.-P., & Foulkes, P. (2013). Introduction. Language acquisition and sociolinguistic variation. *Linguistics*, 51 (2), 251–254. DOI: 10.1515/ling-2013-0010

Chomsky, N. (1965). Aspects of the Theory of Syntax. MIT Press.

Clark, L. (2009). Cognitive sociolinguistics: A viable approach to variation in linguistic theory, *Lacus Forum* 33, 105–118.

Cohen-Priva, U. (2015). Informativity affects consonant duration and deletion rates. *Laboratory Phonology*, 6 (2), 243–278. DOI: 10.1515/lp-2015-0008

Coupland, Nikolas (2007). *Style: Language Variation and Identity*. Cambridge, U.K.: Cambridge University Press.

Croft, W., & Cruse, D. A. (2004). *Cognitive Linguistics*. Cambridge University Press.

D'Arcy, A. (2013). Variation and Change. In Bayley, R. Cameron, & C. Lucas, *The Oxford Handbook of Sociolinguistics* (pp. 484–502). Oxford University Press.

Darwin, C. (1859 [2004]). *The Descent of Man* (Reprint edition). Princeton, N.J.: Penguin Classics.

De Vogelaer, G., Chevrot, J.-P., Katerbow, M. & Nardy, A. (2017). Bridging the gap between language acquisition and sociolinguistics, Introduction to an interdisciplinary topic. In De Vogelaer, G. & Katerbow, M., *The Acquisition of Sociolinguistic Variation*, John Benjamins, 1-41.

Dufour, S., Brunelliére, A., & Nguyen, N. (2014). To what extent do we hear phonemic contrasts in a non-native regional variety? Tracking the dynamics of perceptual processing with EEG. *Journal of Psycholinguistic Research* 42: 161-173. DOI: 10.1007/s10936-012-9212-8

Duranti, A. (2002). Linguistic Anthropology. In N. J. Smelser, J. Wright, P. B. Baltes & D. Hodgson *International Encyclopedia of the Social and Behavioral Sciences*. (pp. 8899–8906). Elsevier.

Duranti, A. (2003). Language as Culture in U.S. Anthropology: Three Paradigms. *Current Anthropology*, 44 (3), 323–347.

Eckert, P. (2000). *Linguistic Variation as Social Practice: The Linguistic Construction of Identity in Belten High*. Malden, Mass: Wiley-Blackwell.

Eckert, P. (2008). Variation and the indexical field. *Journal of Sociolinguistics*, 12 (4), 453–476. DOI: 10.1111/j.1467-9841.2008.00374.x

Erker, D., & Otheguy, R. (2016). Contact and coherence: Dialectal leveling and structural convergence in NYC Spanish. *Lingua*, 172, 131-146. DOI: 10.1016/j.lingua.2015.10.011

Fagyal, Z., Swarup, S., Escobar, A. M., Gasser, L., & Lakkaraju, K. (2010). Centers and peripheries: Network roles in language change. *Lingua*, 120 (8), 2061–2079. DOI: doi.org/10.1016/j.lingua.2010.02.001

Fishman, J. A. (1972). *The Sociology of Language: an Interdisciplinary Social Science Approach to Language in Society*. Newbury House Publishers.

Fought, C. (2006). *Language and Ethnicity*. Cambridge: Cambridge University Press.

Foulkes, P. (2010). Exploring social-indexical knowledge: A long past but a short history. *Laboratory Phonology*, 1(1), 5–40. DOI: 10.1515/labphon.2010.003

Giles, H., & Powesland, P. F. (1975). *Speech Style and Social Evaluation*. London and New York: Academic Press.

Hay, J. & Foulkes, P. (2016). The evolution of medial (-t-) over real and remembered time. *Language,* 92 (2), 298-330. DOI: 10.1353/lan.2016.0036

Henry, L., Barbu, S., Lemasson, A., & Hausberger, M. (2015). Dialects in animals: Evidence, development and potential functions. *Animal Behavior and Cognition*, 2 (2), 132–155. DOI: 10.12966/abc.05.03.2015

Hildebrandt, K. A., Jany, C. & Wilson Silva, W. (2017). Introduction: Documenting variation in endangered languages. In Hildebrandt, K. A., Jany, C., & Silva, W. (Eds) Documenting Variation in Endangered Languages. *Language Documentation & Conservation* Special Publication 13: 1-5.

Hruschka, D. J., Christiansen, M. H., Blythe, R. A., Croft, W., Heggarty, P., Mufwene, S. S., Pierrehumbert, J.B., Poplack, S. (2009). Building social cognitive models of language change. *Trends in Cognitive Sciences*, 13 (11), 464–469. DOI: 10.1016/j.tics.2009.08.008

Johnson, K., Strand, E. A., & D'Imperio, M. (1999). Auditory–visual integration of talker gender in vowel perception. *Journal of Phonetics*, 27 (4), 359–384. DOI: 10.1006/jpho.1999.0100

Kaufmann, L., & Clément, F. (2011). L'esprit des sociétés. Bilan et perspectives en sociologie cognitive. In L. Kaufmann & F. Clément, *La sociologie cognitive* (pp. 7–40). Ophrys.

Koops, C., Gentry, E., & Pantos, A. (2008). The effect of perceived speaker age on the perception of PIN and PEN vowels in Houston, Texas. *University of Pennsylvania Working Papers in Linguistics*, 14 (2), 93–101.

Kristiansen, G., & Dirven, R. (2008). Introduction: Cognitive Sociolinguistics: Rationale, methods and scope. In G. Kristiansen & R. Dirven, *Cognitive Sociolinguistics: Language Variation, Cultural Models, Social Systems* (pp. 1–17). Mouton De Gruyter.

Labov, W. (1972). *Sociolinguistic Patterns*. Oxford. Blackwell.

Labov, W. 2001. *Principles of Linguistic Change*, Vol II: *Social Factors*. Oxford: Blackwell.

Lacoste, V., & Green, L. (2016). Child Language Variation: Sociolinguistic and formal approaches. *Linguistic Variation* 16 (1), 1-11. DOI: 10.1075/lv.16.1

Laks, B. (2013). Why is there variation rather than nothing? *Language Sciences*, 39, 31–53. DOI: 10.1016/j.langsci.2013.02.009

Lazer, D., Pentland, A., Adamic, L., Aral, S., Barabasi, A.L., Brewer, D., Christakis, N., Contractor, N. Fowler, J., Gutmann, M., Jebara, T., King, G., Macy, M., Roy, D., & Van Alstyne, M. (2009). Life in the network: the coming age of computational social science. *Science* 323 (5915), 721–723. DOI: 10.1126/science.1167742

Le Page, R. B., & Tabouret-Keller, A. (1985). *Acts of Identity* : *Creole-Based Approaches to Language and Ethnicity*. Cambridge ; New York : Cambridge University Press.

Levinson, S. C. (2012). The Original Sin of Cognitive Science. *Topics in Cognitive Science*, 4 (3), 396–403. DOI: 10.1111/j.1756-8765.2012.01195.x

Local, J. (2003). Variable domains and variable relevance: interpreting phonetic exponents, *Journal of Phonetics*, 31: 321–339. DOI: 10.1016/S0095-4470(03)00045-7

Loudermilk, B. (2013). Psycholinguistic Approaches. In R. Bayley, R. Cameron, & C. Lucas, *The Oxford Handbook of Sociolinguistics* (pp. 132–152). Oxford: Oxford University Press.

Lupyan, G., & Dale, R. (2010). Language structure is partly determined by social structure. *PLoS ONE*, 5 (1), e8559. DOI: 10.1371/journal.pone.0008559

Mallinson, C., & Kendall, T. (2013). Interdisciplinary approaches. In R. Bayley, R. Cameron, & C. Lucas, *The Oxford Handbook of Sociolinguistics* (pp. 152–171). Oxford: Oxford University Press.

Mendoza-Denton, N. (2008). *Homegirls: Language and Cultural Practice Among Latina Youth Gangs*. Malden, MA: Wiley-Blackwell.

Milroy, L. (1987). *Language and Social Networks.* Oxford: Blackwell.

Morgan, D. L., & Schwalbe, M., L. (1990). Mind and self in society: Linking social structure and social cognition. *Social Psychology Quarterly*, 3 (2), 148–164. DOI: 10.2307/2786676

Munson, B., Edwards, J., & Beckman, M. E. (2012). Phonological Representations in Language Acquisition: Climbing The Ladder of Abstraction. In A. C. Cohn, C. Fougeron, & M. K. Huffman, *The Oxford Handbook of Laboratory Phonology* (pp. 288–309). Oxford University Press.

Nagy, N. (2006). Experimental methods for study of linguistic variation. In K. Brown, *Encyclopedia of Language and Linguistics* (Vol. 4, pp. 390–394). Oxford: Elsevier.

Nettle, D. (1999). Using social impact theory to simulate language change. *Lingua*, 108, 95–117. DOI: 10.1016/S0024-3841(98)00046-1

Nguyen, D., Doğruöz, A. S., Rosé, C. P., & de Jong, F. (2016). Computational Sociolinguistics: A Survey. *Computational Linguistics*, 42 (3), 537–593. DOI: 10.1162/COLI_a_00258

Niedzielski, N. (1999). The Effect of Social Information on the Perception of Sociolinguistic Variables. *Journal of Language and Social Psychology*, 18 (1), 62–85. DOI: 10.1177/0261927X99018001005

Ochs, E. (1999). Socialization. *Journal of Linguistic Anthropology*, 9 (1-2), 230–233. DOI: 10.1525/jlin.1999.9.1-2.230

Payne, R. B. (1981). Population structure and social behavior: Models for testing the ecological significance of song dialects in birds. In R. D. Alexander & D. W. Tinckle, *Natural Selection and Social Behavior: Recent Research and New Theory* (pp. 108–120). New York : Oxford Oxfordshire: Chiron Press.

Podesva, R. (2004). On constructing social meaning with stop release bursts. Paper presented at Sociolinguistics Symposium 15. Newcastle upon Tyne.

Poplack, S., Zentz, L., & Dion, N. (2012). Phrase-final prepositions in Quebec French: An empirical study of contact, code-switching and resistance to convergence. *Bilingualism: Language and Cognition*, 15 (2), 203–225. DOI: 10.1017/S1366728911000204

Saussure, F. de. (1916) [1995].*Cours de linguistique générale*. Paris: Payot.

Selting, M., & Couper-Kuhlen, E. (Eds.). (2001). *Studies in interactional linguistics* (Vol. 10). John Benjamins Publishing.

Shaw, J.A. and S. Kawahara, S. (eds.) (2018, in press). The role of predictability in shaping human language sound patterns. *Linguistic Vanguard*. DOI: 10.1515/lingvan-2018-0042

Shibamoto-Smith, J., S., & Chand, V. (2013). Linguistic Anthropology. In R. Bayley, R. Cameron, & C. Lucas (Eds.), *The Oxford Handbook of Sociolinguistics* (1st ed., pp. 31–47). Oxford: Oxford University Press.

Stamp, R., Schembri, A., Evans, B. G., & Cormier, K. (2016). Regional sign language varieties in contact: Investigating patterns of accommodation. *Journal of Deaf Studies and Deaf Education* 21 (1): 70-83.

Stanford, J. N. & Kenny, L. A. (2013). Revisiting transmission and diffusion: An agent-based model of vowel chain shifts across large communities. *Language Variation and Change* 25 (2), 119-153. DOI: 10.1017/S0954394513000069

Stanford, J. N., & Preston, D. R. (Eds.). (2009). *Variation in Indigenous Minority Languages* (Vol. 25). Amsterdam: John Benjamins Publishing Company.

Strand, E. (1999). Uncovering the role of gender stereotypes in speech perception. *Journal of Language and Social Psychology* 18, 96–100. DOI: 10.1177/0261927X99018001006

Sun, R. (2012). *Grounding Social Sciences in Cognitive Sciences*. Cambridge, MA: MIT Press.

Tesink, C. M., Petersson, K. M., Van Berkum, J. J., Van den Brink, D., Buitelaar, J. K., & Hagoort, P. (2009). Unification of speaker and meaning in language comprehension: an fMRI study. *Journal of Cognitive Neuroscience*, 21 (11), 2085–2099. DOI: 10.1162/jocn.2008.21161.

Trude, Alison M. and Sarah Brown-Schmidt (2012) Talker-specific perceptual adaptation during online speech perception. *Language and Cognitive Processes* 27 (7/8): 979-1001. DOI: 10.1080/01690965.2011.597153

Van Berkum, J. J., Van den Brink, D., Tesink, C. M., Kos, M., & Hagoort, P. (2008). The neural integration of speaker and message. *Journal of Cognitive Neuroscience*, 20 (4), 580–591. DOI: 10.1162/jocn.2008.20054

Van Noorden, R. (2015). Interdisciplinary research by the numbers. *Nature*, 525 (7569), 306–307. DOI: 10.1038/525306a.

Walker A., Hay J. (2011). Congruence between 'word age' and 'voice age' facilitates lexical access. *Laboratory Phonology*, 2 (1), 219–237. DOI: 10.1515/labphon.2011.007

Weinreich, U., Labov, W., & Herzog, M. (1968). Empirical foundations for a theory of language change. In W.P. Lehmann & Y. Malkiel, *Directions for Historical Linguistics: A Symposium* (pp. 95-195). Austin: University of Texas Press.

Zhang, Q. (2005). A Chinese yuppie in Beijing: Phonological variation and the construction of a new professional identity. *Language in Society*, 34 (03), 431–466. DOI: 10.10170S0047404505050153

Papers in this topic

Buson, L.,Nardy, A., Muller, D., Chevrot, J.P. (2018). The sociolinguistic repetition task: A new paradigm for exploring the cognitive coherence of language varieties, *Topics in Cognitive Science*, 10 (3), PAGE. DOI URL.

Clark, L. (2018). Priming as a Motivating Factor in Sociophonetic Variation and Change, *Topics in Cognitive Science*, 10 (3), PAGE. DOI URL.

Cuskley C., Loreto, V., & Kirby, S. (2018). A Social Approach to Rule Dynamics Using an Agent-Based Model, *Topics in Cognitive Science*, 10 (3), PAGE. DOI URL.

Docherty, G.J., Foulkes, P., Gonzalez, S., & Mitchell, N. (2018). Missed connections at the junction of sociolinguistics and speech processing, *Topics in Cognitive Science*, 10 (3), PAGE. DOI URL.

Harrington, J. Kleber, F., Reubold, U., Schiel, F., & Stevens, M. (2018). Linking Cognitive and Social Aspects of Sound Change Using Agent-Based Modeling, *Topics in Cognitive Science*, 10(3), PAGE. DOI URL.

Hay, J. (2018). Sociophonetics: The Role of Words, the Role of Context, and the Role of Words in Context, *Topics in Cognitive Science*, 10(3), PAGE. DOI URL.

Kim, J., & Drager, K. (2018). Rapid Influence of Word-Talker Associations on Lexical Access, *Topics in Cognitive Science*, 10(3), PAGE. DOI URL.

Kleinschmidt D. F., Weatherholtz, K., & Jaeger, T.F. (2018). Sociolinguistic Perception as Inference under Uncertainty, *Topics in Cognitive Science*, 10(3), PAGE. DOI URL.

Lev-Ari, S., Ho, E., & Keysar, B. (2018). The Unforeseen Consequences of Interacting With Non-Native Speakers, *Topics in Cognitive Science*, 10(3), PAGE. DOI URL.

Sóskuthy, M., Foulkes, P., Hughes, V., & Haddican, B. (2018). Changing Words and Sounds: The Roles of Different Cognitive Units in Sound Change, *Topics in Cognitive Science*, 10(3), PAGE. DOI URL.