Perturbing the community grammar: Individual differences and community-level constraints on sociolinguistic variation

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Abstract The traditional focus of variationist sociolinguistic research is the patterning of language variation at the level of the community, which individual language users are said to learn and reproduce (Labov 1972; 2012). In this paper, I observe that, although members of a speech community may all have learned the same grammar of a sociolinguistic variable, they may nonetheless produce that variable in ways which obscure this. This "perturbation," I argue, is epiphenomenal, stemming from at least two possible sources: individual differences in mental representations, and individual differences in speech production planning. Moreover, I demonstrate that these differences are not only inter-individual; they can also be intra-individual, such that speakers may undergo age-grading which disrupts their patterning of a variable from how they previously produced it. I ask whether these individual differences may give rise to changes in constraints in the same way that individual differences can lead to sound change. The paper concludes with a call for more research that integrates sociolinguistic, formal, and psycholinguistic approaches to the study of language variation and change.

Keywords: Sociolinguistic variation, community grammar, language change, individual differences, comparative sociolinguistics

1 Introduction

A growing line of inquiry in the area of sound change research concerns whether and how individual differences play a role in actuating changes. In a review of the literature, Stevens & Harrington (2014) identify four types of individual differences that may initiate sound change: (i) articulatory differences in how speakers produce sounds; (ii) cognitive differences in how listeners perceive sounds; (iii) differences in how speakers link perception and production (Beddor 2009; 2012); and (iv) the extent to which individuals are sensitive to the range of variation they hear over their lifetimes (which may itself be driven by individual differences in susceptibility to imitation). Several of these types of differences are addressed in this special issue; for instance, Mielke et al. and Dediu & Mosik demonstrate that individuals can differ in subtle ways in how they articulate particular sounds (i), and Yu addresses individual differences in how speakers identify and categorize sounds (ii). Related to Stevens & Harrington's (iv) are social differences between individuals in their exposure and/or receptivity to linguistic innovations, as discussed in the contributions by Eckert and Dodsworth.

By and large, this research addresses the role of individual differences in the introduction and propagation of **new speech sounds** — that is, new pronunciations of existing phonemes. In this paper, I assess whether these models of change can be extended to other areas of language as well. Given that individual-level articulatory and perceptual differences are a likely source of community-level sound change, I ask whether individual-level differences can lead to other sorts of changes, too: in other words, whether the proposals put forth for sound change are broadly generalizable to other areas of language.

This paper points out two further ways in which individuals can differ that have not been recognized in the above-cited work. First, individuals can differ in their mental representation of a particular surface structure. Second, individuals can differ in their ability to plan their speech. Though these are two quite dissimilar types of differences, I show that they have something in common: both can influence an individual's production of a sociolinguistic variable.

Sociolinguistic variables are classically defined as cases in which speakers of a language have two ways of saying something (Labov 1972). All sociolinguistic variables have constraints, or conditioning factors, that shape their patterning: that is, (extra)linguistic factors that covary in a systematic way with the production of the varying form (Weinreich et al. 1968; Tam-

minga et al. 2016). A rich literature, surveyed in Section 2, demonstrates that the members of a given speech community, when considered in the aggregate, show great uniformity in their application of these constraints; as I will discuss in that section, this has been attributed to them sharing a variable rule of grammar.

In this paper, I show that the two types of individual differences identified here — differing mental representations and different speech production planning abilities — can cause individuals to deviate from this community-level uniformity. That is, an individual who differs from the mainstream with respect to their mental representation of a particular surface structure, or their production planning abilities, may show a "perturbation" of these community-level constraints in their language production. Moreover, these differences are not simply inter-individual; they can also be intra-individual, changing over the lifespan. As a result, we may find speakers undergoing a sort of age-grading which has the result of disrupting their patterning of a variable from how they previously produced it.

Given what we know about how individual differences in language production and perception can generate innovations that may be taken up by the members of a speech community, leading to change, I ask whether the individual differences identified here can also lead to community-level change in the grammar of constraints on a sociolinguistic variable. I demonstrate that, suggestively, there are documented cases of community-level divergence in the constraints on a variable that resemble individuals' attested "perturbations."

Research acknowledging these two particular types of individual differences is quite new, and, as I will demonstrate, the implications of considering them together go beyond the results of the particular research studies involved. This paper not only documents their relationship, but also presents the implications of this relationship for the production of sociolinguistic variation, for the understanding of community grammars, and to questions of language change.

After providing some background on community-level constraints on sociolinguistic variation (Section 2) and the role of individual differences in sound change (Section 3), I discuss differing mental representations in Section 4 and differences in production planning in Section 5. In Section 6, I discuss how constraint change might be implemented grammatically, before concluding in Section 7.

2 Constraints on variation in the community and the individual

2.1 Background

As was first demonstrated by Fischer (1958) and Labov (1963), and as has been confirmed countless times since, variability in language is not randomly distributed, but is systematically governed by a set of observable predictors. These predictors are variously termed "constraints," "conditioning factors," or "factor groups," and comprise sociodemographic features of the speaker, the situational context of the utterance, elements of the linguistic environment surrounding the varying form, and cognitive and psychological traits of the speaker (Bayley 2013; Tamminga et al. 2016). All of these factors act in systematic ways to shape a speaker's choice of form, and the method of variationist sociolinguistics involves identifying these constraints and assessing how they correlate with the rates of occurrence of the varying forms.

The traditional object of investigation in variationist sociolinguistic research is the patterning of these constraints at the level of the community. A major contribution of Weinreich et al.'s (1968) landmark work on language change is the demonstration of "orderly hetereogeneity": the structured variation that manifests when the linguistic productions of a body of individuals are examined in the aggregate.

2.2 Uniformity, change, and divergence in constraints

Weinreich et al. (1968: 173) propose that the fact of orderly heterogeneity derives from the members of a speech community sharing a variable rule of grammar and its attendant constraints. And while there may be individual-level fluctuations in the application of such a rule, "the level of fluctuation or random variability is relatively low." This leads Labov (1989b: 2) to dismiss the possibility that "the linguistic community is an aggregate of individuals with an unlimited number of different systems in their heads" as an "illusion." On the contrary, Labov asserts that the process of language learning is the process of acquiring "the general pattern used in the speech community," resulting in "a high degree of uniformity in both the categorical and variable aspects of language production," such that "individual variation is reduced below the level of linguistic significance" (Labov 2012: 265).

Labov (1966/2006; 2009) demonstrates this by taking the case of variable rhoticity in the New York City English of speaker Jacob S., interviewed in 1963 as part of a speech community study of the Lower East Side. Jacob S. shows the same hierarchy of stylistic constraints on this variable as does the rest of the community: in lockstep with the other Lower East Side residents interviewed, he uses less rhoticity in spontaneous speech, more when reading a word list, and even more when producing elicited minimal pairs. Another demonstration of individual-level conformity to a group pattern is provided by Guy (1980). Guy shows that the language-internal constraints on word-final consonant cluster simplification in English are consistently replicated on an individual-speaker basis, provided that enough data has been collected from each speaker. With greater than 35 observations from a speaker, "there is 100% conformity" to the community-level pattern (Guy 1980: 20).

Recent work continues to confirm this individual-level conformity to the surrounding group. Meyerhoff & Walker (2007) study speakers of a Caribbean variety of English who have spent time abroad, and find that despite their exposure to other English varieties, they persist in matching the constraints on variation present in their home communities. Forrest (2015) examines the linguistic constraints on [ɪŋ]∼[ɪn] variation among 109 speakers in Raleigh, North Carolina, and finds that "a reorganization of the hierarchy of internal constraints never truly occurs" in any one individual's production. Forrest further speculates that "any dramatic [reorganization] […] would actually garner some conscious notice, which helps to keep the constraint hierarchy intact" (Forrest 2015: 400).

This individual-level conformity to a group pattern appears to start early. A growing body of research shows that children as young as three years old match not only their parents' rate of use of sociolinguistic variants, but also the constraints on those variants' occurrence (Labov 1989a; Roberts 1997; Smith et al. 2007). The pressure to conform to a community-level pattern also manifests quickly in cases of immigration: Hoffman & Walker (2010) demonstrate that second- and third-generation members of minority ethnic groups in Toronto match majority-ethnic speakers in their constraints on variation in a way that their first-generation counterparts do not.

Though the evidence to date consistently shows individuals matching their community in the nature and ordering of the constraints that affect their production of a variable, individuals will nonetheless differ from one another in their overall rate of variant use. So, while all New Yorkers in Labov's (1966/2006: 141) study showed the same hierarchy of contextual styles affecting r-vocalization, they differed in whether their rate of

r-vocalization in the most favorable context was closer to 100% (as Labov found for members of the lowest social class), or closer to 80% (as was found for members of the highest social class studied). Indeed, different rates of use of an innovative variant between community members of different ages is a necessary condition for language to ever change. This is not incompatible with community-level conformity on constraints, however. In fact, Labov (2007) attributes the way young speakers perpetuate language change, known as incrementation, to the same community-focused learning process that leads children to match community-level constraints early in life. He hypothesizes that children notice age stratification in the community (he calls this "learning an age vector") and push ever higher the rates of those variants that they identify as characteristic of other young people. Labov (2007: 344) thus sees language change as "incrementation within a faithfully reproduced pattern": children manage to both acquire the community-level constraints on a variable **and also** to progress those variants that show age stratification.

In sum, when sociolinguists have looked, they have very consistently found that the constraints on a variable are shared across members of a speech community, despite inter-speaker differences in the rate of use of the alternating variants. In fact, because constraints on variation are so often consistent across community members while rates of variant use tend to differ, many sociolinguists have hypothesized that constraints are represented grammatically in a way that rates of variant use are not (Poplack & Tagliamonte 1991; Meyerhoff & Walker 2007; Tagliamonte 2013).

Comparing a single variable across communities often presents a similar picture, with different varieties of a language showing the same constraints on a shared variable. To give just a few examples, this has been documented for an effect of grammatical class on [ɪŋ]∼[ɪn] variation across American, British, Australian, and New Zealand Englishes (Labov 1989a; Bell & Holmes 1992; Tagliamonte 2004; Forrest 2015); for an effect of following segment on variable coronal stop deletion in English word-final consonant clusters (also known as "t/d-deletion," and henceforth "(TD)"; see Tamminga 2018 for a recent review of literature on varieties as diverse as American English, Singapore English, and Nigerian English); and for an effect of following segment on l-vocalization in Australian and New Zealand Englishes (Horvath & Horvath 2003). Some of these cases of cross-community uniformity are due to the shared constraint being grounded in universal principles of articulation: for instance, Tamminga (2018) attributes the widespreadness of the following segment effect on (TD) to a process of resyllabification that occurs when coronal stops appear in prevo-

calic position. In other cases, though, constraints are shared across varieties because the variable in question was present in a common ancestral variety, and its constraints have remained stable even as the varieties have diverged. This appears to be the case for the grammatical class effect on [ɪŋ]∼[ɪn] variation, which can be traced back to Old English (Houston 1985; Labov 1989a).

The assumption that the constraints on a variable will be shared among daughter varieties that have inherited that variable is so strong in sociolinguistics that it has led to the development of the field of "comparative sociolinguistics," which uses shared constraints on variation (when they cannot be attributed to universal principles) to argue for two varieties deriving from a common source (Tagliamonte 2013). This approach has most notably been used to assess whether African American English resembles English-based creoles, in order to speak to the debate concerning whether this variety has Caribbean Creole or British English origins (e.g. Poplack & Tagliamonte 1991).

When varieties of a language share a variable but not its constraints, the variable can often be shown to have originated in one and then diffused to the other. Labov (2007) proposes that the diffusion of a feature across varieties of a language must occur through adult-to-adult contact, and therefore will involve adult learning, which is imperfect. As a result, the constraints on the variable may change as it diffuses from one community to another. Diffusion has been invoked to explain differences between communities in the constraints on r-vocalization (Nagy & Irwin 2010; Blaxter et al. Forthcoming) and in the constraints on quotative *be like* across American, Canadian, English, and New Zealand Englishes (Buchstaller & D'Arcy 2009).

The effect of some constraints on a variable may also be eroded over time if that variable is involved in change. In other words, as a change progresses toward completion, it may come to be used at an equal rate in all contexts, despite having shown contextual differences at an earlier stage. This has been demonstrated in some apparent time studies (e.g. Haddican et al. 2013 on GOAT-fronting, Tagliamonte 2013 on the English future). It also means that when two varieties share a change, but the change has progressed further in one than the other, we may find cross-community differences in constraints. Schleef & Ramsammy (2013) explain cross-community differences in the effect of word position on th-fronting in this way.

This being said, there are occasional cases in the literature of two communities sharing a variable but differing in its constraints, with no indication that diffusion is at play, or that the two communities are at different stages of a change. One well-cited example concerns the absence or pres-

ence of an effect of morphological class on (TD): Tagliamonte & Temple (2005) find no significant effect on (TD) among their York (UK) English speakers of whether a (TD) word is a monomorpheme, a semi-weak past tense, or a regular past tense, while countless studies of (TD) in varieties of American English have found this factor to play an important role in the variation. Another is the effect of a following /l/ on the production of the GOOSE vowel in English: /l/ disfavors GOOSE-fronting in the majority of dialects this variable has been studied in, but has no effect for many speakers in Manchester, England (Turton & Baranowski 2014; Baranowski & Turton 2015). Other examples concern the effect of pre-pausal position on a variable: (TD), Spanish s-debuccalization, and English l-vocalization have all been found to show cross-community differences in whether pre-pausal position favors or disfavors application of the process (see Guy 1980 on (TD), Kaisse 1996 on s-debuccalization, and Horvath & Horvath 2003 on l-vocalization).

Though these cases of community-level divergence in constraints on a shared variable have long been recognized, their actuation has, to my knowledge, never been addressed. Why does pre-pausal position affect (TD) in one way in Philadelphia and in a different way in New York City (Guy 1980)? What led to this state of affairs? Just as the comparative method of historical linguistics determines the sound changes that must have occurred to give rise to different phonologies in sister languages, I propose that comparative sociolinguistics should attempt to identify the changes that have occurred to lead to different constraint patterns in varieties of a single language.

In this paper, I provide a first attempt at doing that. I demonstrate that the parameters on which communities and varieties diverge in their constraints on variation resemble the parameters on which individuals differ in production. This opens up the possibility that models of sound change that implicate individual differences in the actuation of change can be extended to cases of constraint change, as well.

Since we currently lack real-time evidence to confirm that this individual-level variability does indeed get taken up by the members of a speech community to eventually lead to constraint change, I suggest that connecting the dots between these individual differences and the stable end states documented by cross-dialectal sociolinguistic research is an important direction for future work. And I further recommend that such work should pay close attention to the models of innovation and propagation put forth in the sound change literature, which offer a useful potential parallel.

In the next section, I present the research on individual differences and the actuation of sound change in more detail. After that, I present two case studies in which individual-level cognitive differences result in speakers producing constraints that differ from the community pattern. I suggest that this situation sows the seeds for constraint change, eventually leading to community-level constraint divergence like we find in the cases cited above.

3 Individual differences and the actuation of change

As Mielke et al. (this volume) discuss, sound change can occur when a learner chooses the wrong articulatory target for a pronunciation that they encounter in their linguistic input. Recent work has identified the important role that individual differences in aspects of speech production and perception play in this process (e.g. Stevens & Harrington 2014).

One model of how these individual differences can lead to sound change is found in Baker et al. 2011. Baker et al. consider the actuation of a change toward /s/-retraction before /ɹ/ in many varieties of English (leading to, for instance, [ʃ]*treet* for *street*). In order to explain why /s/-retraction, which is rooted in a universal process of coarticulation between /s/ and /ɹ/, has not happened everywhere, the authors appeal to individual differences in the articulation of English /ɹ/. As Mielke et al. (2016) detail, and as I discuss further in Section 4, /ɹ/ can be produced with different tongue configurations that produce no audible cues to articulation. Speakers with one articulation of /ɹ/ which engenders less coarticulation with their /s/ may encounter speakers with another articulation of /ɹ/ which engenders more coarticulation with their /s/. Because the less-coarticulating speakers are not accustomed to /s/–/ɹ/ coarticulation in their own speech, and because they have no way of knowing that their interlocutors are using a different /ɹ/ production which engenders coarticulation, they will be unable to compensate for it when they encounter it. Instead, they will interpret their interlocutors' coarticulated /s/ as a distinct production target, spurring a change toward /ʃ/. Because the coincidence of interlocutors with these necessary characteristics is rare, and moreover because a speaker needs to occupy a certain social position in the community in order for their pronunciations to influence others (Labov 2001), Baker et al. predict that sound change will be rare as well.

Bermúdez-Otero, in this volume, refines Baker et al.'s model. He points out that Baker et al.'s model overpredicts the incidence of sound change,

and suggests constraining the model by adding a process of community-oriented learning and recognition of an age vector. Bermúdez-Otero proposes that while the situation laid out by Baker et al. may indeed correctly predict how new variants arise in some cases of sound change, the strong pressure on learners to reject individual idiosyncrasies (reviewed in Section 2.2) prevents innovations from catching on in the majority of cases. For an innovation to be taken up in the community, it is not merely enough for its user to occupy a socially influential position, as Baker et al. propose. There must be multiple users of the innovation, and they must be distributed in the society such that production of the innovation is skewed by age in the right direction (i.e., with younger speakers using it more). This will prompt the learner to set up an age vector and consequently begin incrementing the innovative variant. Because this scenario must be exceedingly rare, sound change is correctly predicted to be rare, too. Bermúdez-Otero thus adds to Baker et al.'s model the necessity of a correlation between age and innovative production.

I follow Bermúdez-Otero in understanding sound change as taking place through a combination of individual differences leading to actuation, and a distribution of innovations in the community that triggers propagation. Here, I apply this model to constraint change, and in the next two sections, I present two types of individual differences in the cognitive domain which I suggest can actuate constraint changes.

4 Individual differences in mental representation

Researchers working in usage-based traditions have argued that all members of a speech community will have slightly different mental representations of the elements of their language from one another. They attribute this to the fact that "linguistic representations are, at some level, constantly updated with experience and are rich in phonetic and indexical detail" (Hay & Foulkes 2016: 300, and see references to other works therein). At the same time, as Hay & Foulkes (2016: 300) put it, "the presence of experience-based representations does not preclude a role for abstraction," though the precise details of these so-called "hybrid models" remain to be worked out (Pierrehumbert 2006; Guy 2014).

As I will show, the nature of these abstract representations can differ between (as well as within) individuals, too. This can happen when the underlying representation of a form is ambiguous from its surface production. With little or no evidence to disambiguate the possible abstract representa-

tions, learners may occasionally choose a different one than others in the community have settled on. I review cases of this sort, which I term "covert representational variation," in Section 4.1.

This situation is a cognitive analog to the phenomenon of "covert articulatory variation" introduced in the contribution to this issue by Mielke et al. This refers to individual-level differences in the articulatory strategy used to produce a given sound. As summarized in Section 3, covert articulatory variation arises when the acoustic and auditory signal for a sound is compatible with multiple articulations which are themselves effectively indistinguishable by listeners, and has been attested in American English /ɹ/.

/ɹ/ can be produced with either a bunched-tongue articulation or a retracted-tongue articulation, with no apparent audible difference between the two (Delattre & Freeman 1968). Mielke et al. (2016) demonstrate that, without any cues with respect to how this sound is to be articulated, the population of speakers surveyed in their study breaks down into roughly half who use retroflex /ɹ/ in at least some contexts, and roughly half who use bunched /ɹ/ exclusively.

Covert articulatory differences cannot spread through a speech community (precisely because they are covert), but they can have acoustic consequences which themselves can trigger change (Mielke et al., this volume). One example is the retraction of /s/ discussed in the previous section, which Baker et al. (2011) propose has its source in individual differences in /ɹ/ articulation.

Similarly, in Section 4.2, I demonstrate that covert representational differences can have knock-on effects. Most relevant to this paper, one such knock-on effect is a "perturbation" of the constraints on a sociolinguistic variable. In these cases, the community at large shares a variable process, with particular linguistic constraints on its occurrence. However, there is individual-level variation in how the structures that the variable process applies to are represented. As a result, we see individual differences in the application of those constraints. In some cases, I suggest, this may lead to community-level change in the constraints on that variable, creating the cross-community divergence attested in the literature surveyed in Section 2.2.

4.1 The phenomenon of covert representational variation

Covert representational variation has been attested at multiple levels of language. Two case studies of Korean demonstrate inter-speaker representational differences in the domain of syntax. Han et al. (2007; 2016) and Kim & Han (2016) show that there are structures in Korean which could be grammatically represented in two possible ways, but that the contexts which provide definitive evidence for one or the other rarely occur in natural speech. When these disambiguating contexts are explicitly elicited from Korean speakers, the population sampled has been found to essentially split in half with respect to whether speakers have landed on one or the other grammatical analysis. In fact, Han et al. find that diagnostics of parents' and children's analyses do not correlate: children may settle on different analyses than their parents have.[1] Without unambiguous input data that would allow child learners of Korean to settle on one analysis or the other, "child learners of Korean [...] must randomly choose" (Kim & Han 2016: 348).

In neither of these cases does this covert representational variation have any apparent effect on the vast majority of instances of language production. It is possible that a subsequent change in some other aspect of Korean syntax may bring these grammatical differences into the open, leading those speakers with one representation to start producing different surface structures than speakers with the other. But absent that, and with the diagnostics of the underlying structure being so unlikely to surface in everyday language, the covert representational variation can, as far as we can tell, simply continue unnoticed.

Ringe & Eska (2013: 123–131) survey some cases of covert representational variation in phonology. These are cases in which a sound, historically an allophone of another, is reanalyzed by learners as being present underlyingly (see also Bermúdez-Otero & Hogg 2003 on input restructuring). This can occur when the two phones are involved in few, or even no, synchronic alternations, making evidence that that they share an underlying form difficult to come by. (As Bermúdez-Otero & Hogg discuss, distributional evidence — that is, evidence that the two forms are in complementary distribution — is apparently not sufficient to lead learners to posit allophony; evidence of alternations is needed as well.) In contrast to the case studies of Korean syntax discussed above, learners do not appear to randomly

[1] This demonstration of covert variation within a family unit is reminiscent of Magloughlin's (2015) finding of a pair of twin boys who differed in /ɹ/ articulation, with one producing predominantly bunched /ɹ/ and the other almost exclusively retroflex.

choose phonological representations when the surface data they encounter is compatible with more than one possible analysis. Instead, learners are biased toward minimizing abstractness, leading them to project surface forms back into the input (Bermúdez-Otero & Hogg 2003). But, as in the Korean case, this community-wide heterogeneity in underlying representation may not be evident until another change occurs that affects one of the implicated sounds. Ringe & Eska present examples of phonological differences between varieties of Swiss German that can be attributed to a phone being underlying in one variety but synchronically derived in the other.

In the next section, I demonstrate that we can also find cases of covert representational variation in which a speaker's having a different mental representation for some form causes them to produce the constraints on a sociolinguistic variable that affects that form in a community-divergent way. I suggest that, combined with a model of how individual differences actuate change, this can explain how communities come to diverge in constraints on variation.

4.2 Covert representational variation and the patterning of sociolinguistic variables

In this section, I survey three cases in which individual language users differ in their mental representations, with sociolinguistically observable results. Two of these cases are localized to a specific stage of the life course: childhood in the first, old age in the second. The third is a case of individual differences in mental representation which persists across the lifespan.

Smith & Holmes-Elliott (2017) study children's glottal replacement of /t/ (e.g. [pɹɪʔi] for [pɹɪti] 'pretty') in the town of Buckie, Scotland. They examine the rate of glottal replacement of /t/ in several different phonological environments, in a sample of the community comprising children, their caregivers, and other, unrelated adults. They find that children replicate their caregivers' (and the community-level) rates of glottal replacement closely in every phonological environment except one: forms in which the /t/ precedes a syllabic consonant, as in *bottom, bottle,* or *cheating*. Adults show glottal replacement at a high rate in this environment, but children show it at a much lower rate, comparable to their rate in intervocalic position (in words like *pretty*). Have children mislearned this community-level constraint on glottal replacement? Not necessarily: Smith & Holmes-Elliott suggest, instead, that children have misanalyzed the phonology of syllabic consonants, interpreting them as schwa + consonant sequences. Their rate

of glottal replacement in this environment is thus perfectly in line with their rate in true intervocalic position.

Smith & Holmes-Elliott find that children grow out of their misanalysis as they age, bringing their productions in line with those of adults. Examining longitudinal data on these same speakers, who were reinterviewed several years later as preadolescents, Smith & Holmes-Elliott find them to show a much higher rate of glottal replacement before syllabic consonants than they showed as children.

In a converse of the pattern shown for glottal replacement of /t/, it is also possible that an individual can posit the majority community representation for a structure in early life, but then diverge from this over time. This is what MacKenzie (2017) proposes in her longitudinal study of nature documentary narrator Sir David Attenborough, sampled at two points over his life separated by a fifty-year interval. MacKenzie examines Attenborough's variable pronunciation of /ɹ/ as [ɾ] ("r-tapping"), a change in progress in Attenborough's native variety, Received Pronunciation. Previous work on r-tapping in Received Pronunciation (Fabricius 2017) finds a strong linguistic constraint on the variation: /ɹ/ is articulated as a tap more often in word-internal position (e.g. *very*) than in hiatus (also called "linking") position (e.g. *for a*). In his 1950s-era recordings, MacKenzie shows, Attenborough adheres closely to this constraint, tapping approximately 60% of the time in word-internal position, and approximately 30% of the time in linking position (a significant difference via mixed-effects logistic regression). However, in Attenborough's 2000s-era recordings, this constraint is no longer in evidence: there is no significant difference in Attenborough's tapping rate between linking and internal position. It is as if he has for some reason stopped adhering to the phonological position constraint on the community-level rule.

But as in the case of glottal replacement, there is an alternative explanation. MacKenzie demonstrates that Attenborough's loss of the distinction between word-internal and linking environments has come about through an increased rate of tapping in high-frequency collocations (such as *there is, here are, for a*). Specifically, by the 2000s, he has brought his previously-low tapping rate for these high-frequency collocations in line with his tapping rate in word-internal position, and the large number of high-frequency collocations in the data has had the effect of erasing the difference between the two environments. When low-frequency collocations are examined on their own, they show a tapping rate in the 2000s that is not significantly different from the low rate of the 1950s.

MacKenzie suggests that this interaction between time and item frequency can be explained if decades of producing high-frequency collocations has led Attenborough to store them as single words by the time of his 2000s-era recordings. Since they have come to constitute a word-internal environment, his rate of tapping in these items comes into line with his tapping rate in word-internal position. In other words, what can explain Attenborough's apparent later-life lack of adherence to the community-level position constraint on r-tapping is not a change to his tapping rule, but rather a change to the representations of some of the items that it applies to.

To recap, Smith & Holmes-Elliott (2017) find speakers to grow out of a particular grammatical analysis; MacKenzie (2017) finds a speaker who "grows into" one. Representational heterogeneity may also persist across the lifespan, something which has been demonstrated for the (TD) variable in English. A well-known constraint on this variable is the morphological makeup of the item containing the consonant cluster in question: monomorphemic words (e.g. *past*) undergo deletion at a higher rate than regular past tense forms (e.g. *passed*), with irregular (also called "semi-weak") past tense forms (e.g. *left, lost*) either in between the two or deleting at a rate comparable to that of regular past tense forms (Guy 1980; 1991a; b). However, several studies which compare children's production to adults' find that children diverge from the majority adult production in a conspicuous way: children's rate of deletion in semi-weak past tenses is very high, comparable to their rate of deletion in monomorphemes (Labov 1989a; Guy & Boyd 1990; Roberts 1997).

Guy & Boyd attribute this to a misanalysis of these forms on the part of child learners. Very young children, they argue, misanalyze these forms as having no final /t/ or /d/ at all, and categorize them with the irregular English past tenses that undergo only a vowel change (such as *gave* and *took*). As a result, the youngest children produce these forms with essentially categorical /t, d/ absence. As children grow up, they learn that these forms do end in a consonant cluster, but at first do not attribute any morphological status to the final /t/ or /d/; at this stage, their rate of deletion for semi-weak past tense forms is comparable to their rate of deletion in monomorphemic forms. Finally, in adulthood, most, though still not all, speakers come to recognize the final /t, d/ as a meaning-bearing suffix, and then delete it at a lower rate, comparable to their behavior in regular past tenses. The "intermediate" status of semi-weak forms thus comes from aver-

aging across speakers, some of whom treat these forms as monomorphemes, and others who treat them as regular past tenses.[2]

Looking at the morphological constraint on (TD) among children, we might be tempted to say that children have mislearned the community's variable (TD) rule: they have somehow missed the fact that this rule has a hierarchy of morphological environments that goes monomorphemes > semi-weak past >/= regular past. But this is not strictly the case. For children who have analyzed semi-weak past tense forms as not containing a final alveolar stop, this rule simply does not apply. Their adult-divergent performance is not a matter of having incorrectly learned the rule, but rather of having an adult-divergent representation of certain forms that the rule applies to. The same is true for those adult speakers who persist in treating semi-weak verb forms as monomorphemes.

To recap, there is age-stratified community-level variation in the mental representation of semi-weak verb forms. That variation in mental representation has a knock-on effect on a sociolinguistic variable: it gives the impression that some speakers have not correctly learned the community-level morphological effect on (TD).

Interestingly, there is cross-community divergence in the morphological effect on (TD) in precisely the same way that there is individual variation in that effect. Baranowski & Turton (Forthcoming) examine (TD) in Manchester (UK) English, and find that, while Manchester English speakers show the expected effect whereby monomorphemes show more deletion than past tenses, they treat semi-weak forms just like monomorphemes. This is exactly where Guy & Boyd (1990) find inter-individual-level variation persisting past childhood. It is very possible that the difference in the morphological effect between Manchester and other communities can be traced back to those individual differences in speakers' mental representation of semi-weak forms.

It is perhaps significant that the two studies which have found individual differences in the morphological effect on (TD) (Guy & Boyd 1990; Fruehwald 2012) have found them throughout the life course, rather than localized to a particular developmental stage. This may be a necessary criterion for individual differences to actuate change, as Bermúdez-Otero (this volume) hypothesizes.

[2] Fruehwald (2012) provides a slightly different account of the situation in which some speakers retain their early childhood-era analysis of semi-weak as forms lacking a final coronal stop, and this representation varies with a co-existing analysis of semi-weak forms as containing a final coronal stop.

4.3 Summing up

In summary, covert representational variation, like covert articulatory variation, is attested, though confirmed cases of this phenomenon are still relatively sparse. An open question is whether it may in fact be more common than recognized, but simply near-impossible for linguists to detect (as the name "covert" would imply). This being said, it is possible that it may manifest in unexpected ways. The three different case studies presented in Section 4.2, which all show an individual or a group of individuals apparently failing to produce community-level constraints on a sociolinguistic variable, are each consistent with an explanation rooted in covert representational variation. Careful studies of individual-level adherence to community-level constraints (in the model of Forrest 2015) alongside cross-dialectal comparisons of constraints (in the model of comparative sociolinguistic work) will be welcome, particularly in the case of sociolinguistic variables whose surface form is compatible with multiple underlying representations (e.g. MacKenzie 2013).

5 Individual differences in speech production planning

Tamminga et al. (2016) discuss the role of physiological and psycholinguistic factors in shaping the production of sociolinguistic variation. Factors such as coarticulation, priming, automatic imitation, and constraints on working memory can all affect a speaker's choice of variants. Tamminga et al. call these factors "p-conditioning."

These universal factors differ from other constraints on variation in that they are properties of individuals, rather than stemming from a "community grammar," as has been proposed for internal linguistic and social effects on variation (see discussion in Section 2.2). As such, they are not learned. Inter-speaker consistency in the application of these constraints is therefore not attributable to individuals having learned a community rule, but rather due to universal properties of the human language system that all speakers share. (See Blaxter et al. Forthcoming for further discussion on this point.)

That being said, as Tamminga et al. (2016: 325) point out, many of the cognitive systems that are involved in p-conditioning — for instance, memory — are not identically distributed across individuals. This means that we should see variation in p-conditioning effects — variation which falls within an expected distribution, but variation nonetheless. Further

complicating the issue is Tamminga et al. (2016: 325)'s observation that p-conditioning can "phonologize": that is, formerly automatic and gradient effects can develop into categorical, grammatically-represented ones. (See also Janda & Joseph 2003 and Bermúdez-Otero, this volume, for related discussion.) In other words, p-conditioning is universal to some degree, but it may also eventually give rise to non-universal effects.

In this section, I discuss one p-conditioning factor in particular: differences between (and within) individuals in their ability to incrementally plan their speech. I first survey the evidence that the scope of speech production planning not only varies across individuals, but also may change with age (Section 5.1). Then I demonstrate that planning differences can modulate speakers' production of sociolinguistic variables, specifically by attenuating the effects of certain community-level constraints on variation (Section 5.2). I also assess the possibility that individual differences in speech production planning could lead to cross-community divergence in constraints on variation.

5.1 The phenomenon of speech production planning

Many recent models of speech production assume that speech is produced in an incremental fashion, with the planning of what a speaker is going to say next and the production of the current, already-planned, unit occurring in parallel. In other words, many utterances are not mentally formed in their entirety before being spoken; rather, we plan out the later components as we produce the earlier ones (Ferreira & Swets 2002).

A complication to this is that external factors can interfere with a speaker's planning, diminishing the size of planning/production units or even preventing a speaker from planning ahead at all while producing. Factors that have been attested to interfere with planning include a speaker's cognitive load; the frequency, predictability, and neighborhood density of the words to be planned; and the structural complexity of the utterance to be produced (Wagner et al. 2010 and further studies reviewed in Tanner et al. 2017 and Fink & Goldrick 2015). As a result, two words that end up being produced adjacent to one another in the speech stream may not in fact have been planned together. The second may have been planned while the first was being produced, or even afterward, following a pause or hesitation marker (Beattie 1979).

A clear example of planning disruption can be seen in work by Ferreira (1991), who investigates the effects of structural complexity on advance

planning. Ferreira asks speakers to produce sentences from provided subject and object noun phrases of varying structural complexity. She finds that, when asked to produce a sentence in which both subject and object are syntactically complex (defined in her study as containing an embedded relative clause), speakers are slow to begin producing the sentence, and tend to produce a pause between the subject and the verb phrase. Ferreira interprets these findings as follows. A complex subject requires a speaker to pause before producing it, in order to plan it. Then, the complexity of this subject prevents the speaker from concurrently planning the entirety of the object that will follow. As a result, the speaker must pause after articulating the subject, in order to finish planning the second half of the sentence. The planning required by a particularly complex sentence thus exceeds short-term memory capacity, forcing the sentence to be planned and produced in two separate performance units.

There is still considerable debate over the size of planning units in the simplest case; that is, over the question of how much linguistic material a speaker can plan at once when disruptive factors like cognitive load and structural complexity are not at issue (see Tanner et al. 2017 for a recent review of work in this area). In fact, the scope of speech planning appears to be subject to individual differences. Schriefers & Teruel (1999) examine speakers' planning and production of two-word utterances in a lab setting, and find that the participants in their study break down into two subgroups: one consisting of speakers who begin producing an utterance as soon as they have planned its first syllable, and another of speakers who wait to begin producing until they have planned the entire first word. Accordingly, Schriefers & Teruel (1999: 45) conclude that "the amount of advance planning on the phonological level can vary between speakers."

A likely factor underlying these individual differences in planning scope is individual differences in working memory. Swets et al. (2014) find that speakers with a high working memory capacity are able to plan more linguistic material in a given amount of time than are low-capacity speakers. In fact, speech planning scope shows not only individual differences within a population, but also, potentially, changes over the lifespan. Mortensen et al. (2008) find that older speakers are less efficient in their planning than younger ones; there is also evidence that working memory declines with age (Salthouse & Babcock 1991; Kemper 2015), giving us further reason to believe that planning scope may diminish with age.

In sum: a speaker's ability to plan the later components of an utterance while concurrently producing earlier ones is contingent on many factors. Some of these are likely to affect all speakers equally (e.g. the structural

complexity of a sentence), but others — namely, a speaker's working memory capacity — are subject to both inter-individual and intra-individual differences. In the next section, I demonstrate that a speaker's production of sociolinguistic variation can be contingent on their having planned an upcoming unit of speech, and connect the dots between this observation and the individual differences presented here.

5.2 Speech production planning and the patterning of sociolinguistic variables

A small but growing body of research implicates processes of production planning in the patterning of sociolinguistic variation. One such study is MacKenzie 2012; 2013, which examines copula contraction in English; that is, the variable realization of the copula as either a syllabic, or "full," form (/ɪz/) or a non-syllabic, or "contracted," form (/z/). In her study of copula contraction in a corpus of spontaneous speech, MacKenzie finds that the rate at which the copula surfaces in its contracted form is strongly dependent on how long and/or complex the noun phrase subject of that copula is. Specifically, the longer or more complex a copula's noun phrase subject, the less likely speakers are to produce the contracted form of the copula, with a rate of circa 50% contracted forms after single word-subjects, but no contracted forms at all after subjects exceeding eight words in length.

MacKenzie appeals to processes of production planning to explain this finding. As we know from Ferreira (1991), producing a complex subject inhibits a speaker's ability to concurrently plan the material that follows. Accordingly, a possible explanation for the subject length effect on contraction is that a long or complex subject prevents a speaker from planning ahead to the copula that is to come, and subject and copula must be planned together in order for contraction, a process of cliticization, to take place. Though we await evidence confirming that planning is the source of this effect (e.g., experiments in which speakers' advance planning is compromised, for instance by means of a cognitive load, and effects on copula contraction are assessed), it is suggestive, as contraction requires host and verb to be phonologically close in order to occur (MacKenzie 2012), and, as discussed further in the next paragraph, inhibited advance planning disrupts phonological closeness.

Further examples of how planning disruption can shape the production of sociolinguistic variation can be seen in work by Wagner (2011) and Tanner et al. (2017). In both studies, researchers examine the potential for

disrupted advance planning to modulate a following context constraint on a sociolinguistic variable. Wagner examines the variable realization of the English suffix *-ing* as either [ɪn] or [ɪŋ] (in shorthand, "(ING)"), and Tanner et al. investigate (TD). Both of these variables have been shown to be sensitive to the nature of the segment that follows the varying consonant, with more [ɪn] and more /t, d/ absence before consonants than before vowels. These authors use prosodic proxies for planning to assess whether this following segment is likely to have been planned at the time of variable production, hypothesizing that a segment that was not likely to have been planned when the varying item was uttered is unlikely to have influenced the shape of the varying form.[3]

Indeed, both sets of authors find that the following-segment effect on variation is lessened the more the planning proxy indicates that advance planning of that segment had not occurred at the time the variable item was produced. In other words, there are instances of production of (TD) and (ING) in which these variables are not subject to the well-attested following segment constraint on their patterning, simply because the speaker has not planned far enough ahead for that constraint to be operative. As Tanner et al. (2017: 2) put it, "Only if the details of upcoming words are already known at the time of planning of the current word can they exert their conditioning effect on a phonological process." In the context of this paper, failure to plan ahead perturbs the community-level constraint on a sociolinguistic variable.

It is clear, then, that there is a growing body of evidence that a speaker's ability to plan upcoming speech can have an influence on their production of sociolinguistic variation. This effect can manifest through their choice of variant, as in the copula contraction study of MacKenzie (2012; 2013), or through the extent to which a following segment conditions their choice of variant, as in the work by Wagner (2011) and Tanner et al. (2017). And, because we know that planning scope differs across, and even within, in-

[3] In the case of Wagner (2011), the planning proxy is the duration of the word following *-ing*; in the case of Tanner et al. (2017), the planning proxy is the duration of pause following the consonant cluster subject to deletion. In each case, a longer item (word or pause) following the site of variation is taken as an indicator that the following segment is less likely to have been planned at the time of production of the varying form.

Note that a pause has been found to condition /t, d/ absence differently in different communities (Guy 1980, and see discussion in Section 2.2). Tanner et al. find that pause inhibits /t, d/ absence in their British English data (longer pauses correlate with more /t, d/ presence), replicating a finding from other studies of British English (Tagliamonte & Temple 2005) and other dialects (Philadelphia English: Guy 1980, Appalachian English: Hazen 2011).

dividuals (Section 5.1), we can hypothesize that individual differences in speakers' planning scope will lead speakers to differ in the extent to which they show planning-based effects on sociolinguistic variation. For instance, a speaker who is particularly adept at planning ahead should show less of an effect of subject length on contraction — long subjects will not disrupt their ability to plan that a copula is coming — than a speaker with a short planning scope, who may show little use of contracted forms even with short noun phrase subjects, due to a reduced ability to plan subject and copula at once. By the same token, high planning-scope speakers should show more robust following segment effects on (ING) and (TD) than low planning-scope speakers, who may conceivably appear to lack such effects.

These proposals await empirical confirmation. However, given that (i) working memory capacity is a documented contributor to planning scope, (ii) working memory capacity can be easily assessed in a lab setting, e.g. via a memorization + reading task (Martin & Slevc 2014), and (iii) several sociolinguistic variables with following-segment effects can also be elicited in a lab setting (see, e.g., Wagner 2011 for (ING); Raymond et al. 2016 for (TD)), it should be feasible to test whether the effects demonstrated by Wagner (2011) and Tanner et al. (2017) show individual-level differences which correlate with individual-level differences in working memory capacity.

In addition, much as we saw with covert representational variation, speech planning scope shows not only individual differences within a population, but also the potential for change over the lifespan. This means that it is conceivable — although again, untested — that individuals may change the extent to which they show planning-implicated effects on sociolinguistic variation over their lifetimes, and that the effects cited here will show age correlates in the general population, in much the same way as the effect of semi-weak verbs on (TD) discussed in Section 4.2.

This paper has been considering the possibility that individual-level variation in constraints could sow the seeds for cross-community divergence in constraints. In the previous section, we saw that the morphological constraint on (TD) varies intra-individually, inter-individually, and across communities. Do any of the intra- and inter-individual effects considered in this section have community-level parallels?

Detailed cross-community work on the subject length effect on contraction is lacking, but there is considerable cross-community work on the following segment effects on (TD) and (ING). In the case of (TD), the effect of a following consonant versus a following vowel appears to be consistent across communities, despite the potential for individual-level variation. Tamminga (2018) surveys over a dozen studies of (TD) in eleven different

varieties of English and finds an effect of following segment in each of them. However, (ING) **does** show cross-community divergence in whether a following segment conditions the variation (Forrest 2017). And, suggestively, Forrest (2017: 151)'s study of (ING) among 132 speakers also finds "a great deal of individual-level variability" in the application of this constraint. It is conceivable that individual differences in advance planning scope can perturb a community-level effect of following segment on (ING), and that in some communities, this has resulted in a loss of this effect entirely.

An open question is whether the considerable cross-community heterogeneity in how a following pause affects several different sociolinguistic variables (reviewed in Section 2.2) can be traced back to individual differences in planning, or in some other aspect of language production. Perhaps, when an individual goes to produce a variable pre-pausally, and nothing has been planned in the upcoming word to condition their variant choice, they produce a default variant (shaped by any applicable other elements of the context, but skewed more toward their individual baseline application rate than would be the case otherwise). A community may eventually converge on a preferred pre-pausal variant, but the heterogeneity in individual baselines may explain why we find so much inter-community (and even intra-community, see Bailey 2018) differences in variable production pre-pausally.

5.3 Summing up

Individual differences in speech production planning scope join individual differences in mental representations of grammatical structures as a means by which constraints on a community grammar can be perturbed. Effects of a preceding or following element on a sociolinguistic variable may be in evidence at the level of the community, when individual speakers are abstracted over, but, when considered individually, particular speakers may appear not to show them, or may show them to a reduced degree, depending on particular aspects of their language production systems, like their working memory capacity and their scope for speech planning. Though these individuals may appear to be diverging from the community norm — failing to show a following segment effect on (TD), for instance — this is simply an epiphenomenon: there is every reason to believe that they have learned the community pattern correctly, but simply don't produce it, due to external factors.

In this respect, we find a commonality between a speaker's planning scope and how a speaker grammatically analyzes a particular word or collocation. Both can perturb a speaker's production of community-level constraints on a sociolinguistic variable, and because of that, both are liable to give rise to community-level difference.

6 Discussion

The preceding sections have presented two types of individual differences that have not received much attention in the literature on language change: heterogeneity in mental representations and differences in speech production planning. I have provided evidence that these two types of individual differences may perturb a speaker's production of community-level constraints on sociolinguistic variation.

I have also surveyed the comparative sociolinguistics literature to demonstrate that there are cases of cross-community divergence in constraints on a variable which resemble these individual differences. I have discussed this in the context of models of sound change in which differences between speakers are not corrected for and eventually take hold and spread throughout the population. I suggest that these models can be extended to other cases of language change, such as changes in constraints.

An important aspect of Baker et al.'s (2011) model of the way individual differences actuate sound change is that learners or listeners must be unable to compensate for the divergent productions they encounter. In Baker et al.'s case study, this stems from covert articulatory differences among speakers which listeners cannot reconstruct. In this paper, the two types of differences presented are cognitive. As in the case of articulation, this prevents the learner from gaining direct evidence to the source of the "perturbation" of the community pattern. I suggest that this analytical ambiguity creates the potential for change in the grammar of constraints on a sociolinguistic variable. The perturbations presented here are epiphenomenal — speakers would produce the constraints on variation in a different way if these other factors didn't impinge — but learners can't know that.

A question I have not yet addressed is how constraint change in a community might be operationalized. Assuming that the individual differences presented here really are the source of the cross-community constraint differences found in comparative sociolinguistic research, what was the pathway of change to get from one state to the other? Or, put differently, since

all cases of change go through a state of variation (Weinreich et al. 1968), what varies with what when the constraints on a variable change?

To answer this, I suggest that we should look to work on competition in phonological systems. Competition between abstract parameters has recently been invoked to account for the change in Philadelphia English /æ/-tensing from a "traditional" allophonic system with a complex distribution of allophones and several lexical exceptions, to an exceptionless allophonic system simply conditioned by whether the segment following /æ/ is nasal or oral (Labov et al. 2016; Sneller 2018). Using Pillai scores to measure adherence to one or the other system, Labov et al. find the 106 white speakers in their study to cluster into two groups: the traditional speakers and the nasal speakers. Sneller further finds evidence of individual speakers who oscillate between the traditional and the nasal system, reflecting a transitional stage of the change. Both sets of authors invoke Kroch's (1989) model of competing grammars, originally introduced for modeling abstract syntactic changes, as a way to account for the change in phonological systems.

Constraint change may represent a similar situation. Speakers in the transitional stage of the change, once the innovative pattern of constraints has "phonologized," may oscillate between two systems: sometimes showing an effect of following segment on (ING), say, and sometimes not. Once the change reaches completion, a new pattern of constraints will apply to the variable, and the community will show a different pattern from other communities and from what its speakers showed at an earlier stage.

The quantitative reality of this proposal becomes complicated very quickly. A transitional speaker must oscillate between producing a variant so that it occurs more often in one set of environments than another, and producing that variant so that it occurs more often in a different set of environments. Learners in the transitional stage of the change must be able to assess that two different systems are in play, pick up both, and increment the rate at which they use the innovative one (Labov 2001). They will not simply be incrementing the rate at which they use a new pronunciation, a new lexical item, or a new syntactic structure, as they are in the typical case of language change; they will be incrementing the rate at which particular environments probabilistically condition a particular variant. That being said, we know that children are highly sensitive to the probabilities and statistical generalizations that they encounter in the input (e.g. Labov 1989a; Roberts 1997; Yang 2000; Smith et al. 2007). This may not be beyond their grasp.

There is still very little real-time evidence of change in constraints on sociolinguistic variation. More real-time studies, particularly those in which

detailed analyses of individual behavior can be compared to the overall community-level pattern, will be very welcome.

7 Conclusion

This paper has opened up a new question in the domain of comparative sociolinguistics: when two communities are found to differ in the constraints that affect a single variable, how did this situation come about? I have considered whether models of sound change put forth in contributions to this volume by Mielke et al. and Bermúdez-Otero might be able to shed light on the situation. In these models, differences between individual speakers which cannot be compensated for by listeners result in the introduction and propagation of new variants in a speech community.

I have presented two types of cognitive differences which can result in an individual or group of individuals producing a sociolinguistic variable in such a way that community-level constraints on that variable's patterning are attenuated, changed, or absent entirely. In this way, these individual differences lead to productions in which the community grammar is "perturbed." The first of these two types of differences is a speaker's mental representation of a given surface structure ("covert representational variation," Section 4). The second is their scope and ability of production planning, i.e., the facility with which they can plan an upcoming unit of speech while producing an earlier one (Section 5). There is reason to believe that each of these can change across the lifespan, which may provide the age vector that Bermúdez-Otero (this volume) hypothesizes is essential for actuating change.

This paper has attempted to extend a model of change originally introduced to account for the introduction and propagation of new speech sounds to a different aspect of language: the constraints on sociolinguistic variation. Sociolinguistic variables may occur at all levels of grammar, not simply at the level of phonetics/phonology (Sankoff 1973; Embick 2008; MacKenzie 2012). By extending the sound change model in this way, I hope to have demonstrated that researchers working on change in different domains of language and from different research traditions have much to learn from each other. Relevant to sound change researchers, I have flagged up understudied individual differences in the cognitive domain; relevant to sociolinguists, I have demonstrated that seeing cross-community divergence in constraints through the lens of sound change can shed new light on old sociolinguistic findings.

Covert representational variation, differences in production planning ability, and the role of both of these in the patterning of sociolinguistic variation are still considerably under-researched. Pursuing these lines of inquiry will necessitate the integration of sociolinguistic, formal, and psycholinguistic approaches to the study of language. Only through this kind of interdisciplinary work can we gain a thorough understanding of patterns of language variation and change.

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The author has no competing interests to declare.

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