Persistence in the production of linguistic variation

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1 Introduction

Since its inception in the 1960s, quantitative variationist sociolinguistics has made substantial progress in understanding how both social and linguistic factors relate to language variation and change. These advances have largely been made on the level of the speech community: a group of speakers who orient themselves towards a common set of evaluative norms and whose language use is, as a result, systematically structured. Hearkening back to the "grammars of the speech community" of Weinreich et al. 1968, Labov calls it "the central dogma of sociolinguistics that the community is conceptually and analytically prior to the individual" (2012, 266). This emphasis on the speech community has given rise to a rich literature detailing the driving role of external social factors such as class, gender, network, and ideology in language variation and change. It has also substantially improved our understanding of the influence of internal linguistic factors on variation, with patterns of language use often revealing grammatical underpinnings. The explanatory value of these two types of factors combined should not be underestimated. There is, however, another perspective on variation that remains poorly understood. This is the role of a speaker's cognitive processes in their production and perception of language variation. In this dissertation, I aim to advance our understanding of the interplay between psychological and social influences on language variation and change.

The individual has never been absent from the study of the speech community. It is only through studies of the community that intricately stratified patterns of social class, gender, and style can be described; these patterns provide a backdrop against which the behavior of speakers with certain social characteristics can be understood. The view that the community supersedes the individual is set in opposition to a recurring focus on the *idiosyncrasy* of individuals. Weinreich et al. (1968) trace the latter view back to Hermann Paul and his view that the idiolect is the only true object of linguistic study. More recent calls to elevate the individual to renewed prominence in sociolinguistics bear some resemblance to this 19th century viewpoint, putting at the forefront of the study of language variation "individuals creating unique ways to sound, to be, and to respond to specific rhetorical exigencies" (2001, 123). The conception of language

as "fundamentally particular, fundamentally the property of individuals" (Johnstone 1999, 313) is not what I advocate here. Although I support the notion that language is a property of individuals in that the only possible locus for linguistic knowledge is the human brain, this need not imply particularity. My goal is to ask not what some specific individual knows or does, but rather what *all* individuals must know in order to produce their respective slices of the stratified speech community. In other words, the focus is not on what differentiates individuals, but what unites them—a view entirely compatible with the primacy of the speech community.

I propose to take the phenomenon of **persistence** as a window into this question.[1] Persistence is the tendency for a recently-used linguistic option to be used again. Such a tendency is relevant to the study of language variation and change because it impinges on the choice between the variants of a linguistic variable. The study of persistence in language variation has sometimes been advocated as a way to refine our description of the sources of the observed variation (Gries 2005; Szmrecsanyi 2006). Persistence effects are sufficiently robust that they often significantly improve statistical models of variation when included as a predictor. Although this is of course a laudable achievement, I suggest that the motivations for studying persistence are deeper.

First, persistence may provide compelling evidence on the central issue of 'sameness' in language. A core task of linguistic analysis is to give a principled adjudication of sameness on multiple levels. This is what Labov terms the "fundamental postulate of linguistics": that, despite extensive variability at every linguistic level, some utterances are the same (2004). A vast psychological literature recognizes that priming and related effects provide a dependent variable measuring the classification of things as the same or not in a way that does not require explicit judgments. I will suggest that such subconscious reflections of classification emerge in naturalistic data as well. As persistence is a speaker's tendency to use the same linguistic option again, careful observations of persistence may shed some light on what counts as 'the same' and thus contribute to linguistic analysis.

Second, it is possible that persistence effects may be susceptible to both universal and sociostylistic conditioning. Persistence is often observed to be asymmetric, such that one variant in an alternation facilitates its own re-use more strongly than the other variant. The determinants of persistence magnitudes and asymmetries are not well understood and have rarely been probed. Here I suggest that the key is not what is the same, but what is different. The modulation of persistence asymmetries in response to shifts in context reflects speakers' dynamic estimation of what is unexpected. This estimation, I suggest, must be closely linked to a speaker's knowledge of stylistic markedness. Style being the only social factor that is manipulated in the course of speech production by any given individual, it is generally the source to which sociolinguists attribute intraspeaker variation. The existence of persistence phenomena is unlikely to be attributable purely to style-shifting, though, reminding us that psycholinguistic factors are also at work in producing intraspeaker variability. The sensitivity of persistence asymmetries to context lies at the interface between universal processing effects and stylistic competence. Improving our understanding of persistence asymmetries, then, may lead both to refinements in our ability to

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[1]The phenomenon in question has also been called *priming, perseverance, perseveration, parallelism, serialism,* and even *'the birds-of-a-feather effect'*. Of these, the most serious contender for widespread acceptance is *priming*. I follow Szmrecsanyi 2006 here in preferring the term *persistence*, especially when the effect is observed in corpus data, for its neutrality with respect to the mechanisms at play. The term *priming* is associated with the experimental psycholinguistic literature. I will use it when discussing that literature, and return in section 5 to the question of the relationship between persistence observed in use and priming observed experimentally.

quantify style and to a clearer picture of the components of language use.

The two motivations I have laid out are in line with Pickering and Ferreira's observation that persistence is sometimes "merely a dependent variable, when patterns of priming are used to infer the operation of certain kinds of representations or processes," while "other times, the persistence or repetition-benefit reflected by structural priming is itself of interest" (2008, 45). The proposed dissertation is intended to explore both sides of this dual perspective through data found in naturally-occurring language. The first half of the dissertation views persistence as a window on grammatical representations and relationships. In the second half of the dissertation, I turn to persistence as a phenomenon in its own right, one which taps both psycholinguistic processes and sociolinguistic awareness. The ultimate goal is to synthesize these two perspectives in the hopes of improving our understanding of the relationship between the derivation of linguistic objects and the use of those objects by speakers in social contexts.

2   Overview

I propose here a diverse set of case studies clustered around three central themes: grammar, frequency, and style. The first theme is highlighted in section 6, where the presence of grammatical effects in persistence is exemplified by the failure of /t,d/-deletion persistence to extend across grammatical categories. This result coincides with the finding from Estival 1985 that different types of passives do not prime each other. To reinforce these results, I suggest that they should first be replicated in separate corpora. I then intend to add investigations of similar grammatical effects in ING variation and the historical emergence of periphrastic *do*.

The second two themes are intertwined in section 7, with 7.1 dedicated primarily to frequency and 7.2 adding a stylistic dimension without abandoning considerations of frequency. I first show that the inverse frequency effect observed in psycholinguistic priming studies correctly predicts diachronic shifts in persistence asymmetries. The case study for this demonstration in section 7.1 is again the rise of periphrastic *do*. Returning to synchronic morphophonological variation in section 7.2, I consider that frequency must be calculated over some context. I show that within a speech community there is interspeaker variation in the direction of persistence asymmetries, and further suggest that there may be concomitant intraspeaker variation. The case studies here are the variables ING and DH.

The proposed case studies are summarized in table 1, with reference to the data source they are based on, the theme they pertain to, and the section they are discussed in. The variables and data sources are described in sections 3 and 4. The case studies are both synchronic and diachronic and operate across phonology, morphology, and syntax. Although their topics may seem disparate, they are intended to complement each other and thereby illustrate the generality of the conclusions to be drawn from persistence effects.

Variable	Data source	Theme	Section
TD	PNC, Buckeye	Grammar	6.1
ING	PNC	Grammar	6.2
	PNC, Buckeye	Frequency	7.2
	Celeste	Style	7.3
DH	PNC	Frequency	7.2
	Celeste	Style	7.3
Periphrastic *do*	PHC	Grammar	6.2
	PHC	Frequency	7.1
Passives	PHC	Grammar	6.2

Table 1: Proposed case studies.

3 The variables

Because each of the variables associated with the case studies laid out above recurs several times throughout the proposal, with a different emphasis each time, I give a brief introduction to the basic facts of each variable here.

3.1 TD

TD is the variation between retention and deletion of final apical stops /t, d/ in consonant clusters (Labov et al. 1968; Guy 1980, *inter alia*). I will refer to the process as /t,d/-deletion or the variable as a whole as TD. In some words the deletion targets a phoneme within a morpheme, as in *old* or *west*, while in others it targets a phoneme that also constitutes a morpheme, as in *grazed* or *kicked*. The TD literature has accordingly distinguished between deletions in monomorphemes and regular past tense verbs, with the former showing reliably higher rates of deletion than the latter. An third class of words, the 'semiweak' or 'derivational' past tense verbs, are those that have both a final inflection-like /t/ or /d/ and a vowel change in the stem. The semiweak verbs undergo deletion at an intermediate rate. A fourth class that is sometimes distinguished and sometimes excluded is *-n't* clusters, as in *does't*. I will not deal with *-n't* clusters here.

For TD coding, glottalization and palatalization are counted as indicating /t,d/ presence. Tokens with a following coronal stop, affricate, or fricative are excluded as contexts where the evidence for /t,d/ presence is not audible. The variable does not include clusters where the segment preceding the /t/ or /d/ is /r/, as these do not undergo deletion. The lexical item *and* is also excluded based on previous research suggesting that it is best treated as exceptional in its underlying representation (Guy 2007).

3.2   ING

ING is perhaps the best known showcase variable for sociolinguistics, having been under perpetual investigation since Fischer 1958 (Houston 1985; Labov 2001a; Campbell-Kibler 2006; *inter alia*). It is the alternation between a velar or alveolar coda in unstressed word-final syllables spelled <ing>, as in *working* versus *workin'*. I will refer to the alveolar variant as /in/ and the velar variant as /ing/. The former is "overtly and accurately associated with informality" (Labov et al. 2011, 435). ING can occur in either verbal or nominal elements, as in 'He was paint<ing> the ceil<ing>'. Rates of the nonstandard /in/ variant are consistently higher with verbal ING than nominal ING. There are no neutralization contexts, but proper nouns are excluded because they do not show variation.

3.3   DH

DH refers to the variable realization of the voiced interdental fricative in word-initial position. The stigmatized variant is a stop, with fricative and affricate variants being less socially marked. This variation is neutralized following apical stops. DH can also be deleted entirely, as in *'Give 'em to me'*. The optimal categorization of the dependent variable here is an issue that I have not yet settled, which is why DH is not yet the basis of any results.

3.4   Periphrastic *do*

Periphrastic *do* is the use of *do* as an auxiliary rather than a main verb. The emergence of periphrastic *do* in negative and interrogative contexts is associated with the transition from Middle English to Early Modern English. Unlike Modern English, Middle English had verb raising to a tense position. The loss of verb raising was accompanied by the emergence of periphrastic *do* to bear tense features when the tense head was not in a sufficiently local relationship with the verb to allow tense-lowering. The emergence of periphrastic *do* is generally treated as competition between two tense heads, one triggering raising, in the diachronic syntax literature (Kroch 1989). The variants are operationalized as the presence or absence of periphrastic *do*, where the absence of *do* implies verb-raising. The examples in 1 illustrate the conservative verb-raising grammar while those in 2 reflect the modern grammar.

1. (a) Affirmative declarative: I wende wel thys nyght to have deyed. ('I managed almost tonight to die') (Caxton, *The Ryall Book*, line 20-25) [2]

   (b) Negative declarative: ...spoile him of his riches by sondrie fraudes, whiche he perceiueth not. (Ellegård 346:86:23)

   (c) Yes/no question: Thynkest thou to avoyde that neuer mortall creature might escape? (Ellegård 302:192:43)

2. (a) Affirmative declarative: The girl almost went to the store on Saturday.

   (b) Negative declarative: The girl didn't go to the store on Saturday.

   (c) Yes/no question: Did the girl go to the store on Saturday?

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[2]Historical examples in 1a-c via Kroch (1989).

There are several contexts where periphrastic *do* appears in the absence of verb-raising: negative declaratives, negative questions, affirmative adverbial questions, affirmative yes/no questions, and affirmative *wh-* object questions. One complication to these generalizations is that there was a period in the early 16th century where periphrastic *do* also began to be used with affirmative declarative sentences. Although this use increased during the 16th century, it reversed direction after 1600 and did not come to be part of the modern grammar of English (except to mark emphasis or contrast). Both the changing frequency of *do* over time and the relationships between the different contexts will be of interest in the following sections.

4   Data and methods

4.1   Philadelphia Neighborhood Corpus

The Philadelphia Neighborhood Corpus of LING560 Studies (PNC) (Labov and Rosenfelder 2011) is a collection of sociolinguistic interviews conducted between 1973 and 2010. The data for the study of grammatical factors in /t,d/-deletion (section 6.1) and sociostylistic conditioning of ING persistence (section 7.2) are drawn from this corpus. The corpus interviews are generally conducted in the speaker's home and, following the theory and methods described in Labov 1984, focus on eliciting narratives of personal experience. Of the 1,087 recordings in the corpus, I have selected a sample of 42 interviews with white speakers from the working-class neighborhoods of South Philadelphia. The sample is stratified by sex and birth year as shown in table 2. Although the sample contains three generations, I do not expect to find apparent time effects because the variables of interest—TD, ING, and DH—are known to be stable in Philadelphia.

The transcribed interviews in PNC have been forced-aligned using the FAVE suite (Rosenfelder et al. 2011), which in turn allows efficient hand-coding of phonological variables facilitated by a Praat script.[3] Coding for the factors needed to study persistence entails coding each token for the previous token's dependent variable and independent predictors. To give a simplified example, a token of ING needs to be coded for 1) its own realization as /ing/ or /in/, 2) its own part of speech, 3) the previous ING token's realization, and 4) the previous ING token's part of speech. In addition, I code each token for its distance (in seconds, log-transformed) from the immediately previous token. Tokens are excluded when there is an interruption by an interlocutor between the token and its precedent; back-channel cues such as "hm" or "uh huh" are not considered interruptions.

Birth year	Male	Female	Total
Before 1930	5	5	**10**
1930–1959	11	10	**21**
After 1959	5	6	**11**
Total	**21**	**21**	**42**

Table 2: Number of speakers by sex and birth year in the 42-speaker PNC sample

4.2   Buckeye Corpus

The Buckeye Corpus contains interviews with 40 middle-class white speakers native to Columbus, Ohio. The sample is balanced for age (under 30 or over 40), sex, and interlocuter sex. Interviewees were told that they were part of a focus group studying how people express opinions. The size and structure of the corpus are thus roughly comparable to the PNC sample, but the stylistic context and social background of the speakers are distinct. It thus has the potential to form a useful point of comparison to PNC, allowing exploration of the difference between universal and context-dependent factors in persistence.

The Buckeye Corpus has been transcribed and forced-aligned, and the phone tier hand-corrected to match the speaker's pronunciation rather than the dictionary standard. This allows for the extraction of all the TD and ING tokens with a simple Python script[4]. I do not intend to code DH in Buckeye because I do not expect it to be an active variable in the careful speech of middle-class midwesterners.

4.3   Penn Historical Corpora

The Penn Historical Corpora (PHC) include three corpora: the Penn-Helsinki Parsed Corpus of Early Modern English (PPCEME) (Kroch et al. 2004), the Parsed Corpus of Early English Correspondence (PCEEC) (Taylor et al. 2006), and the Penn Parsed Corpus of Modern British English (PPCMBE) (Kroch et al. 2010). These corpora contain annotated and syntactically parsed texts from 1500 to 1719 for PPCEME, 1410 to 1695 for PCEEC, and 1700-1914 for PPCMBE. PPCEME contains over 1.7 million words, PCEEC contains approximately 2.2 million words, and PPCMBE contains just under 1 million words. All three corpora have been annotated and syntactically parsed, facilitating automated extraction of tokens by structural search criteria.

Currently I have made use of the Penn Historical Corpora for the diachronic study of periphrastic *do* described in section 7. For PPCEME and PCEEC, all clauses in the combined corpora were coded for the dependent variable of *do* presence, along with a variety of independent predictors, using a CorpusSearch coding query. The output of the coding query was further coded for the relevant persistence factors using Python and R.[5] I have not yet made use of PPCMBE, but will be extending the study of DO into this corpus as well as including it in the proposed study of passive participle persistence.

We might ask whether written language should be expected to show the same patterns of persistence as spoken language. Experimental work has indicated that structural priming does occur in written tasks (Pickering and Branigan 1998; Branigan et al. 1999), as well as from spoken primes to written targets and vice versa (Cleland and Pickering 2006). Similarly, Gries finds persistence effects of equal magnitude within the spoken and written portions of the International Corpus of English (2005). These results suggest that persistence investigations based on written corpora will prove fruitful.

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[4]Thanks to Joe Fruehwald for allowing me to borrow and modify his Python scripts for extracting data from Buckeye.

[5]Thanks to Aaron Ecay for sharing his coding query and various Python and R scripts.

5 Data from language use

A natural preliminary question is whether the issues I raise in sections 1 and 2 are appropriately addressed with corpus data, as I propose to do. This has long been a question of interest to sociolinguists. Since the introduction of quantitative methods to the study of language variation and change, it has been argued that such methods have the potential to reveal not only social conditioning but also the grammatical forms underlying observed linguistic variability. In a landmark 1969 paper, Labov raises the possibility that one might "make inferences about the underlying system from the evidence of language behavior" (1969, 716). He argues for this position based on the quantitative patterns of copula deletion and contraction. The degree to which this paper has fulfilled his hopes of serving as "a model for linguistic research which will arrive at decisive solutions to theoretical questions through the use of data from the speech community" (1969, 761) in the decades since is mixed. Wolfram 1975 follows Labov's lead by arguing, on the basis of variable constraint rankings, that the deletion of English coronal stops after vowels should be considered formally distinct from coronal stop deletion following consonants. Much subsequent work in sociolinguistics, though, has been aimed primarily at delineating the conditioning factors on variation rather than identifying the nature of the grammatical objects being subjected to such conditioning. Fasold, for example, argues that "analysis of variation in syntactic structure…is nonetheless not about 'rules' at all, at least not in the ordinary sense. Rather, it seems to be about the social and discourse consequences of making certain choices within language—quite a different thing from trying to specify what is or is not language" (1991, 12). On the other hand, the model of seeking to improve grammatical description through quantitative analysis has continued to be influential in diachronic syntax. A foundational paper by Kroch demonstrates that a careful analyst of historical change is "able to show, with statistical methods, the controlling effect of abstract grammatical analyses on patterns in usage data" (1989, 36); Taylor (1994) similarly uses quantitative observations of written language variation to resolve the long-standing debate on the basic word order of Ancient Greek.

The position taken by Labov and Kroch, among others, dovetails neatly with a line of argumentation coming out of the experimental psycholinguistic literature on structural priming. Structural priming is "the phenomenon whereby the act of processing an utterance with a particular form facilitates processing a subsequent utterance with the same or a related form" (Pickering and Branigan 1999, 136). Processing facilitation is generally inferred through increased probability of re-using the same structure relative to a baseline, with Bock 1986 being the classic demonstration. The emphasis in this research program is on the syntactic structure that is being primed, with more surficial factors like lexical identity enhancing but not determining priming. Experimental observations of priming relationships between different syntactic structures are taken as evidence for the nature of the mental representation of linguistic objects. Branigan et al. lay out the argument explicitly:

> If the processing of a stimulus affects the processing of another stimulus, then the two stimuli must be related along a dimension that is relevant to the cognitive system. Under certain circumstances, we can conclude that they are represented in a related manner. If the relationship between two stimuli is syntactic, then we can use this relationship as a way of understanding what syntactic information is represented, and how that information can interact with other information. (Branigan et al. 1995,

490)

Pickering and Branigan also argue this point when they "claim that syntactic priming taps into knowledge of language itself, and as such can inform linguistic theories that are concerned with accounting for knowledge of language" (1999, 140). They advocate the use of priming studies in particular to determine relationships between sentences, a question which is not susceptible to introspection-based methods in the same way grammaticality is. Pickering and Ferreira take the argument a step further when they suggest that in the face of overwhelming general evidence for structural priming, an observed absence of priming may indicate that the prime and target are not representationally related (2008, 429).

Just as sociolinguists and diachronic syntacticians have argued for the value of data from language use in answering theoretical linguistic questions, then, so too have psycholinguists championed the merits of data from language processing for the same purpose. These two perspectives mesh in studies of persistence phenomena in usage data, including the proposed dissertation. The earliest such study, to my knowledge, is Sankoff and Laberge 1978. Calling "the interactions of neighboring tokens...an interesting phenomenon in its own right" (Sankoff and Laberge 1978, 119), they demonstrate that speakers of Montreal French switch between referentially-equivalent pronoun options only about one-third as often as the null hypothesis of token independence would predict. They leave open the possibility that the effect they identify reflects not psycholinguistic priming but stylistic homogeneity, a possibility that has been raised again more recently by Szmrecsanyi 2006. I turn now to this possibility.

Skepticism about the nature of corpus results on persistence has come from both corpus linguists and experimental psycholinguists. The discussion is anticipated by Estival when she acknowledges that "in order to show that [syntactic priming] exists, we must first make sure that we have isolated it from the effect of other factors" (1985, 8). Szmrecsanyi expands on the variety of factors besides psycholinguistic priming that might be at play, writing that, "in naturalistic data, speakers' output may exhibit persistence effects for reasons of rhetoric, politeness, or thematic coherence, to aid the process of gap filling in creating and processing elliptical utterances, to open up question-answer pairs, because speakers feel like intentionally repeating items from previous discourse – but it is not easily possible to disentangle the above motivations through corpus study in a waterproof fashion" (2006, 144). This is essentially the same criticism as leveled by Branigan et al. and Pickering and Branigan (1999), the former of whom suggest that "Weiner and Labov's (1983) results might just reflect shifts in the register used during the interviews which they studied" (1995, 492).

I take the position throughout this proposal that stylistic covariation is insufficient to account for the existence of persistence effects in corpus data. In this I join Scherre 2001, Cameron and Flores-Ferrán 2004, and Gries 2005 in advocating for a psycholinguistic interpretation of persistence effects observed in language use. Cameron and Flores-Ferrán, for example, draw from the pyscholinguistic theory of spreading activation (Dell 1986) to account for persistence effects in Spanish null subjects (2004). Defending the use of corpus data, Gries protests that "explaining the frequent cases of syntactic priming by hundreds of sudden register/formality changes does not seem very plausible" (2005, 387). His interpretation follows in the footsteps of Estival's (1985) demonstration that the persistence effect on the passive alternation, identified by Weiner and Labov 1983, is significant even after a variety of discourse-level factors are controlled. Meanwhile, Jaeger and Snider suggest that the tasks typically used in experimental priming studies are

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also problematic because they might induce explicit learning and thus reflect cognitive processes distinct from priming (2007, 28).[6] To my mind, however, the strongest arguments supporting the cognitive relevance of corpus persistence results are the ones that show convergence between corpus results and experimental results. The inverse frequency effect that I will demonstrate and discuss in sections 7 and 7.2 is informative in this regard. There is no obvious way to make frequency-sensitive asymmetries fall out of a style-shifting account. They do, however, align with many experimental findings and with basic psycholinguistic expectations. I argue, therefore, that the use of language reflects both grammar and processing, and that these influences can thus be seen in data from language use with sufficiently careful quantitative analysis.

6   Grammar in persistence

I turn now to the reflection of linguistic structure in persistence. The goal of this section is to show that the study of persistence effects in corpus data can provide evidence relevant to linguistic analysis. The case study from my own work that holds out the greatest promise along these lines so far is an exploration of grammatical effects on persistence in /t,d/-deletion, which I lay out in section 6.1. First, though, I review a crucial impetus for this section, the results from Estival 1985.

Among the early corpus-based demonstrations of persistence, Estival's study is of particular relevance to this section because she investigates the persistence relationship between two different types of passive constructions. Following Wasow 1977, she distinguishes between transformational passives such as "John was believed to have left", which have an eventive interpretation, with lexical passives such as "John is interested in music", which have a stative interpretation (examples hers). Her data come from a small corpus of speech from six Philadelphians. By calculating persistence effects separately for preceding lexical and transformational passives, she is able to show that the effect is not active between the two types of passives. Her results are presented in figure 1. Under the joint assumptions that both usage patterns and priming effects can be diagnostic of syntactic relations, and that priming effects can be seen in usage patterns, this result suggests that lexical and transformational passives do not share a representation to be primed. In Estival's words, it "would argue that the difference between the two passive constructions is a syntactic one" (1985, 8).

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[6]An additional complication that should be kept in mind is that the term *priming* has at least three possible meanings: a behavioral result of facilitation, the neural processes assumed to underly the result, and the experimental methodology for eliciting the result. Here the suggestion is that the behavioral facilitation effect might not always have the same neural basis.
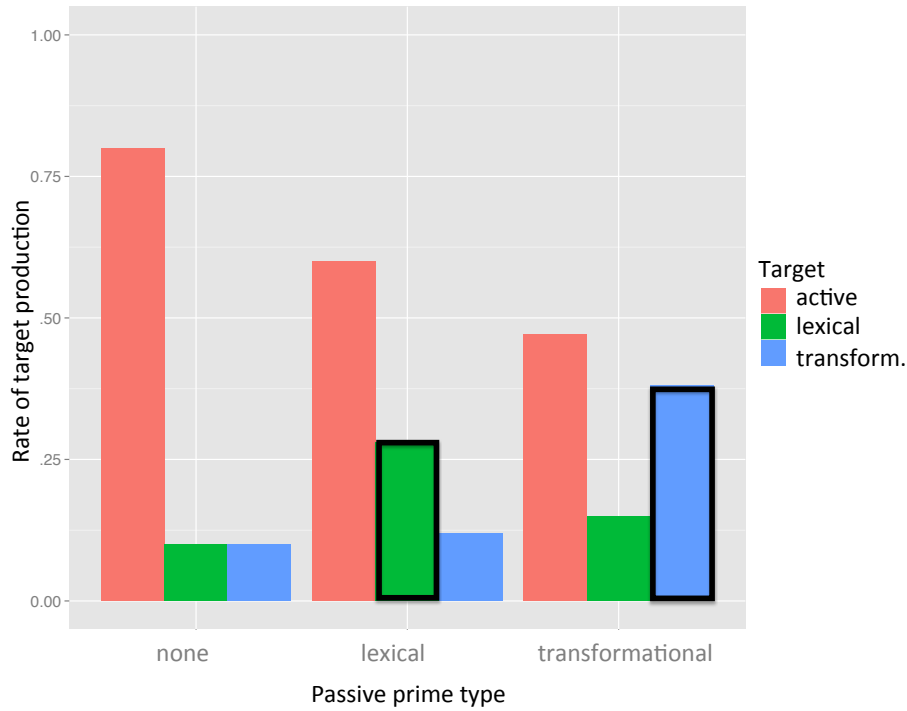
Figure 1: Rate of active/passive target clauses with passive or no passive prime in preceding 5 clauses. Bars with black outline have matched target and prime. Graph reproduced from Table 13 in Estival (1985, 20)

6.1   The case of /t,d/-deletion

The variable in which I identify grammatical effects is TD, the deletion of word-final coronal stops in consonant clusters. As described in section 2, this variable deletion process is sensitive to the grammatical status of the word it operates on, with deletion applying at higher rates in monomorphemes than in regular past tense verbs and at intermediate rates in semiweak past tense verbs (Labov et al. 1968). An influential analysis from Guy 1991 posits that the rate differences across these categories is a consequence of the architecture of lexical phonology (Kiparsky 1982; Kaisse and Shaw 1985; Monahan 1986). In this analysis, /t,d/-deletion is "treated as a variable rule with a fixed rate of application" (Guy 1991, 1) that applies at each level of a multi-level derivation. Clusters in monomorphemes are subjected to the application of this rule three times because they are present underlyingly and then pass through level 1, level 2, and the postlexical level. Clusters in semiweaks are introduced after the application of the rule in level 1 and thus undergo deletion twice, while clusters in regular past tense verbs are introduced only in time for the final postlexical application of the deletion rule. The resulting prediction, supported by Guy's results, is that the relationship between coronal stop retention rates in monomorphemes, semiweaks, and regular pasts will be exponential.

   Although lexical phonology has fallen out of favor in theoretical phonology, the treatment of TD as a single probabilistic rule has been maintained. If indeed the different categories of TD to-

ken share the characteristic of participating in a unified alternation between /t,d/ and ∅, we might expect to be able to show persistence across categories. The categories, then, could be construed as conditioning factors on the variation but not as structurally integral to its operation. This result might be analogous to the structural priming demonstrated on the ditransitive alternation irrespective of tense, aspect, or number in Pickering and Branigan 1998 or to Bock and Loebell's (1990) result that prepositional phrases prime each other regardless of whether they are locative or agentive.

To explore this possibility, I present an analysis of TD variation in conversational speech. As described above, the task at hand is to explore the interaction between persistence effects and grammatical conditioning in TD variation. The simplest measure of persistence is simply whether or not the variant in one token is the same as the variant in the most recent token before it. In this sense, persistence is a binary property of a pair of data points: they either share or do not share a value. I wish to ask what persistence looks like for four types of pairs and so split the TD dataset into four subsets corresponding to those pair types:

- Matched grammatical category:

    - PAST/PAST: Regular past tense TD with previous regular past tense TD

    - MONO/MONO: Monomorphemic TD with previous monomorphemic TD

- Mismatched grammatical category:

    - MONO/PAST: Regular past tense TD with previous monomorphemic TD

    - PAST/MONO: Monomorphemic TD with previous regular past tense TD

The basic persistence measure can be refined by conditioning it over the distance between the two tokens, with the assumption being that it will be weaker at a greater distance. To visualize the simple effect of persistence in conjunction with its decay, I separate the data into two subsets, tokens whose preceding token showed retention and tokens whose previous token showed deletion. I then fit a separate GLM smoothing line to each of these subsets. Figure 2 illustrates this for the four types of token pairs described above, with the pair types in separate facets. The x-axis of each facet is the log-transformed lag time; the y-axis is the estimated probability of retention (since retention is coded as 1). The red splines show the probability of getting retention after a deleted token. We therefore expect them to be lowered towards zero on the left (short lag) sides of the graphs if there is a persistence effect where deleting a token makes subsequent retention less likely. The blue splines show the probability of getting retention after a retained token, so we expect them to be raised towards one on the left sides of the graphs if there is a persistence effect. The lighter blue and red ribbons around the splines are 95% confidence intervals, while the dashed black horizontal line represents the overall rate of retention within that subset of the data.
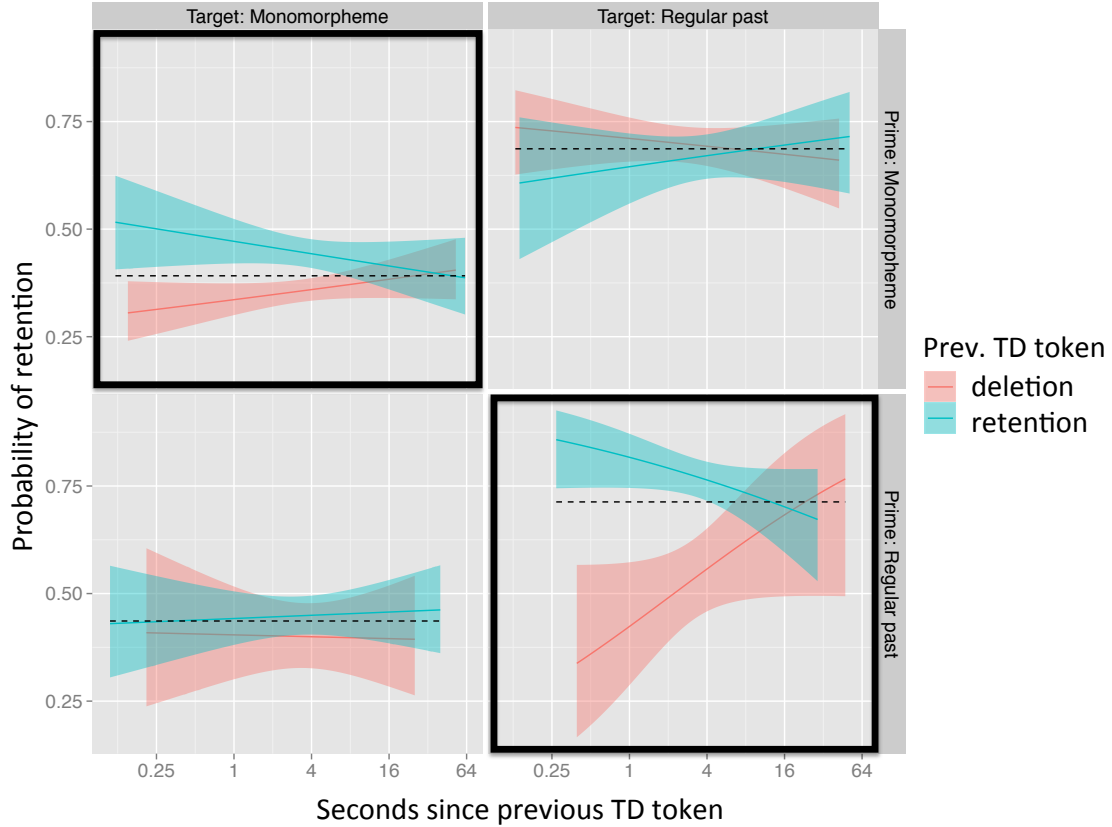
Figure 2: Persistence in TD in monomorphemic and regular past tense token pairs. Facets with black outline have grammatically-matched target and prime.

In the bottom right facet of figure 2, there appears to be a strong persistence effect for grammatically matched pairs of past tense tokens. Deleting a /t,d/ when that /t,d/ represents the past tense exponent strongly promotes deleting a subsequent past tense /t,d/, and retaining a /t,d/ when that /t,d/ represents the past tense exponent promotes retaining a subsequent past tense /t,d/. The upper left facet of the same figure also shows a persistence effect for the MONO/MONO pairs, where deleting or retaining a /t,d/ in a monomorphemic word slightly promotes reuse of the same variant, deletion or retention, of a /t,d/ in a subsequent monomorphemic word. These are the facets with black boxes around them in the graph to highlight the matched condition. In the upper right and lower left facets, however, we do not see any evidence for a persistence effect when the two tokens do not have the same grammatical status. The persistence effect for /t,d/-deletion holds only when the grammatical categories of the prime and target are the same.

The results in figure 2 are a striking phenomenon in need of an explanation. Certainly they raise questions about the unity of the /t,d/-deletion process. But advancing any particular explanation at this point would be premature. There are a number of further analyses to be done before too much theorizing is pinned to this result. The first is to verify that the result is not confounded by some other predictor. Because this is essentially a proof-of-concept rather than

Gram. category	Buckeye rate (N)	PNC rate (N)
-n't cluster	0.69 (3855)	0.71 (2597)
Monomorph.	0.53 (7325)	0.55 (4372)
Regular	0.23 (1642)	0.32 (2387)
Semiweak	0.41 (278)	0.45 (380)

Table 3: TD deletion rates and token counts by grammatical category for Buckeye and PNC. Buckeye data as reported by Fruehwald 2011

an extended analysis, I do not present full regression modeling results here. Preliminary models, though, do indicate that the significance of the persistence effect for the Mono/Mono and Past/Past pairs holds up in linear mixed effects models with random effects for speaker, prime word, and target word, as well as fixed effects of speaker sex, preceding segment, following segment, same word, and cluster voicing harmony. A second crucial step will be to demonstrate this finding's generality by replicating it in another TD corpus. An ideal point of comparison would be the Buckeye Corpus (Pitt et al. 2007), which is of similar size and composition as my PNC sample. However, there are fewer past tense tokens in Buckeye than in PNC, presumably because the PNC interview format explicitly targets narrative (Labov 1984) and thereby prompts reference to past events. Combined with the prevalence of interlocutor interruption in Buckeye and the high retention rate of /t,d/ in regular past tense verbs, there are too few past tense tokens in the previous deletion subset to form the basis of a reliable analysis. I aim to supplement the Buckeye corpus with additional existing interviews from Columbus, and am making inquiries along several lines.

It would also be of great interest to investigate persistence in the semiweak class, as this is an area where previous analyses have disagreed on the status of the coronal stops. The coded PNC data is insufficient for this purpose. Figure 3, a comparison of the /t,d/-deletion rates in Buckeye and PNC, shows that the by-category rates are consistent across the two corpora. If I am also able to successfully replicate the relationship between regular past tense verbs and monomorphemes in the available Columbus data, I suggest that it would be justifiable to combine the two datasets to analyze the semiweaks. The token count would still be low enough to require a more simplistic analysis of persistence, one without a lag parameter, but I believe this would nonetheless be worthwhile.

6.2   Additional proposed cases

The results I've shown here from TD will be stronger and more easily interpretable if they are part of a series of related results. In addition to extending and refining the TD results, I propose to conduct three additional case studies of a similar nature. Of these, two build on projects which are already well underway.

(1) In the same set of data from which my TD dataset is derived, I have also coded the variable ING. It has been suggested that there is a cline from the most to least verbal types of ING along which /in/-use decreases (Labov 2001a). More recent treatments of ING, however, take the position that the variation is not phonological but rather

morphological, and that variation in the nouns is separate (Labov et al. 2011). In section 7.2, I will present preliminary results on ING persistence. The question pertinent to this section is whether there is persistence across verbal ING and nominal ING. Answering this question should be an easily achievable task due to the amount of coding that I have already done and the TD model to base the analysis on. I may need to supplement the current sample with additional interviews, which are readily available in PNC.

(2) In section 7 I present some results from a study of persistence during the rise of periphrastic *do*. This dataset also holds promise for the questions raised here because there are a number of different contexts in which periphrastic *do* occurs. Since Kroch's (1989) demonstration of the constant rate of increase in *do* across these contexts (negative declaratives; various types of questions), the emergence of *do* has been treated as a single change. I would hypothesize, then, that there should be a persistence effect that holds across the different contexts. The one context that did not follow the same trajectory and ultimately retreated from the change at all, affirmative declaratives, might be expected to *not* participate in this effect. Although the data available in the Penn Historical Corpora is sparse for several of these contexts, two options to make the analysis feasible are to abstract away from the diachronic dimension and to include additional data from Ellegård 1953.

(3) Finally, I will attempt to replicate the results from Estival 1985. This is a worthwhile undertaking in its own right, but I also wish to consider the possible role of a more recent analysis where Estival's 'lexical' passive participles are further subdivided into resultatives and statives (Embick 2004). I will conduct this replication using the Penn Historical Corpora.

7   Frequency and context in persistence

In the second half of the proposed dissertation I turn from the use of persistence as an analytic tool to an investigation of the factors conditioning and constraining the phenomenon of persistence itself. The previous section dealt primarily with the presence or absence of persistence effects within and across grammatical contexts. Here I deal with the characterization of persistence effects when they are present. In particular, I look at the appearance of persistence asymmetries: when and why do some variants facilitate their own re-use more strongly than other variants do?

One factor that has been observed to shape persistence asymmetries is frequency. The inverse frequency effect on persistence is one where "less frequent constructions prime more" (2011, 4). A careful reader of the literature might notice that such an effect has been recurring since Bock 1986, but it is only recently that a handful of studies have called attention to, and sought to investigate, this type of asymmetry (Ferreira 2003; Szmrecsanyi 2006; Jaeger and Snider 2007; Reitter et al. 2011). Although I am not aware of any instances of the effect being reversed, its presence and magnitude seem to vary across case studies; Szmrecsanyi's (2006) corpus-based investigation of five morphosyntactic alternations in English, for instance, reports asymmetries for three (future marking, particle placement, complementation) and no asymmetries for two (comparatives, genitives). My own results on /t,d/-deletion as reported in section 6 are similarly mixed, with past

tense persistence asymmetric and monomorpheme persistence roughly symmetric. In the past tense case the asymmetry is, as predicted, in the direction of stronger facilitation for the rarer deletion variant (although this can be difficult to tease apart from a ceiling effect).

The inverse frequency effect, to the extent that we expect it to hold consistently, carries with it a clear prediction for language change over time. As we trace a change from its inception through its completion, the relationship between the persistence of the innovative and conservative variants should shift. Early in the course of the change there should be an asymmetry where the innovative variant strongly facilitates its own re-use, but the conservative variant does not boost itself beyond its already high level of probability. As the change progresses through its middle stage, the asymmetry should level out such that both variants are moderately persistent. When the change nears completion the original state of affairs should be reversed, with the obsolescent variant now being strongly persistent in comparison to the dominant new variant. In this section, I present preliminary results from a case study on the rise of periphrastic *do* in the history of English. These results are supportive of the hypothesis that persistence asymmetries are sensitive to frequency and thus shift diachronically.

7.1 The case of periphrastic *do*

The case study that I take up to test the hypothesis of diachronic shifts in persistence asymmetries is that of periphrastic *do*. As described in section 2, the loss of verb-raising was accompanied by the appearance of *do* in a tense position in several different contexts. Here I investigate persistence both in negative declaratives, the most frequent of the modern environments for periphrastic *do*, and in affirmative declaratives, the environment in which *do* reversed course. Because these contexts have such different trajectories of change, a diachronic comparison of their persistence effects should be informative.

The study of persistence in syntax poses some additional methodological issues that are not a problem for the study of morphophonological variables like ING and TD. Chief among these is the question of which clauses should be included as instances of the variable. With a variable like TD, tokens naturally occur at a range of distances, making it relatively easy to measure the decay of the persistence effect. The rise of periphrastic *do*, on the other hand, is attributed to an abstract alternation between tense heads that do or do not trigger verb raising (Kroch 1989). This means all finite clauses are supposed to contain an instance of the alternation. As discussed in section 6.2, a plausible possibility is that all of these "count" from the point of view of persistence and that persistence effects will extend across the different environments for periphrastic *do*. If there is a yes–no question, for example, intervening between the first and second members of a negative declarative clause pair, the variant used in the question might affect the dependent second negative declarative. Somewhat thornier is the question of whether clauses will affect persistence if they are ambiguous as to their tense head status. To sidestep these issues, I limit my analysis for the time being to pairs of clauses that are immediately adjacent. Although this approach reduces the available data and makes it impossible to study the persistence decay, it should provide the clearest picture of persistence at its strongest point.

I divide the data into three chronological time periods: 1500-1575, 1576-1650, and 1650-1710. These are numbered 1 through 3 on both graphs in figure 3. The rate with which periphrastic *do* is used over time is shown on the left of figure 3, with the negative declaratives highlighted in blue. Within each time period I estimate a baseline probability of periphrastic *do* from the initial

negative declarative clauses in each text. I then calculate the rate of periphrastic *do* in two subsets of the data for the time period: pairs where the initial clause has *do* and pairs where the initial clause has verb-raising. This is equivalent to subdividing the TD data by tokens with preceding deletions and tokens with preceding retentions, as described in section 6.1. Within each time period I subtract the logit of the baseline from the logit of each subset, providing a measure of divergence from the time period–specific baseline that is comparable across time periods. These descriptive results from all three time periods are plotted on the right in figure 3, with blue points showing the persistence effect of *do* occurrence and red points showing the persistence effect of *do* absence.
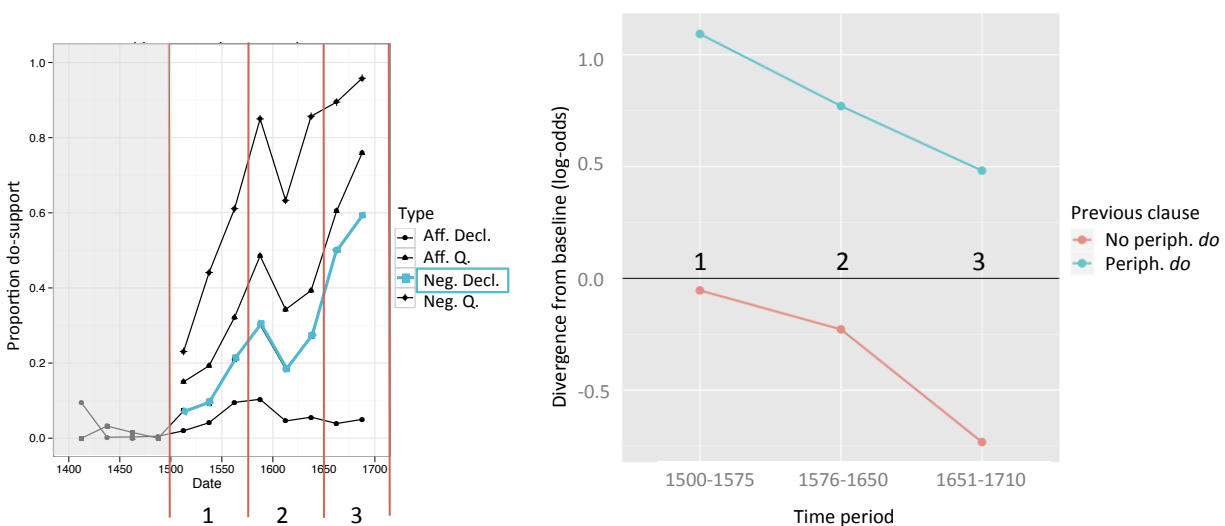

Figure 3: Diachronic course of periphrastic *do* in negative declaratives. Proportion *do* on left (base graph from Ecay 2010, modified); persistence in adjacent clauses across time periods on right (N=489).

Figure 3 shows a change over time in the asymmetry associated with periphrastic *do* persistence. In the early part of the change (1500-1575), the use of *do* increases the likelihood that *do* will immediately be used again, but the use of verb-raising does not lessen the probability of using *do* in the following clause. In the middle period (1576-1650), the result is generally similar, although it appears that the persistence of *do* may have weakened slightly and there may be a small persistence effect for verb-raising that was not present in the first period. In the final period studied here (1651-1710), the apparent asymmetry has been replaced by a more symmetric persistence effect that operates over both variants. Note that although this is the final time period represented in the corpus, it is not the end of the change. In period 3 the overall proportion of periphrastic *do* is still between 40% and 60%. As a next step I will extend this study through the completion of the change using the Modern British English data in PPCMBE. The basic persistence result from negative declaratives across time is thus far in line with the predictions of the inverse frequency effect, with the hypothesized final reversal of the asymmetry remaining to be tested.

I now turn to the affirmative declarative context. Although overall rates of auxiliary *do* in

affirmative declaratives never reach more than 13% even in the favorable sub-environment of transitive clauses (Ecay 2010), the large number of affirmative declarative clauses available from the corpus means that even at low rates there are enough tokens of both variants to examine the effect of persistence. I essentially repeat the analysis from the negative declaratives, with one difference: I divide the available data into four time periods (1500-1550, 1551-1600, 1601-1650, and 1651-1710) rather than three. The three-way time period division from the negative declarative analysis would split the affirmative declarative *do* trajectory at its peak, washing out any potential associated change in the persistence effect. Applying this four-way division to the negative declaratives, however, would have subdivided that data too finely.
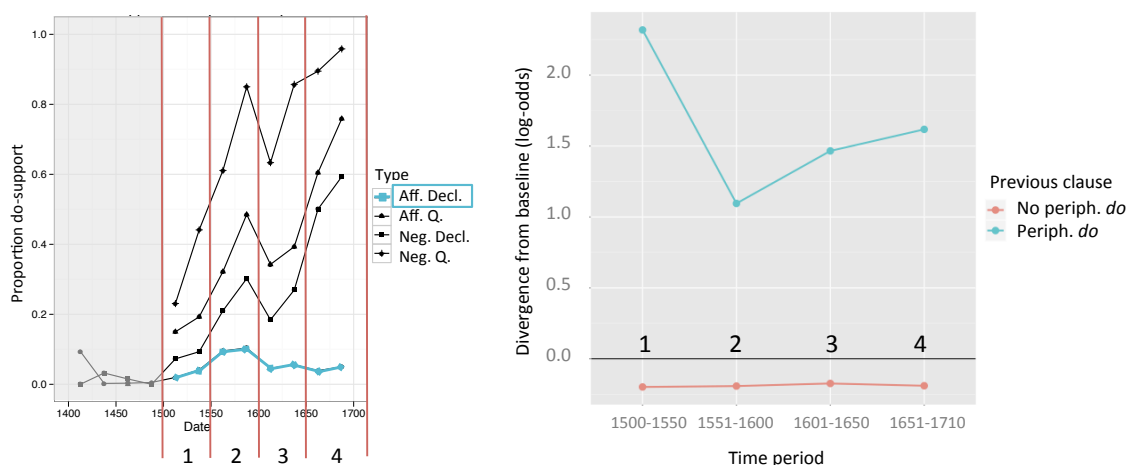

Figure 4: Diachronic course of *do* in affirmative declaratives. Proportion *do* on left (base graph from Ecay 2010, modified); persistence in adjacent clauses by time period on right (N=32,778).

Figure 4 shows the overall proportion of affirmative declarative *do* on the left and the associated persistence effects on the right. The sustained rarity of periphrastic *do* in affirmative declaratives is reflected by a strong persistence effect for *do* across all four time periods, in line with the inverse frequency effect. Furthermore, the magnitude of this effect tracks the frequency, with a dip in the persistence strength in period 2 corresponding to the peak of the change. This is suggestive of a close, maybe continuous, inverse relationship between frequency and persistence, rather than a gross effect where the minority variant determines the direction but not the strength of the asymmetry. I will return to this point in section 7.2.

In the introduction to section 5, I discussed the debate over whether persistence effects in corpus data reflect the same psycholinguistic phenomenon as the structural priming literature. In defense of corpus methods, Gries has argued that "it is hard to explain all the similarities between the different kinds of results and still simply uphold the claim that all this is epiphenomenal" (2005, 387). Diachronic corpus evidence for the inverse frequency effect, as presented here, further bolsters the case for a link between corpus persistence and experimental priming. Certainly it is not clear how the most frequently proferred alternative explanation for corpus persistence, stylistic co-occurrence, would account for the asymmetries linked to frequency. This in turn increases our confidence in the value of persistence studies for investigating the psychological mechanisms of language variation.

7.2 The case of ING

There seems to be an emerging consensus that persistence is partially predicated on some form of unexpectedness, with lower-probability alternatives causing strong priming. The results presented above in section 7.1 are consistent with this generalization. But as Jaeger and Snider point out, "we can ask 'probable given what?'" (2007, 42). The basic observation of the effect has been that the alternant that occurs overall less frequently primes more strongly, but recent papers have begun to consider verb-specific probabilities. For example, in Jaeger and Snider's study of ditransitives they find a role for a specific measure of verb surprisal, the conditional probability of a syntactic construction given verb identity. Ditransitive verbs that occur in their dispreferred construction exert a stronger priming effect on their following target than verbs that occur in their usual construction. Gries (2005) finds similar results for the probabilities of individual verbs using a method called distinctive collexeme analysis.

Here I aim to show that unexpectedness can vary across different sociostylistic contexts — that is, that frequency-based unexpectedness is not calculated on a high level across an entire language or even across the aggregated output of a single speech community, but rather is sensitive to frequency within more narrowly-defined contexts. This is a complementary, not competing, approach to the verb-specific probability studies just mentioned. It is also compatible with results from event-related potentials on the processing of ING, which show that speakers react to the occurrence of variants that are unexpected based on the prior discourse (Loudermilk et al. 2010).

A preliminary result, on the contextual conditioning of persistence asymmetries in ING, comes from the subdivision of the PNC sample into three groups by the individual speakers' rates of the alveolar /ing/ variant. The overall use of /ing/ in the PNC sample is 41%. This rate, however, varies widely across different interviews with different speakers. The three groups are simply the lowest 14 /ing/ users, the middle 14, and the highest 14. The left side of figure 5 shows the rate for each speaker's interview, with the colors representing the group.
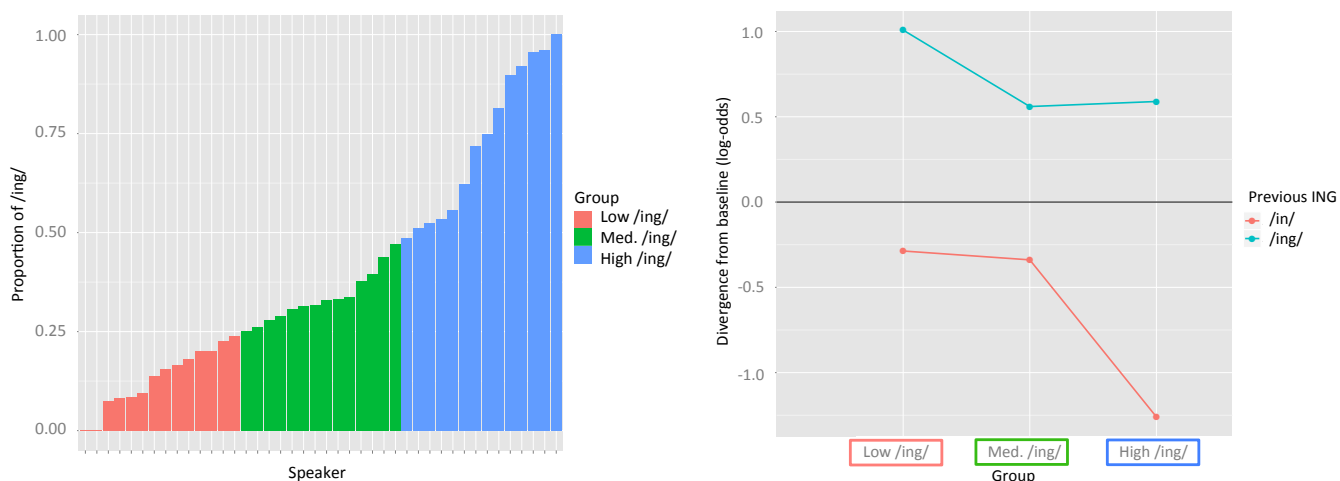

Figure 5: ING in PNC grouped by speaker /ing/ mean. Group means on left; persistence by group on right (N=2,646).

Because the token counts are lower when the sample is divided in three, I calculate only the

simple persistence effect of previous token value rather than conditioning it over the lag time. I then treat this measure in a similar manner to the periphrastic *do* data in section 7. The baseline for each group is simply the observed mean of all the tokens in the group. I once again subdivide the token pairs into those with initial /in/ and those with initial /ing/, and subtract the logit of the group baseline from the logit of each subset's mean. These results are shown on the right side of figure 5. The blue line shows that for the speakers who use the velar /ing/ variant least frequently, the effect of an /ing/ token in facilitating further /ing/ use is stronger than for the speakers in the middle and high /ing/ groups. The red points, as expected, show an effect in the opposite direction. Speakers who use the alveolar /in/ variant least (the high /ing/ group) show a stronger persistence effect of using /in/ than the speakers who use it more often. In other words, the more infrequent variant shows the stronger persistence effect.

I intend to both refine and extend this case study of interspeaker variation in persistence asymmetries. As can be seen in figure 5, speakers do not fall naturally into obvious groups but rather cover the entire range from 0% to 100% /ing/. In the course of refining the analysis, I aim to answer the question of whether there is a gradient relationship between a speaker's use of /ing/ and the strength of their persistence asymmetry, or whether there is a more binary relationship with the variant proportions predicting the direction but not the strength of the asymmetry. Whatever the result, I will then attempt to replicate it both in a different corpus with the same variable—ING in the Buckeye Corpus—and the same corpus with a different variable—DH in PNC.

7.3 The case of Celeste S.

Although somewhat crudely measured, the interspeaker variation in the asymmetry of ING persistence suggests that speakers are sensitive not to the overall frequency of variants in their language or speech community, but to the frequency of the variant within their own speech. We might further ask whether speakers' sensitivity to their own variant frequencies changes across stylistic contexts – are persistence asymmetries dynamic within individuals' output? Travis (2007) asks a similar question in her study of subject expression persistence in two genres: New Mexican Spanish oral histories and informal Columbian Spanish conversations. While she does find differences in both the decay rate and the asymmetry for the two different genres, she does not satisfactorily resolve the confound between genre and dialect. To most clearly demonstrate the sensitivity of persistence to sociostylistic context, I would like to demonstrate shifts in persistence asymmetries within the same speaker.

To this end, I plan to include in the dissertation an investigation of persistence in the speech of South Philadelphian Celeste S.. Celeste is a central figure in Labov's (2001b) study of social networks and the leaders of linguistic change. He reports that 17 recordings of Celeste were made by the interviewer she befriended; of these, 12 are currently available in the archives at the Penn Linguistics Lab. I am having these interviews transcribed so that they can be forced-aligned and coded. In these recordings, Celeste interacts with different conversational partners—her husband, her best friend, the interviewer—in a way that we expect will trigger style-shifting. Preliminary listening to these tapes confirms that Celeste does produce variation in ING and DH, which have both been shown to by stylistically dynamic in the context of similar interviews (Labov 2001a). The amount of data should be enough to give a basic measure of her persistence behavior as it relates to her own variable production in different contexts. Given the results so far, I expect to find that Celeste does indeed show variation in her own persistence asymmetries across different

contexts. This question is, in some ways, at the heart of the dissertation, because it most directly approaches the interplay between style and processing in the production of variation. The analysis of Celeste's data should prove comparable to other recent approaches to style and variable clustering, including Podesva 2007 and Sharma and Rampton 2011.

8   Implications

The case studies presented above, although in different stages of development, demonstrate that the proposed dissertation will be able to make substantial headway in relating persistence to important questions of both grammar and use. It is my hope that progress on this topic will also add to the literature supporting the use of naturalistic corpus data for studying such questions. On the basis of the preliminary results I've discussed here, I suggest that I will be able to conclude:

- that persistence is tied to grammatical relationships and can serve a useful diagnostic of sameness in linguistic analysis; and

- that persistence shows fine-grained sensitivity to context and reflects speakers' sociostylistic awareness.

These are not intended, however, as isolated generalizations. The ultimate goal of the dissertation is to tie these findings to a more complete understanding of the relationships between grammatical representation and derivation, sociolinguistic variation, and universal psycholinguistic factors. Researchers working from a perspective privileging one of these elements have sometimes tended to either subsume all linguistic phenomena under their perspective or reject the other elements as wholly unrelated. I take the position that neither of these extremes will prevail in a fully-articulated theory of the human linguistic capacity.

It seems clear that speakers bring multiple types of knowledge, mostly unconscious, to the act of speaking. There has recently been a renewal of interest in conceptually and empirically disentangling these types of knowledge (Preston 2004; Labov et al. 2011; MacKenzie 2012; MacKenzie and Tamminga 2012). Preston, for example, sketches a model where linguistic variants can be generated either grammar-internally or from multiple grammars and the social and psycholinguistic factors impacting the probability of a variant's selection exist outside of the grammar(s) proper (2004). His sketch of this model is reproduced in figure 6.

Preston's model admittedly leaves certain crucial details to future inquiry. It is consistent, though, with MacKenzie's suggestion that we should distinguish language use from grammar (2012) and with Labov et al.'s inference of the existence of a "sociolinguistic monitor which tracks, stores, and processes information on linguistic variation" (2011, 435). Section 6 of this proposal dealt with the manner in which the 'Processing' component of Preston's model acts on the 'Grammar' component, while section 7 touched on the interaction between the 'Processing' and 'Sociocultural selection device' components. The case studies I have proposed, therefore, will not only shore up the motivation for working out such models but also begin to fill in some of the details.
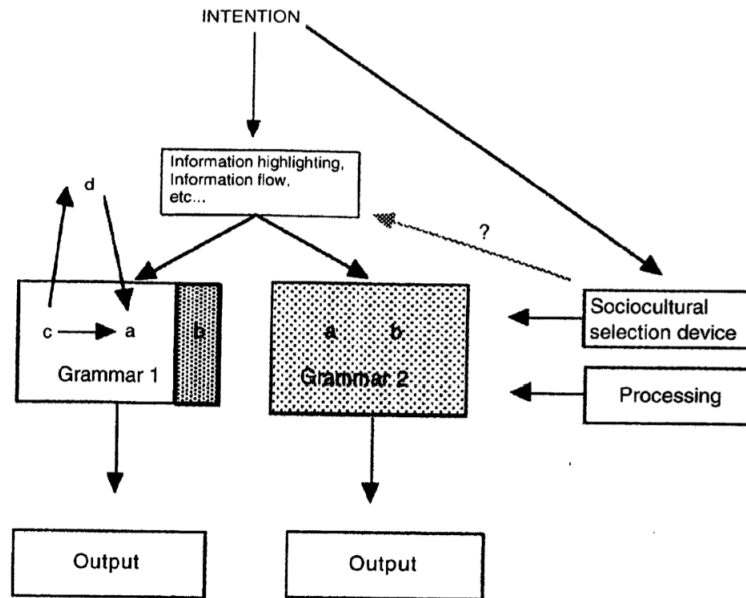
Figure 6: Preston's "Elaborated Level III Psycholinguistic Model", reproduced from figure 8.6, (2004, 156).

9 Timeline

The following is my projected timeline for completion of the dissertation. As a strategy for timely completion, I intend to write up descriptions of each case study as I complete them and keep them updated with any changes I make as I refine the analyses. The goals are to document my methods and results while they are fresh in my memory and to avoid being overwhelmed by the scope of the writing task at the end of the process. I believe this is particularly important for managing a series of distinct case studies with various data sources and methods.

December 2012

- Have Celeste S. transcriptions completed
- Seek extra Columbus interviews for TD
- Code supplemental interviews for ING
- Analyze DH

January-February 2013

- Analyze ING
- Code Celeste recordings for ING and DH
- Replicate TD analysis

22

- Write up TD results

March-April 2013

- Write up ING and DH results

- Code *do* in PPCMBE

- Analyze Celeste data

May-June 2013

- Analyze PPCMBE *do*

- Write up Celeste results

June-July 2013

- Code passive participles

- Analyze cross-context *do* persistence

August-September 2013

- Analyze passive participles

- Write up cross-context *do*

October-November 2013

- Write up passive participle results

- Consider models for language use system

December 2013-January 2014

- Summarize grammatical implications

- Summarize language use implications

February-March 2014

- Write introduction

- Write conclusion

April-May 2014

- Put together defense

- Defend (mid April)

- Revise as recommended

- Submit (early May)

References

Bock, K. (1986). Syntactic persistence in language production. *Cognitive Psychology*, 18:355–387.

Bock, K. and Loebell, H. (1990). Framing sentences. *Cognition*, 35:1–39.

Branigan, H., Pickering, M., and Cleland, A. (1999). Syntactic priming in written production: evidence for rapid decay. *Psychonomic Bulletin and Review*, 6(4):635–640.

Branigan, H. P., Pickering, M. J., Liversedge, S. P., Stewart, A. J., and Urbach, T. P. (1995). Syntactic priming: Investigating the mental representation of language. *Journal of Psycholinguistic Research*, 24(6):489–506.

Cameron, R. and Flores-Ferrán, N. (2004). Perseveration of subject expression across regional dialects of Spanish. *Spanish in Context*, 1(1):41–65.

Campbell-Kibler, K. (2006). *Listener perceptions of sociolinguistic variables: The case of (ING)*. PhD thesis, Stanford University.

Cleland, A. and Pickering, M. J. (2006). Do writing and speaking employ the same syntactic representations? *Journal of Memory and Language*, 54:185–198.

Dell, G. S. (1986). A spreading-activation theory of retrieval in sentence production. *Psychological Review*, 93:283–321.

Ecay, A. (2010). On the graduated evolution of *do*-support in English. Paper presented at the 34th annual Penn Linguistics Colloquium. March 20, Philadelphia, PA.

Ellegård, A. (1953). *The auxiliary do: The establishment and regulation of its use in English*. Almquist and Wiksell, Stockholm.

Embick, D. (2004). On the structure of resultative participles in English. *Linguistic Inquiry*, 35(3):355–392.

Estival, D. (1985). Syntactic priming of the passive in English. *Text*, 5(1/2):7–21.

Fasold, R. W. (1991). The quiet demise of variable rules. *American Speech*, 66:3–21.

Ferreira, V. S. (2003). The persistence of optional complementizer production: Why saying "that" is not saying "that" at all. *Journal of Memory and Language*, 48:379–398.

Fischer, J. (1958). Social influence of a linguistic variant. *Word*, 14:47–56.

Fruehwald, J. (2011). TD deletion and morphological interaction. Unpublished manuscript, University of Pennsylvania.

Gries, S. T. (2005). Syntactic priming: a corpus-based approach. *Journal of Psycholinguistic Research*, 34(4):365–399.

Guy, G. R. (1980). Variation in the group and the individual: The case of final stop deletion. In Labov, W., editor, *Locating language in time and space*, chapter 1, pages 1–36. Academic Press, New York.

Guy, G. R. (1991). Explanation in variable phonology: An exponential model of morphological constraints. *Language Variation and Change*, 3:1–22.

Guy, G. R. (2007). Lexical exceptions in variable phonology. *University of Pennsylvania Working Papers in Linguistics*, 13(2):109–119.

Houston, A. (1985). *Continuity and change in English morphology: the variable (ING)*. PhD thesis, University of Pennsylvania.

Jaeger, T. F. and Snider, N. (2007). Implicit learning and syntactic persistence: surprisal and cumulativity. *University of Rochester Working Papers in the Language Sciences*, 3(1):26–44.

Johnstone, B. (1999). Lingual biography and linguistic variation. *Language Sciences*, 21:313–321.

Johnstone, B. (2001). Individual. In Duranti, A., editor, *Key terms in language and culture*, pages 122–125. Blackwell.

Kaisse, E. M. and Shaw, P. A. (1985). On the theory of lexical phonology. *Phonology Yearbook*, 2:1–30.

Kiparsky, P. (1982). Lexical morphology and phonology. In Yang, I., editor, *Linguistics in the morning calm*, pages 3–91. Hanshin, Seoul.

Kroch, A. (1989). Reflexes of grammar in patterns of language change. *Language Variation and Change*, 1:199–244.

Kroch, A., Santorini, B., and Diertani, A. (2004). *Penn-Helsinki Parsed Corpus of Early Modern English*.

Kroch, A., Santorini, B., and Diertani, A. (2010). Penn Parsed Corpus of Modern British English.

Labov, W. (1969). Contraction, deletion, and inherent variability of the English copula. *Language*, 45(4):715–762.

Labov, W. (1984). Field methods of the project on Linguistic Change and Variation. In Baugh, J. and Sherzer, J., editors, *Language in use: readings in sociolinguistics*, pages 28–53. Prentice-Hall.

Labov, W. (2001a). The anatomy of style-shifting. In Eckert, P. and Rickford, J. R., editors, *Style and Sociolinguistic Variation*, chapter 5, pages 85–108. Cambridge University Press.

Labov, W. (2001b). *Principles of Linguistic Change, Vol. 2.* Blackwell, Oxford.

Labov, W. (2004). Quantitative analysis of linguistic variation. In Ammon, U., Dittmar, N., and Mattheier, K. J., editors, *Sociolinguistics/soziolinguistik: An international handbook of the science of language and society*, volume 1, pages 6–21. de Gruyter, Berlin.

Labov, W. (2012). What is to be learned: the community as the focus of social cognition. *Review of Cognitive Linguistics*, 10(2):265–293.

Labov, W., Ash, S., Ravindranath, M., Weldon, T., Baranowski, M., and Nagy, N. (2011). Properties of the sociolinguistic monitor. *Journal of Sociolinguistics*, 15(4):431–463.

Labov, W., Cohen, P., Robins, C., and Lewis, J. (1968). A study of the non-standard English of Negro and Puerto Rican speakers in New York City. Final report, Cooperative Research Project 3288, Vols. I and II.

Labov, W. and Rosenfelder, I. (2011). The Philadelphia Neighborhood Corpus of LING 560 studies, 1972-2010. With support of NSF contract 921643.

Loudermilk, B., Gutierrez, E., and Corina, D. (2010). What are you talkin' about? perception of sociolinguistic variation: Evidence from event-related potentials. *Journal of Cognitive Neuroscience.* Forthcoming.

MacKenzie, L. (2012). *Locating variation above the phonology.* PhD thesis, University of Pennsylvania.

MacKenzie, L. and Tamminga, M. (2012). Non-local conditioning of variation: evidence and implications. Paper to be presented at NWAV 41, Indiana University Bloomington, October 28.

Monahan, K. (1986). *The theory of lexical phonology.* Reidel, Dordrecht.

Pickering and Branigan (1999). Syntactic priming in language production. *Trends Cogn Sci*, 3(4):136–141.

Pickering, M. J. and Branigan, H. P. (1998). The representation of verbs: Evidence from syntactic priming in language production. *Journal of Memory and Language*, 39:633–651.

Pickering, M. J. and Ferreira, V. S. (2008). Structural priming: A critical review. *Psycholinguistic Bulletin*, 134(3):427–459.

Pitt, M., Dilley, L., Johnson, K., Kiesling, S., Raymond, W., Hume, E., and Fosler-Lussier, E. (2007). *Buckeye Corpus of Conversational Speech (2nd release).* Columbus, OH: Department of Psychology, Ohio State University (Distributor).

Podesva, R. J. (2007). Three sources of stylistic meaning. In *Proceedings of SALSA 2007*.

Preston, D. (2004). Three kinds of sociolinguistics: A psycholinguistic perspective. In Fought, C., editor, *Sociolinguistic variation: critical reflections*, chapter 8. Oxford University Press.

Reitter, D., Keller, F., and Moore, J. D. (2011). A computational cognitive model of syntactic priming. *Cognitive Science*, 35(4):587–637.

Rosenfelder, I., Fruehwald, J., Evanini, K., and Yuan, J. (2011). *FAVE Program Suite [Forced alignment and vowel extraction].*

Sankoff, D. and Laberge, S. (1978). Statistical dependence among successive occurrences of a variable in discourse. *Linguistic variation: models and methods*, page 119.

Scherre, M. (2001). Phrase-level parallelism effect on noun phrase number agreement. *Language Variation and Change*, 13(01):91–107.

Sharma, D. and Rampton, B. (2011). Lectal focusing in interaction: A new methodology for the study of superdiverse speech. *Queen Mary's Occasional Papers Advancing Linguistics*, 2:1–22.

Szmrecsanyi, B. (2006). *Morphosyntactic persistence in spoken English: A corpus study at the intersection of variationist sociolinguistics, psycholinguistics, and discourse analysis.* Mouton de Gruyter.

Taylor, A. (1994). The change from SOV to SVO in Ancient Greek. *Language Variation and Change*, 6:1–37.

Taylor, A., Nurmi, A., Warner, A., Pintzuk, S., and Nevalainen, T. (2006). *Parsed Corpus of Early English Correspondence.*

Travis, C. E. (2007). Genre effects on subject expression in Spanish: Priming in narrative and conversation. *Language Variation and Change*, 19:101–135.

Wasow, T. (1977). Transformations and the lexicon. In Akmajian, A., Culicover, P., and Wasow, T., editors, *Formal Syntax*, pages 327–360. Academic Press, New York.

Weiner, E. J. and Labov, W. (1983). Constraints on the agentless passive. *Journal of Linguistics*, 19(1):29–58.

Weinreich, U., Labov, W., and Herzog, M. I. (1968). Empirical foundations for a theory of language change. In Lehmann, W. and Malkiel, Y., editors, *Directions for historical linguistics: A symposium*, pages 97–195. University of Texas Press, Austin and London.

Wolfram, W. (1975). Variable constraints and rule relations. In Fasold, R. W. and Shuy, R. W., editors, *Analyzing variation in language: papers from the second colloquium on New Ways of Analyzing Variation*, pages 70–88. Georgetown University Press.