SOCIOLINGUISTIC PRIMING AND THE PERCEPTION OF AGREEMENT VARIATION: TESTING PREDICTIONS OF EXEMPLAR-THEORETIC GRAMMAR

by

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ABSTRACT

This dissertation investigates the sociolinguistic perception of morphosyntactic variation and is motivated by exemplar-based approaches to grammar. The study uses syntactic priming experiments to test the effects of participants' exposure to subject-verb agreement variants. Experiments also manipulate the gender, social status, and individual identity of the talkers to whom participants are exposed, testing the influence of social information on the perception of agreement variation.

Access to social information about a speaker has been found to influence the perception of the linguistic forms they produce. Exemplar-theoretic models of speech perception accommodate these findings by positing that linguistic knowledge consists of episodic memory traces of experiences with language, and that linguistic exemplars represent rich social details. Exemplar-theoretic models of syntax likewise posit that syntactic knowledge is a function of direct experiences with language. However, syntactic exemplar theorists have not explored patterns of sociolinguistic variation, and sociolinguistically-informed exemplar-theoretic work has focused on patterns of phonological variation. This study hypothesizes that for grammatical variation that is sociolinguistically patterned, grammatical processing will show sensitivity to both social and linguistic influences in the processing context.

The dissertation experiments use structural priming, a paradigm common in psycholinguistic research for exploring cognitive representations of syntactic structure.

The experiments manipulate participants' exposure to variants of two subject-verb constructions that alternate commonly across English dialects: $NP_{SG/PL}$+*don't* (*The dog/dogs don't bark*) and *there's*+$NP_{SG/PL}$ (*There's a dog/dogs in the yard*).

The experiments find effects of recency, social similarity, and constructional frequency on participants' interpretation of agreement forms, supporting central features of a socially rich exemplar-based grammar. The study shows that grammatical perception is sensitive to priming, such that exposure to a nonstandard variant in the prime sentence increases the likelihood that participants will perceive a nonstandard variant in the target sentence. Priming is also differentially affected by the social dimensions of gender, social status, and talker specificity. The dissertation argues that the notions of indirect, direct, and potential indexicality capture these differences, and that they can be accommodated by a model of grammatical knowledge that includes multiple levels of abstracted linguistic and sociolinguistic categories.

CHAPTER 1
THEORETICAL AND METHODOLOGICAL BACKGROUND

1.1 Introduction

Speech perception research has shown that listeners use social knowledge in interpreting the speech stream, such that their interpretation of potentially ambiguous phonemes changes when social information about the talker is manipulated. Sociolinguistic research has also shown that listeners use phonetic cues in making social interpretations about speakers. There is building evidence in these fields that the interpretation of social and linguistic information are mutually contingent, deeply interconnected in the processing of linguistic structures, especially structures that demonstrate variation along social dimensions. Yet, little work has been done to test whether this mutuality also applies to sentence processing.

To account for this interdependence of social and linguistic knowledge, recent research has turned to exemplar-theoretic models of language. Exemplar-based theories of language posit that linguistic representations consist of detailed memory traces of linguistic experiences. The perception of language is accomplished by processes of comparison and categorization between new input and existing exemplars. According to much of this work in speech perception and sociolinguistics, social information is among the inherent components of the cognitive organization of language--it is part of speakers' experiences with language, and hence part of their linguistic exemplars. This makes social information a key factor in linguistic interpretation, and it also makes linguistic information a key factor in social interpretation. As applied to representations of grammatical (that is, morphosyntactic or syntactic) aspects of language, exemplar theory predicts that social information should also affect sentence processing--if not for all grammatical patterns, then at least for those that are sociolinguistically variable--and that

sentence forms should affect the social meanings of an utterance construed in a given context. The dissertation comprises seven experiments designed to test this and related predictions by examining the perception of variable morphosyntactic patterns, manipulating perception through structural exposure (priming) and social cues.

The dissertation thus sits at an intersection of sociolinguistics and psycholinguistics, which until recently have worked as separate subfields of inquiry with little interaction (though each is, in its own way, also an intersectional field). Sociolinguists have focused on documenting the production of linguistic variation, tying this variability to the social factors that structure speech communities. It is only in the last decade or so that sociolinguistics has ventured to explore the cognitive elements, and behavioral reflexes, of variation. Meanwhile, psycholinguists have used behavioral (and recently, neurological) tasks to assess the procedures involved in comprehending language: recognizing words, parsing sentences, identifying linguistic anomalies, and resolving structural ambiguities. Social factors have not been treated as relevant to these tasks, nor have they occupied space within the models or mechanisms constructed to explain language production and comprehension (de Bot, 2000). However, these fields have much to offer one another, and one goal of this dissertation is to pursue the connections between sociolinguistic problems and psycholinguistic methods.

Exemplar theory itself brings together insights from both fields, as a theory rooted in psychology (though not psycholinguistics), adapted within linguistics to understand how humans' perception of language is influenced by nonlinguistic factors. I will refer in the dissertation to a "socially-informed exemplar theory," by which I mean a theory that permits social information to be part of the grammar--that is to say, part of one's linguistic exemplars. This is the way that exemplar theory has been developed by those within speech perception and sociolinguistics, and more particularly within sociophonetics (the branch of sociolinguistics concerned with phonetic variation and perception; e.g., Foulkes, 2010). Without going into depth yet here, the explanation that a socially-informed exemplar theory posits for perceptual patterns relies on specifications of the mental representations of language as memory traces of individual instances of language, complete with both linguistic and social detail. It thus can be developed as a theory of

linguistic competence, comprehension, and production; all are central concerns of psycholinguistics. And, that exemplar theory can incorporate linguistic variation as inherent to linguistic representation--predicting its relevance also in language processing--makes it a powerful theoretical contender for those seeking some unifying ground for sociolinguistic, psycholinguistic, and formal linguistic theorizing.

The dissertation contributes one small piece to this project, which is to investigate whether there is experimental support for extending a socially-informed exemplar theory to account more fully for the knowledge and perception of grammar, rather than just phonology. This requires isolating grammatical variation (e.g., in morphosyntax) as a type of linguistic variation, identifying what social features might be stored with knowledge of that variation, and testing for the perceptual relationship between the grammatical and the social. That is, we want to know whether social information affects the interpretation of grammatical structures, and whether social inferences are made on the basis of grammatical information. To find positive evidence on either matter would be encouraging for accounts of linguistic competence that consider it to be comprised of *sociolinguistic knowledge*, and for accounts of language processing that consider it to be a form of *sociolinguistic processing*. These accounts need not be grounded in exemplar theory, but I believe that it is currently the only theory whose proponents are explicit about these relationships; the dissertation serves as an attempt to move the field forward in testing its predictions.

1.2 Research questions

To explore sociolinguistic processing and grammatical variation within an exemplar-theoretic framework, the dissertation experiments address three interrelated research questions. Empirically, these questions relate to whether certain patterns found to occur within the realm of speech perception are replicable within sentence processing, pertaining to the perception of sociolinguistic variables--that is, sets of linguistic alternatives (variants) whose usage is related to social structures or individual styles. Theoretically, these questions ask whether behavioral patterns predicted by an exemplar-theoretic grammatical system are born out. Each question may thus be framed in both

theory-neutral terms, emphasizing behavior/perception, and alternatively in terms that emphasize the theoretical implications for and predictions of an exemplar model of (socio)linguistic representation and processing. Each question's alternative framings are below in 1(a-c):

> (1a) Does grammatical interpretation involve facts or knowledge of grammatical variation? Does processing happen in a way that suggests that listeners have stored exemplars of sociolinguistic variants?
>
> (1b) Do vocal or visual cues to social information about a talker bias a listener's grammatical interpretation? Does processing behavior provide evidence that social cues change which exemplars linguistic input is matched to, and hence that social information is stored with grammatical constructions?
>
> (1c) Do grammatical patterns change a listener's judgments about the social properties of a talker? Does processing behavior provide evidence that grammatical cues change the social categories that linguistic exemplars are matched to, and hence that social information is stored with the grammatical?

To think of these questions more concretely, take the example of two sentential variants:

> (2a) The dogs was barking.
> (2b) The dogs were barking.

Question (1a) asks whether the typical (United States) English speakers' knowledge of language includes representations of both of these subject-verb agreement patterns, and if so, whether the knowledge of this variation is also linked to an understanding of

differences in social properties such as race, class, or gender. Question (1b) asks whether a listener would be more likely to expect sentence (2a) were the speaker understood to belong to certain social categories--lower social status, for instance--rather than others. Question (1c) asks whether a listener would infer from hearing sentence (2a) that the speaker belonged to certain social categories, like a lower social status, than if they had heard sentence (2b) from the speaker.

To a large extent, these questions are aligned with (or even mimic) questions addressed within speech perception research; that is, whether social knowledge exerts what some have called "top-down" (Strand, 1999) effects on linguistic interpretation. As framed from an exemplar-theoretic perspective, the questions are also rather straightforward reflections of linguists' concern to develop models capable of explaining the social influences found on phonetic perception, with exemplar theory seeming to be the prime contender (see Guy, 2011). Yet extending these questions to sentence processing, and specifically to grammatical variation, necessitates clarifying the potential dimensions of sociolinguistic processing for non-phonological variables--and the methodological posibilities for investigating them.

In this chapter, I provide background pertinent to the dissertation's research questions. The background encompasses three major research areas that I discuss in turn: sociolinguistic findings about social and linguistic perception; exemplar-theoretic models of both speech perception and syntax; and psycholinguistic methods for examining syntactic alternatives and preferences. Then, I explain my approach to a core issue underlying the dissertation's research goals: What type of grammatical variation is appropriate for the perceptual study being undertaken in this case, and what are appropriate methods for investigating sociolinguistic perception and grammatical variation? I argue that morphosyntactic variation, particularly variation in subject-verb agreement patterns, is a useful starting point for sociolinguistic processing, and that structural priming is an experimental method well-suited to this purpose. The following chapter, Chapter 2, discusses the dissertation's methods, including the sociolinguistic variables of study and the presumed cognitive representations of those variables, in more detail.

Before proceeding, I should make a note about my use of the terms "processing" and "perception." I use "processing" when referring to the broad phenomenon of listeners taking linguistic input and coming to interpret it as linguistically meaningful. Which interpretations they arrive at, the steps taken to arrive at those interpretations, the sensory mechanisms involved in those steps, and the cognitive and contextual factors at play, are all part of processing. On the other hand, I will use "perception" to refer to something more like the interpretation itself of the linguistic or social input in question. In this usage, I follow Campbell-Kibler (2010b:378) who, in her overview of research in "sociolinguistic perception," defines it as "the extraction of social information from speech and the contributions of social information to linguistic comprehension." For the purposes of discussing my experiments, then, what I mean by "grammatical perception" may be more like what a psycholinguist would call either a "parse" or an "interpretation" (that is, what a listener or reader believes a sentence's structure and/or meaning to be). I want to focus on the potential for several interacting or competing sources of information, including social cues, to affect interpretation, and on the automatic ("low-level") manner in which such processing unfolds. It is in this spirit that I use the term "perception" when discussing participants' responses to the dissertation experiments' stimuli.

1.3 Key findings about sociolinguistic perception

Sociolinguistic research has long documented correlations between linguistic variation and social properties of speakers, such as region (largely under the study of dialectology), formality, gender, age, race, and social class. Sociolinguistics as a subfield has, for the most part, concerned itself with speakers' production, paying less attention to the perception or cognitive representation of sociolinguistic variation. The cognitive mechanisms by which listeners store and map variants onto social information are not well understood. This has started to change over the past two decades, with experimental work shedding light on the question of how linguistic variation is organized in humans' mental capacity for language, and how knowledge of linguistic variation and its social correlates is utilized in the task of understanding linguistic input (for an overview, see Campbell-Kibler, 2010a, 2010b). From this experimental sociolinguistic work have

emerged two key findings: one, that listeners use social information about speakers to resolve ambiguous linguistic input; two, that listeners use linguistic input to make social judgments about speakers. Additionally, social and linguistic sources of information are integrated in the production, reproduction, and transmission of "social meaning" (as in contrast with referential meaning), which is constitutive of social categories, though this has not been studied experimentally to the same extent (e.g., Bender, 2007). These findings suggest a fundamental link between the perception of social information and the perception of language, further suggesting a fundamental link in the mental representations of these types of information.

The earliest perceptual experiments of this kind within sociolinguistics probed the effect of stereotypes on speech perception. One canonical study is Niedzielski's (1997, 1999) study of vowel categorization among listeners in Detroit, Michigan. For each trial in the experiment, participants first heard a sentence produced by a speaker, and were told to focus on the vowel in the word of interest; they subsequently heard six isolated synthesized vowel tokens and were told to choose which one best matched the vowel they heard the speaker say. Target words were words such as *house*, which contain the /aw/ diphthong. For speakers with a Canadian Raising phonological pattern, this vowel is articulated higher and further forward in the mouth than a standard /a/. Niedzielski found that manipulating the identity of the supposed talker, by labeling the talker as from "Detroit, Michigan" (USA) or "Windsor, Ontario" (Canada), resulted in a perceptual difference among participants. Participants were more likely to hear the phoneme /aw/ as more raised and fronted when they believed that the talker was Canadian, indicating that they drew on stereotypes of Canadian speech in perceiving vowel tokens.

Similarly but testing the social dimension of gender, Strand and colleagues (Strand, 1999; Johnson, Strand & D'Imperio, 1999) found that fricative categorization was affected by the gender typicality of talkers' voices. Stereotypically male- or female-sounding voices had lower or higher F1 boundaries between /ʃ/ and /s/, and visually-introduced gender information shifted the category boundaries either upward or downward (a "Face Gender Effect").

While these early studies tested the categorization of isolated phonetic content,

more recent work has also explored the influence of social information on lexical ambiguity resolution, placing phonetic content into context within a larger chunk of speech. These more-recent findings also expand the types of social information manipulated beyond region and gender to categories of social class, age, and race. For instance, Hay, Warren, and Drager (2006) tested perception of diphthongs which are undergoing merger in New Zealand English and found that participants were better at identifying words spoken by females than by males; participants' lexical identification accuracy was also affected by the social class of the pictured talker. For non-merged participants listening to a speaker with more-distinctive phonemes, error rates decreased with decreasing social class; for non-merged participants listening to a speaker with less-distinctive phonemes, error rates increased with increasing social class.

Hay et al. take these complex effects as evidence for exemplar-based models of speech perception that include social indexation of phonetic exemplars (see also Foulkes & Docherty, 2006; Hay, Nolan, & Drager, 2006; Hay, Warren, & Drager, 2010; Johnson, 2006). The introduction of exemplar theory, first formulated within perceptual psychology (see Goldinger, 1997), moved explanations of sociolinguistic perceptual phenomena away from social "stereotypes"--which imply a fallacious mapping between linguistic experience and linguistic belief--and toward real sociolinguistic knowledge. Exemplar theory posits a model of language where linguistic knowledge is a collection of remembered instances (exemplars) of language use, and socially-oriented work has given evidence that these exemplars are remembered *with* social contextual information of the speech experience, rather than *stripped* of it (for further discussion see, e.g., Guy, 2011).

For instance, working within an exemplar framework, Staum Casasanto (2009:89-98) used sentence interpretation tasks to investigate the perception of variable t/d deletion in word-final consonant clusters (a feature more widely exhibited by African American speakers than Caucasian speakers of English). In a semantic judgment task, when listeners saw a sentence that disambiguated the lexical item to containing an underlying [t] or [d], they were slower at processing the sentence when they thought the talker was white, presumably because it violated their sociolinguistic expectations. Listeners' knowledge about the differential probability of a black or white speaker deleting t/d was

used in the process of lexical disambiguation, suggesting that social knowledge of linguistic variation is active across the spectrum of language processing.

While the findings highlighted above show that social information affects linguistic perception, the influence seems to be bidirectional: linguistic information also affects social perception. For instance, Campbell-Kibler (2006) manipulated the common and well-studied (ING) variable, where *-ing* is variably produced as [ɪn] or [iŋ], in a Matched Guise test (Lambert, Hodgson, Gardner, & Fillenbaum, 1960). She found that listeners rated speakers as more articulate and more educated in the [ŋ] guise, but further that listeners' ideas about a talker on one dimension interacted with their ideas about a talker on another dimension. For instance, listeners were more likely to view a speaker as both casual and working-class when they heard an [n] guise. Staum Casasanto (2009:72-77) also investigated racial categorization, in addition to the use of racial cues for phoneme categorization, and found that participants used t/d deletion as a cue to a talker's race. In sum, research about social information affecting linguistic perception and vice versa suggests that social and linguistic perception are mutually contingent; this motivates models of language such as exemplar models, where social and linguistic information are jointly represented.

In addition to studies within sociolinguistics and sociophonetics, the idea of sociolinguistic processing (where there is feedback between social and grammatical input and perception) has received support from several other arenas of linguistic research, including neurolinguistics. For instance, Van Berkum, van den Brink, Tesink, Kos, and Hagoort (2008) exposed participants to spoken sentences. Sometimes, the semantic content of the sentences was unlikely to be said by the particular voices used, which cued age, gender, or class. Measuring brain responses to the stimuli, the researchers found spikes in event-related potentials (ERPs) that have been linked to linguistic processing. Anomalous sentence-talker pairs, such as an older male adult producing a sentence about Britney Spears, produced in participants the same type of brain activity spike found for "pure" semantic anomalies (activity at the N400). This suggests that processing of semantic content happens in very close connection with talker identity processing.

In another neurolinguistic study using event-related potentials to study pragmatic

expectations, Regel, Coulson, & Gunter (2010) found that listeners were able to quickly learn that two different talkers had two different pragmatic styles--one was more likely to speak ironically, whereas the other was more literal. Participants learned which style was associated with which talker, and in a later session, participants exhibited distinct brain activity spikes in sentences where the ironic speaker used ironic sentences, and when the literal talker used literal sentences. The spikes were for the P200 component, which had been shown previously to have larger spikes for more expected stimuli versus unexpected stimuli (see Federmeier, May, & Kutas, 2005). The researchers conclude that this indicates early acquisition of talker-specific information in terms of pragmatic style, and the use of the acquired talker information in subsequent language comprehension.

Neurolinguistic evidence regarding semantic and pragmatic processing, coupled with behavioral findings from speech perception, indicates that during language processing, speakers might also experience rapid integration of social information with grammatical structure, since grammatical structure also has social correlates (see Bender, 2005, 2007). However, grammatical form--in contrast with phonological form, semantic meaning, or pragmatic functions as described above--has not been the subject of inquiry within experimental sociolinguistics, and neither has it yielded much sociolinguistically relevant work within psycholinguistics. While psycholinguistics is the subfield of linguistics most concerned with the processing of syntax, the processing of syntactic variability has not been the focus. Hence, questions about the interaction of social and linguistic cues have not informed sentence processing research. This dissertation thus also contributes to contemporary questions about how models of language processing can fully account for the range of information that speakers use in comprehending and producing language, in particular by testing predictions of the recently popularized (and still developing) exemplar theory. The next section gives background information on exemplar theory as it has been developed predominantly within speech perception.

1.4 Modeling sociolinguistic knowledge: Exemplar theory in phonetics and syntax

The research described above indicates that, at least in terms of speech perception, linguistic theories must account for the interaction between social and linguistic

information in perception. In recent years, exemplar-based models of cognitive representation have made their way from psychology into speech perception as an attractive theoretical alternative to models which explicitly exclude talker-specific information (Guy, 2011). The basic notion of exemplar theory is that humans store memory traces of experienced phenomena, with categories emergent from abstractions across exemplars. Each new exemplar alters the whole system of categorization, however minimally, and exemplars decay over time if they are rarely activated or accessed. Perceptual phenomena arise from analogical processes of comparing new input to existing exemplars and categories, with exemplars that are more similar to the input being more likely to be activated (for an in-depth discussion, see Walsh et al., 2010). Within linguistics, exemplar models have predominantly been discussed in phonetics, in order to account for how listeners achieve categorical perception out of gradient phonetic input (e.g., Johnson, 2006).

Because there is a possibility that not only phonetic details but also details of the context of a token's occurrence--including individual talker information and social group--can be represented in exemplars, exemplar theory can rather straightforwardly account for the effects of manipulating social information on speech perception (Foulkes & Docherty, 2006; Hay et al., 2006; Hay et al., 2006; Johnson, 2006; Staum Casasanto, 2009). Indeed, Guy (2011:262) claims that in contrast to other formal models of language, exemplar theory "puts [sociolinguistic] representations at the centre of linguistic structure" and "embraces variability." If listeners store phonetic tokens as exemplars, and if those representations include some detail about not only the linguistic features of the input but also the social context of the input, then a listener's understanding of the social properties of a talker will affect what they perceive. Social context information is a dimension along which exemplars may be more or less similar, just as linguistic form is, and this should affect which phonetic category a given input token is perceived as matching to, as listeners are capable of deducing associations between linguistic variants and social contexts or identities (Guy, 2011:262). Exemplar theory thus not only *explains* social variation and its manifestations in speech perception, but it actually *predicts* that, given social variation in linguistic input, there should be

perceptual reflexes of social information.

In terms of theories for explaining sociolinguistic phenomena related to the perception of linguistic variation, a related concept recently advanced by Labov (2006; Labov, Ash, & Ravindranath, 2006) is that of the "sociolinguistic monitor." Labov (2006:512) says of the sociolinguistic monitor, "Whether or not this is a distinct component of the linguistic faculty, we find that listeners can track, store and evaluate the frequencies of sociolinguistic variables in a way consistent with the social distributions we track in production." While Labov et al. (2006) present a number of attributes of the sociolinguistic monitor (e.g., that it is sensitive to frequencies of sociolinguistic variables' occurrence; that it has a wide temporal window of operation), the monitor is not discussed within an overall framework of the grammar, so whether it is conceived of as a complement or competitor to exemplar-theoretic explanations is unclear.

The potential that exemplar theory has to explain social effects on speech processing also makes it appealing to those seeking to understand the relations between syntactic structures and social information. Although the research is less developed, many have argued for exemplar-based models of grammar (e.g., Tomasello, 2003; Abbott-Smith & Tomasello, 2006; Bod, 2006; Bybee, 2006; Jaeger & Snider, 2008; Snider, 2008, 2009; Arnon & Snider, 2010). This work is related to more general theories of construction- and usage-based grammar (e.g., Goldberg, 2003; Pietsch, 2005), and to probabilistic linguistics as an approach to linguistic science (Bod, Hay, & Jannedy, 2003). Hay and Bresnan (2006) take just the existence of socially stratified grammatical production as good evidence for exemplars, arguing that finding "gradient syntactic variability across speaker groups" (327) supports the notion that stored exemplars are the source of many (if not all) grammatical phenomena.

The approach of a socially-informed exemplar theory to center the issue of linguistic (social) variability, rather than marginalize it, goes against most mainstream approaches to grammar. Integrating grammatical variability and optionality into formal models of generative grammar has only recently been seriously attempted (see Cornips & Corrigan, 2005) and relies on individuals' biological endowments, as well as universal sets of parameters or constraints, rather than their direct *experiences* with language. Yet

Tomasello (2003) and Abbott-Smith & Tomasello (2006) argue that exemplar models are better at accounting for language acquisition patterns than generative models, which assume some innate language-specific structures and competencies. Their evidence for the increased adequacy for usage-based models, including exemplar models, comes from the fact that children's early production is largely item-based and affected by lexical and constructional frequency. That is, it is not the case that children seem to learn individual lexical items that are plugged into (or activate the use of) *a priori* abstract syntactic categories; rather, children learn patterns of particular words and constructions, then form abstracted grammatical categories from the stored, item-based representations. Innatist generative theories cannot, according to Abbott-Smith & Tomasello (2006), account for the variability with which children apply different grammatical patterns, and the way that frequency affects learning and production. Exemplar theory, with its focus on "building up" grammatical categories from singular instances of input, more sufficiently predicts these patterns.

A major weakness of exemplar theory as currently articulated, however, is the lack of sufficient precision in the features of linguistic representation included in exemplars, as well as the mechanisms of categorization and abstraction. That is, the theory remains largely unspecified as to what exemplars contain, how they interact, and whether all types of information (linguistic, social, frequency, etc.) are represented alike. However, researchers are beginning to implement specified (though small-scale) syntactic exemplar models and simulations that achieve results consistent with what is known about actual language production, processing, and acquisition (see Bod, 2006; Snider & Jaeger, 2008; Snider, 2008, 2009; Walsh et al., 2010). When considering that exemplar representations may include not only linguistic material but also nonlinguistic information, this is an exciting advance for sociolinguists interested in grammatical variation: unlike other views of grammar, a socially-informed exemplar theory generates testable hypotheses about the interrelation of language and social perception.

This dissertation contributes to discussion of the viability of exemplar models from the standpoint of sentence processing, and the behavioral predictions made by exemplar representations that include both grammatical forms and their social

dimensions. Hay and Bresnan (2006) suggest that syntactic representations (exemplars) are indexed with social context information, that "our generalizations over stored phrases may include not only drawing higher-level syntactic generalisations and probabilities over them, but also extracting patterns relating to the kinds of people that use particular phrases or structures" (328). Exemplar theory predicts that if social information is stored with grammatical information, then for grammatical constructions that show variable distributions in production, we would expect a listener's expectation or interpretation of those constructions to be altered by nonlinguistic cues relevant to the variable patterns (see Walker, 2008 for relevant findings regarding the influence of talker differences on overt grammaticality judgments).

Models of exemplar representations are thus a compelling avenue for investigating the perception of grammatical variation, which has been somewhat neglected not only within psycholinguistics and formal syntactic theory, but also within sociolinguistics (for discussion of the status of syntactic variation within sociolinguistics, see Lavandera, 1978; Romaine, 1981; Winford, 1984; Cheshire, 1987, 2005; Rickford, Wasow, Mendoza-Denton, & Espinoza, 1995; Bender, 2005, 2007; Cheshire & Fox, 2009; Szmrecsanyi & Kortmann, 2009). A shared interest has emerged between these fields to understand the range of factors involved in using language, and there has been an increased push across linguistics to incorporate variability into theoretical and formal models. I want to suggest that the fundamental empirical problem posed by the dissertation--how do social and grammatical information interact in language processing--can only adequately be addressed by harnessing insights from both sociolinguists (with their focus on variability and perception) and psycholinguists (with their focus on sentence processing and experimental methods). At risk of oversimplifying things, the dissertation capitalizes on methods developed within psycholinguistics to study the questions emerging from sociolinguistics, with the goal of informing theoretical linguistic models at-large. The following section describes the psycholinguistic work on syntactic priming that forms the background for the dissertation's methods in investigating grammatical perception.

1.5 Structural priming: Psycholinguistic methods for testing syntactic alternatives

What does it mean to measure grammatical perception? The discussion above highlighted the fact that little work has explored the questions central to this dissertation, which involve how grammatical sociolinguistic alternatives are perceived, rather than how grammatical constructions are metalinguistically judged. While literature on grammaticality judgments and the overt evaluation of syntactic forms is common (e.g., Schütze, 1996), neither sociolinguists nor syntacticians have historically dealt with the *perception* of grammatical variation. However, there is a large tradition within psycholinguistics of investigating syntactic and structural preferences among syntactic alternatives, largely using priming as a methodological technique.

Priming is a general cognitive phenomenon detectable across both linguistic and nonlinguistic behavior; priming can be defined as "the process by which perception (or experience) of an item (or person or event) leads to an increase in its accessibility and the accessibility of related material and behaviors" (Cunningham & Macrae, 2007). In other words, what one experiences affects how one perceives subsequently, particularly when the subsequent stimulus is dimensionally similar to the recently experienced percept. The foundation of priming effects is stored knowledge--in the case of language, stored linguistic (phonetic, lexical, or structural) knowledge. Priming makes certain parts of what a speaker has stored more or less accessible in a given situation, which affects what the percept ultimately is. Priming stimuli can constrain perception in various ways, by affecting the degree to which bits of knowledge are made accessible within the perceptual situation, and what other knowledge is activated as a result of the accessible knowledge. Thus, to use priming as an experimental technique is to probe behavioral indications of memory structure, and hence priming effects align nicely with exemplar theories of linguistic knowledge, and may be explained via exemplar models (as discussed by Snider, 2008).

In particular, *structural priming* is a grammatical repetition effect, whereby people are more likely to produce or perceive syntactic options that they have recently encountered than alternative options. For instance, one might be more likely to produce a passive sentence (*The dog was poked by the boy*) after having just heard a different

passive sentence (*The cat was grabbed by the girl*) than after hearing an active sentence (*The girl grabbed the cat*). Such priming effects are seen as a window into the representation, generation, and activation of syntactic structures; the dissertation adapts the methodologies of psycholinguistic work from this area.

The basic template of a structural priming experiment involves exposing a participant to a prime stimulus, which contains one of two structural variants. For instance, a participant might read either a passive construction or an active construction in a trial. Either immediately afterward or following some intervening stimuli or task, the participant is exposed to a target stimulus. In the target, they must either produce a structure, or exercise an interpretation of a structure, to complete the experimental task. When the participant's target response exhibits similarity to the prime structure (on the structural dimension relevant to the experimental design), this is taken as evidence that the prime stimulus has activated that particular aspect of the participant's structural knowledge.

Structural priming (also called *syntactic priming* or *structural facilitation*) foregrounds the issue of variable grammatical structure, by isolating alternative structural configurations for the same semantic content and testing the extent to which exposure to one alternative affects participants' production, expectation, or choice of a following structure (see Pickering & Ferreira, 2008 or Branigan, 2007 for reviews). As Snider (2008:14) writes, "Structural priming studies rely on syntactic variables, pairs (or sets of constructions) that are different in structure, but with respect to meaning, are essentially paraphrases of one another." Priming of syntactic structures provides a promising way of examining "meaning-equivalent" alternatives that are sociolinguistically patterned, not just those that are socially neutral.

1.5.1 Production priming

Structural priming studies have led to fairly robust findings that manipulating the structure of prime sentences leads to higher rates of *producing* the primed structure (Bock, 1986, 1989; Bock & Loebell, 1990; Branigan, Pickering, Liversedge, Stewart, & Urbach, 1995; Haskell & Thornton, 2010). One classic production study by Bock and

Loebell (1990) provides evidence not only for priming, but specifically for structural priming: that what was primed pertained to syntactic structure, *not* to other aspects of the sentences. In testing priming for dative structural alternatives, Bock and Loebell's explicit aim was to see whether structural repetition was related to conceptual similarities between prime and target--when thematic structure is repeated, for instance--or to structural similarities regardless of thematic structure. In their paradigm (similar to that of Bock, 1986, 1989), participants read aloud a written sentence that is in one possible form of the dative; this served as the prime. Following the prime, participants saw a picture, whose depiction encouraged a dative construction; whether participants responded with a prepositional-object or double-object construction was the measure of priming. In their Experiment 1, prime types included prepositional datives, prepositional locatives, and double-object control sentences. The goal was to see whether prepositional datives were equally as likely following prepositional locatives as folowing prepositional datives. Bock and Loebell found that there was little difference between the two prepositional conditions, but as compared to the double-object condition, prepositional datives were more likely following prepositional structures than following double-object structures. These findings lent support that rather than conceptual similarity driving structural priming, the effect was a matter predominantly of structural information itself, regardless of thematic content.

In Experiment 2 of Bock and Loebell's (1990) classic study, the prime conditions were even more dissimilar in terms of sentence-types, with one being a passive and one being a locative--but these two sentence types have the same constituent structures (syntactic trees). For example, "The plane was landed by the pilot" involves a passive *by*-phrase, whereas "The plane was landed by the water" involves a locative *by*-phrase. However, the hierarchical structure of sentence components is identical. In this experiment, the primes were in passive, locative, and active (control) constructions; the test (as in Experiment 1) was of whether people described the following picture with a passive or an active. Participants were more likely to produce a passive in the passive or the locative prime conditions as compared to the control (active) condition, but there was no difference between passive and locative trials. The authors claim this as further

evidence for the structural locus of syntactic priming effects, where the effects are driven by constituent structure, not sentence meaning. Further, in Experiment 3, the authors tested whether prosody or phonological form could be driving their effects. This experiment compared prepositional object, infinitive, and double object constructions (prepositional and infinitive sentences have the same rhythm); whether participants produced prepositional or double-object datives was again the test. They found that prepositional dative responses were reliably more likely in the prepositional dative condition compared to the infinitive or double-object conditions.

I have explained Bock and Loebell's (1990) results in detail because they are canonically referred to as the foundations of syntactic priming work; because they demonstrate clearly that there is a formal component to priming, not just a conceptual one; and, especially important for my study, because they show that priming does not need to lead to an overall reversal of the probability of one structure over another. Rather, priming effects can be seen in movement of the overall likelihood of one structure either downward or upward. That is, priming doesn't necessarily make it more likely overall that X variant will be produced instead of Y. Instead, it might increase the likelihood that X will occur in condition A than in condition B, relative to Y's occurrence. This latter point is especially important for the application of this paradigm to the study of sociolinguistic variants, since we might usually expect one variant to be more likely to be produced or perceived than another by any particular speaker-hearer. But the question is what cues cause the probability to shift either upward or downward; that is, which grammatical and social conditions lead to differential probabilities for the use or perception of grammatical variants.

1.5.2 Comprehension priming

In addition to many production studies since the time of Bock and Loebell (1990), researchers have also explored structural priming within the realm of sentence comprehension, rather than sentence production. This, too, is important for the goals of the dissertation, since my goal is to investigate perception. Priming as a way to probe syntactic knowledge is made particularly appealing by the fact that it has been found both

in production and perception. Recent eyetracking studies have shown that people anticipate that target stimuli will take the same form as prime stimuli (e.g., Arai, van Gompel, & Scheepers, 2007; Thothathiri & Snedeker, 2008). Comprehension effects like these, which show that *comprehension* is sensitive to recent exposure, suggest that priming is a promising avenue for exploring sociolinguistic processing and grammatical variation.

The most substantial body of structural priming research is still in the realm of production--perhaps reflecting the difficulty of monitoring and measuring grammatical perception as opposed to production. However, measuring production relies on participants' own inherent likelihood (indeed, capability) to produce either alternative. While it is easy to measure structural production for alternative forms that are neither meaning-contrastive nor socially contrastive (such as dative alternation), measuring production for forms that are socially distributed in any way would be much more difficult. That is, asking participants to *produce* structures which may not be a regular part of their native dialect would seem fruitless (unless the explicit goal of the research was to see what is needed to induce production of nonnative variants). But we know that listeners do capably *comprehend* grammatical sentences bearing nonstandard, nonnative, or even ungrammatical patterns (e.g., Kim & Osterhout, 2005). Here, I review a few key studies showing different dimensions of comprehension priming, relating them to the task of studying sociolinguistic perception.

Much psycholinguistic work has focused on the resolution of structural ambiguity, and the work on structural priming in comprehension reflects this focus on how people disambiguate constituent structures in a sentence whose surface form contains more than one possible hierarchical configuration. Studies have found that, just as exposure to a different constituent structure influences sentence production, participants can be primed to disambiguate one surface configuration to have either of two internal structures. In these cases, it is only the syntactic parse strictly speaking that is being primed for; surface form is unambiguous. In some ways, the experimental program I develop here, designed for morphosyntactic alternants, represents an inversion of this type of priming: where morphosyntactic variation is concerned, surface form is ambiguous--internal structure is

not (although some formal syntacticians have argued that internal structure differs between sociolinguistic variants of morphosyntactic form; e.g., Tortora & den Dikken, 2010). But it is useful to note that listeners' comprehension at the level of structural parse is also affected by priming, as it demonstrates the possibility that priming is a reflex of knowledge of underlying grammatical structure, rather than simply surface form.

An example of this work on priming structural parses is that of Branigan et al. (2005), which explored priming for globally ambiguous sentences involving phrasal attachment ambiguities. Attachment ambiguities occur when a sentence contains two possible structural attachment sites for a phrasal component. For instance, in "The spy saw the cop with the binoculars," the prepositional phrase "with the binoculars" could modify its nearest determiner phrase constituent, "the spy" (low attachment), or the verb phrase, "saw the cop" (high attachment) (Branigan, Pickering, & McLean, 2005:468). Branigan et al. exposed participants to a prime sentence with an attachment ambiguity, accompanied by a disambiguating picture depicting the action in the sentence, which primed either the high or low attachment parse. In target trials, participants saw a structurally similar sentence also with a prepositional phrase attachment ambiguity, and two pictures: one corresponding to the high attachment interpretation and one to the low attachment interpretation. When asked which picture corresponded to the sentence, participants were more likely to choose the picture corresponding to a high attachment parse when they had been primed with a high attachment picture; this effect was significant when the verb was repeated from the prime to the target sentence, but not statistically significant without verb repetition. For global sentential ambiguities involving meaning differences, then, participants' recent experience with a structure biased their following interpretations, when the same verb was used.

Other work in comprehension priming has investigated not just interpretations of internal structure, but *expectations* of structure that is different in word order at the surface level. This is somewhat more in line with my aims in using surface form ambiguity to probe perception of grammatical variants. Arai et al. (2007) used a visual world paradigm (cf. Tanenhaus & Trueswell, 2006), in which participants' eye movements to objects in a visual scene are tracked while they hear auditory stimuli, to

test the priming of ditransitive structures. Listeners were first primed by reading aloud sentences in either a prepositional phrase (Verb + Theme + Recipient) or direct object (Verb + Recipient + Theme) condition (similar to the dative sentence types used in Bock & Loebell, 1990). In the following target trials, listeners heard a sentence in one of the two conditions and were presented with visual objects corresponding to the possible themes and recipients. Listeners' eye movements indicated that they were anticipating arguments in accordance with the dative structure they were exposed to in the prime stimulus. That is, they looked to the more likely recipient or theme according to which structure they were expecting--they looked earlier to the object that would be the theme after hearing a prepositional phrase prime, while they looked earlier to the object that would be the recipient after hearing a direct object prime. In contrast to the parsing ambiguity work involving attachment sites studied by Branigan et al. (2005), this test involves participants' expectations of constituent order, rather than underlying syntactic parse.

Thus, we know that participants can be primed to provide certain semantic interpretations over others, or to anticipate certain word orders over others. While Branigan et al. (2005) showed priming effects for underlying structures that are *not* meaning-equivalent, Arai et al. (2007) showed priming effects for surface structures that *are* meaning-equivalent; the latter is actually more in line with the other priming work that has been undertaken in syntactic production, where participants produce one syntactic alternant. However, in neither case were the structural alternatives investigated *socially* conditioned or patterned. Meaning-equivalent or not, they are grammatical alternatives which bear no straightforward association with a social group, social context, or social style. Overall, the interpretation of sociolinguistically variable syntactic structures has not been a concern in psycholinguistics, with the field (much like generative syntax) appearing to assume a fixed, standard grammar (one exception to this is work on bilingualism and bilingual processing). However, Kaschak & Glenberg (2004) and Kaschak (2006) have found "structural facilitation" effects for a grammatical feature specific to the Midlands region of the US. These studies tested participants' ability to acquire the *needs* + past participle construction ("the car needs washed"), which was a

novel (non-native) construction to their participants. Their experiments were not carried out as priming tests, since priming is said to attempt to activate existing linguistic knowledge and the goal here was expressly to study the acquisition of nonnative grammatical forms, but their methods are similar to those of priming: they examine the extent to which exposure to alternative grammatical structures influences comprehension.

In Kaschak & Glenberg (2004), three experimental phases were used to investigate the acquisition of the new construction. In the first phase, participants listened to conversations that either included or did not include the *needs* construction. The second phase consisted simply of a time delay. In the third phase, participants read passages that either did or did not include the *needs* construction. Reading time on the passages was taken as a measure of whether comprehension of the novel structure (*needs*+past participle) reflected whether participants had been exposed to it in the first phase, with predicted lower reading times in the third phase for the participants who heard the construction, as compared to those who did not. Results confirmed that facilitation occurred; listeners' reading of the sentences in phase three had indeed been aided by their exposure to *needs* sentences in phase one. Implicit learning had taken place for this dialect-specific structure. In a followup study, Kaschak (2006) demonstrated that this learning was at an abstract level of syntactic structure, such that participants' reading of the *needs* construction in a pseudocleft structure ("It's the car that needs washed") was facilitated by their exposure to the typical *needs* construction in earlier trials ("The car needs washed").

Again, while these dialect acquisition experiments did not use priming techniques *per se*, the results from *needs* + past participle show that people can come to more readily comprehend dialect-specific grammatical constructions through repeated exposure. After exposure to the *needs* structure, not only were listeners faster to read sentences that included it, but they also gave better grammatical acceptability ratings (evidence for a "mere exposure effect" on grammaticality judgments; Luka & Barsalou, 2005), and they even applied the construction to different verbs (e.g., *wants* + past participle). Kaschak and Glenberg argue that their results support the notion of implicit learning of grammatical structures and episodic processing, such that listeners store unknown

structures in memory, making them available for activation and use in subsequent processing. These findings suggest that listeners encountering grammatical constructions not native to their own dialect do not simply disregard the structures, counter to mainstream psycholinguistic views. The authors say, "Because this view [that less preferred interpretations are simply disregarded] features prominently in virtually every extant theory of sentence processing, these results suggest that most sentence processing theories are either incorrect or incomplete" (Kaschak & Glenberg, 2004:464).

Though Kaschak and Glenberg do not approach dialect feature processing from the standpoint of exemplar theory, the idea that all encounters with novel constructions are stored and used in later comprehension situations is in line with the basic tenets of exemplar accounts of language competence and processing. And, their work is a step towards investigating sociolinguistic grammatical variation and how its perception (or comprehension) can be altered via grammatical (linguistic) means. However, the authors do not investigate whether speaker information affects how people learn the dialect structures. For structures that vary socially (such as the *needs* construction, an example of clear-cut regional variation), we might expect speaker information to make a difference in terms of what listeners anticipate a speaker to be producing, or in the learnability of a construction.

In other words, would social information modulate priming or learning effects in Kaschak & Glenberg's experiments? If listeners knew that this construction was related to regional dialect, and if they had reason to believe that the talkers they were exposed to either were or were not from the relevant region, would they be more or less likely to acquire the construction? Though it has not been a central focus of psycholinguistic investigation, there is some indication that nonlinguistic information plays a role in language processing. The next section reviews the limited findings, from within psycholinguistics and priming work, regarding social information and priming.

1.5.3 Priming and social information

This section reviews some work within speech processing that supports the potential relevance of talker identity and other social information to structural priming. I

consider any nonlinguistic information that pertains to speaker identity, whether at the individual or category level, to be part of "social information." That is, I am interested in humans' capacity to process language in concert with knowledge not only of macro-level social categories attributed to an individual, such as race or gender, but also micro-level properties such as individual speaker identity.

This operationalization of "social information" recognizes several aspects of sociolinguistic and psycholinguistic work. First and foremost, exemplar theoretic models of language predict that linguistic information is stored in memory along with nonlinguistic information; in the work on speech perception, this necessitates individual information in order to account for individual variation in the speech signal. Each initial memory trace ought to be stored with nonlinguistic tags that specify fundamentally the features of the individual who used them, and individual talker information can cue certain exemplars over others (see Foulkes & Docherty, 2006). Second, research within speech perception, and to a limited extent psycholinguistic work on speech processing, has found talker-specific effects on language processing. Thus, there is reason to believe that from an exemplar standpoint, individual talker identity and social category may both be relevant cues to linguistic perception.

Additionally, recent work within "third-wave" sociolinguistics has theorized the notion of *style* as a property of either social groups or individuals, wherein the social meaning of linguistic variation resides (see Eckert, 2008; Mendoza-Denton, 2008; Moore & Podesva, 2009). That line of research interprets linguistic variants as carrying social meaning (nonlinguistic, socio-indexical meaning) because of their association with a cluster of features constituting a *style*. But style may exist at the group or individual level; some speakers in communities are considered *icons* because their styles set a center for others in the group (Mendoza-Denton, 2008). Thus both social groups (which is the traditional focus of sociolinguistics) and individual talkers are significant in sociolinguistic models of linguistic variation and social meaning. In terms of structural priming, if priming effects are a result of similarity (like triggering like), then social similarities related to speech--such as individual identity, gender, race, or class--ought to affect priming, if social and linguistic material are represented and processed together.

To my knowledge, only one structural priming study has nodded to the potential effects of talker information. Thothathiri & Snedeker (2008) found priming effects for dative structures across a change in talker from prime to target, where talker and talker gender changed. Their experiment was a comprehension task where participants were faced with four objects, and they were to follow instructions to take certain actions on the objects ("Touch the soap"). The prime sentences consisted of "Bob," a male talker, telling a story about his day, where his last two sentences including either a double-object or prepositional object dative ("I read the boy a story"/"I read a story to the boy"). This was followed by the target sentences, where "Susan," a female talker, gave participants instructions on what to do with the objects, also in either dative condition ("Feed the zebra the candy"/"Feed the candy to the zebra"). Participants' eye movements reflected the order of verb arguments they had experienced in the prime, with more looks to the animal first following the direct-object primes.

Thothathiri & Snedeker's results suggest that priming is persistent from one speaker and one gender to another. However, neither individual speaker nor gender were manipulated across trials, and the researchers do not say why they chose to present the primes and targets spoken by talkers of different genders. They did not investigate whether priming would have been even greater if talker had not changed between trials. Also, the syntactic alternatives tested (dative alternation) were not sociolinguistically patterned--perhaps social information simply was not relevant to interpreting the likelihood of one of these structures over another. Thus, while Thothathiri & Snedeker's work provides further evidence for robust structural priming effects in comprehension, we should not conclude that these effects are insensitive to talker features.

While it is true that priming work on syntactic structures has not tested for nonlinguistic, talker-specific or social category-relevant effects on priming, recall that priming is a general cognitive phenomenon occurring across levels of language processing. Lexical access and speech processing are also subject to the constraints of linguistic priming. And within the study of speech perception, talker specificity, though not social category influence, has been shown to affect priming (Palmeri, Goldinger, & Pisoni, 1993; McLennan & Luce, 2005; Alexander & Nygaard, 2006; Creel, Aslin, &

Tanenhaus, 2008). In reviewing the literature on "specificity" effects in repetition priming, McLennan and Luce (2005) posit that a "repetition priming effect presumably arises because repeated activation of form-based representations in memory facilitates processing. Any significant attenuation in priming for stimuli that mismatch on some dimension (e.g., rate of speech) is referred to as evidence for specificity" (McLennan & Luce, 2005:307). Prime and target stimuli that possess a mismatch on some nonlinguistic dimension have been shown to lead to lower priming effects.

However, in many of the prior studies that they cite, specificity effects are only present for stimuli that are processed at long durations. That is, specificity effects emerge late in the time-course of speech processing. McLennan and Luce's experiments test this time-course hypothesis, by manipulating processing rate of the stimuli (easy vs. difficult processing), crossed with speech rate (Experiments 1A-1B) and talker identity (Experiments 2A-2B) in prime and target phases. They found that for both talker identity and speech rate, matched primes served as more effective primes than mismatched primes (i.e., a mismatch in identity or speech rate between prime and target phase caused longer reaction time latencies). But importantly, this was only the case for difficult words, and talker mismatch did not have an effect on the relatively rapid processing of easy words. The effect of prime and target similarity was only relevant when processing took longer, not when processing was rapid. The authors argue that this provides support for the "time-course hypothesis" for specificity effects: "When processing is probed relatively late ... indexical specificity effects of talker identity emerge" (316). This suggests that talker effects may come into play only in later stages of processing. Such work leaves open questions as to whether specificity effects might generalize to a) grammatical forms, and b) social categories, rather than simply talker individuation. As highlighted above, an exemplar-theoretic account predicts specificity effects for syntactic priming.

In fact, specificity effects have also been used to argue for exemplar models of speech perception. As Creel et al. (2008) write, more frequent phonemic exemplars should also be more prototypical for a listener; a central tenet of exemplar theory is that frequent exemplars are more easily activated than rare ones (though this conflicts somewhat with work on exemplar priming and surprisal, which shows that less-expected

forms are more subject to priming than more-expected ones, cf. Jaeger & Snider, 2008). The authors argue that if a non-phonemic property of speech, such as individual formants or speech rate, can become lexically contrastive such that it is used to cue lexical disambiguation, then that is strong evidence for an exemplar model of the lexicon. This follows because these non-phonemic properties must be encoded somehow in the lexicon, in order to serve as contrastive linguistic cues; it is unclear otherwise what mechanism would permit this mobilization of talker information in the perception of speech. However, Creel et al. (2008) argue from an exemplar perspective that the degree of linguistic distinctiveness between stimuli will affect the relevance of talker information. For two words that are very distinct linguistically, talker identity will not be a disambiguating contrastive cue; but, for two words that are near candidates, talker identity will be distinctive.

Creel et al. (2008) used eyetracking to examine people's eye movements to competitor words--words that might both be activated upon hearing their initial sounds (for instance, *cows* and *couch*). Participants chose the correct picture of the word via mouse click. In late blocks in the experiment, looks to same-talker competitors were higher than looks to different-talker competitors--competition between the words increased when the talker was the same. But, there was no effect of talker in the first two blocks. They call this the "talker disambiguation effect," where competitor activation was greater for same-voice cohort pairs than different-voice pairs, talker information being used as a cue to disambiguating between lexical items. Creel et al. use these findings to argue that talker information should be included in the lexicon; further, they suggest that lower-frequency words should show more specificity effects than high-frequency words, since their memory traces are less strong.

This dissertation follows and expands the use of priming by focusing on sociolinguistic perception, testing whether social information also acts as a factor in grammatical interpretation, in addition to recent exposure to a grammatical prime stimulus. This methodology is suited for the research goals: in testing for priming effects for socially variable structures, we can test whether implicit knowledge of linguistic variation is used during sentence processing. If nonstandard morphosyntactic structures

can be primed such that their subsequent interpretation is preferred, this will be evidence that listeners store these structures (or alternatively, that they are rapidly learned, e.g., Kaschak & Glenberg, 2004; Luka & Barsalou, 2005). We can also introduce social information into the experimental setting to examine its effects on priming, and we can investigate the activation of knowledge or representations that are both linguistic and nonlinguistic. Section 1.6 discusses how priming relates to exemplar theory in terms of representations.

1.5.4 Structural priming and exemplar theory

Structural priming effects are generally taken as evidence for abstract knowledge of syntactic structure which is (somewhat) lexically-independent, on the logic that if syntactic production/perception of the target is influenced by the prime stimulus, then the structures must be similarly cognitively represented along some dimension. That is, priming is a matter of similarity. The question posed by this dissertation is, Which dimensions of similarity will influence perception of variable grammatical patterns? Grammatical, social, or both? Modifying a structural priming technique allows us to "prime" for interpretation of socially rich stimuli (like the voice or picture of a talker) and "prime" for interpretation of a sentence, thus manipulating jointly two dimensions of sociolinguistic similarity (the social and linguistic) (for precedent in the use of photos to cue talker information, see Hay et al., 2006 or Staum Casasanto, 2009). If grammatical but not social information influences perception, that is support for the primacy or independence of grammatical knowledge. If social information also plays a role, however, that is support for the interdependence and mutuality of grammatical and social knowledge. This would bring sentence processing in line with recent accounts of speech perception, and indicate that exemplar models that center issues of variability and social information are on the right track.

Positive evidence for structural priming being affected by social information would also call into question the explanation typically given to structural priming effects, which is the abstract and *independent* storage of structural representations (see Branigan, 2006; Pickering & Ferreira, 2008). Yet exemplar theory presents an alternative

explanation for structural priming effects, which is also consistent with the possibility of social information proving influential over priming. Bod (2006), Hay and Bresnan (2006), Snider (2008, 2009), and Walsh et al. (2010) are recent advocates of this explanation of priming. Exemplar-theoretic syntax models differ from generative models primarily in assuming that what is represented in linguistic knowledge is not rules for forming structures, but simply static representations of linguistic structures, which may include grammatical features, though there is not wide agreement on this point. In Chapter 2.4, I discuss the "contents" of these exemplar syntax models at some length; the discussion here remains at the conceptual level in outlining an exemplar account of priming.

Hay & Bresnan (2006) point out that since syntactic priming results have been most strongly identified when the verb is the same from the prime to the target stimulus, priming is perhaps at some level about specific constructions, rather than abstract representations or rules that build those constructions. For instance, a verb-argument structure (such as the double-object form of the dative) is less likely to be primed when the verb itself is different from prime to target than when it is the same. This suggests that priming does not take place at a purely abstract structural level (as claimed by many of the researchers in priming; cf. Branigan, 2007), for if it did, there should be no difference in priming from one verb with the same argument structure to another (because what is primed is a representation of a generic structure specified only with grammatical categories, not individual lexemes). An exemplar-based explanation of priming takes the general principle of usage-based grammar approaches and applies exemplar-specific representations that build in notions of frequency and similarity, which can explain the differential activation of different structures, and the fact that priming is enhanced through greater similarity (Snider, 2009). Explanations of structural priming based on abstract structures, in contrast, do not provide a straightforward way to account for the fact that priming is not equivalent across all structure types, and in particular the fact that priming effects are sensitive to constructional frequency.

A more comprehensive account of priming and exemplars comes from Snider (2008, 2009; see also Jaeger & Snider, 2008), who shows through computational

simulations that exemplar models can account for structural priming effects. Snider's work involves corpus analyses of the active/passive and dative alternations. Theoretically, Snider (2008) suggests that prime constructions activates exemplars, and that the most likely activated exemplars are a matter of at least similarity and frequency. More-similar exemplars to the prime construction are more likely to be activated. More-frequent exemplars should also be more likely to be activated in the first place, because they are stronger--stored with more robust information and a higher probability, due to more tokens of experience. Activation then spreads to nearby exemplars, making them more likely to be produced subsequently.

Though Snider's (2008, 2009) work is based on corpus investigations of priming in the production of syntactic structures (and again, not sociolinguistically variable ones), and though his formal modeling is outside the scope of my discussion, the conceptual foundation behind his project is important, as it represents the first straightforward exemplar-theoretic explanation of structural priming. Snider explains that exemplars that are more similar are more likely to prime, such that the more closely a prime stimulus matches an existing exemplar, the more likely that exemplar is to be produced subsequently in the target (put alternatively, a prime stimulus will be most likely to activate the most similar exemplar to it). Snider (2008) finds, in a corpus investigation of both voice alternation and ditransitive alternation, that priming happens more often between more similar constructions. This is an extension of the typical finding within structural priming studies that repeating the verb from a prime to a target encourages the priming effect (Pickering & Branigan, 1998; Arai et al., 2007).

Snider shows, though, that it is not just verb identity (lexical identity) that drives this effect; if exemplar theory is correct, one would expect a more general similarity-based processing should be at work rather than a verb-specific identity. Rather, Snider shows that a complex distance metric is predictive of priming: passive constructions are more likely to follow passive constructions the more similar the following construction is to the prime along dimensions such as animacy, definiteness, and verb bias. Snider (2009) also finds this for the dative alternation, suggesting that it is "evidence that prime-target similarity significantly strengthens structural priming: target tokens that share more

features with the prime are more likely to repeat the prime construction" (819).

The dissertation takes up Snider's (2008, 2009) and Walsh et al.'s (2010) supposition that priming is a matter of exemplar activation, and extends the possible dimensions of relevant similarity from lexical and grammatical to social (as per Hay & Bresnan, 2006). However, in addition to similarities between prime, target, and exemplar, we can also consider the "resting activation level" of exemplars as relevant to sociolinguistic processing. This is the baseline probability level at which an exemplar sits while stored in memory (we can think of this as how "ready" an exemplar is to be activated). Typically, it is thought that more-frequent items have a higher level of resting activation than less-frequent items. Snider claims that upon exposure to a syntactic alternative, the closest-matching exemplar's resting activation level is increased. Thus in a perception context (though Snider does not address it), the primed alternative should be more likely to be the exemplar against which ambiguous input is matched, because it is more highly activated. On this account, structural priming works by a mechanism of activation, with an exemplar's probability of being activated contingent both on the similarity it bears to the input, and the extant probability of encountering it based on overall frequency.

Recency contributes to higher activation by stimulating existing exemplars. More-frequent items will be stored with higher "resting activation levels" that make their activation more likely. However, in terms of priming, Snider finds support for an "inverse frequency effect," where less-frequent constructions garner larger priming effects than more-frequent constructions. Since activation spreads to many other exemplars for high-frequency constructions, the overall effect of the prime's activation on any given exemplar will be smaller. For low-frequency constructions, however, fewer exemplars will be activated, making the effect on each one larger. Prime exposure thus effects low-frequency constructions more than high-frequency ones. This interaction between frequency and recency, where low-frequency items are more susceptible to priming than high-frequency items, has been discussed elsewhere in the structural priming literature (e.g., Bock, 1986; Jaeger & Snider, 2008; Reitter, Keller, & Moore, 2011) and in the lexical priming literature (e.g., Forster & Davis, 1984). The dissertation results suggest

that this effect may not hold for sociolinguistic variants, however; as discussed in the concluding chapter, in my results, less-frequent variants are more difficult to prime than more-frequent variants.

The notions of similarity and frequency make apparent the utility of a priming paradigm for investigating sociolinguistic processing in particular. In terms of sociolinguistic variation, we might expect that whatever variant is the norm for a given speaker (e.g., more frequent) will sit at a higher level of resting activation as compared to whatever other variants they have exemplars of, but that an atypical variant's activation is possible via grmmatical exposure. And by varying social dimensions of prime and target stimuli, priming can help in identifying the types of similarities which are relevant in perceiving grammatical structures. As Foulkes and Docherty (2006) write, "The exemplar model intrinsically captures the observation made…that no natural utterance offers linguistic information without simultaneously indexing some social factor" (426). Such a position suggests that any priming should be subject to social influences--but especially so for sociolinguistic variables.

In a major attempt to build a unified exemplar theory capable of handling both phonological and syntactic production and perception, Walsh et al. (2010) highlight the necessity of accounting for three aspects of linguistic processing: similarity, frequency, and recency effects. Walsh et al. suggest that taking these three factors as central components, exemplar theory is a sufficiently capable theory of linguistic competence and processing, because analogical processes are used both to analyze new sentences and produce novel utterances (see further discussion in Chapter 2.4). The authors report successfully simulating a grammar that achieves good results for both phonological categorization and for syntactic grammaticality judgments. The authors achieve this by building a model which may match exemplars either at the *unit* level, which for syntactic material consists of phrases, constructions, or sentences; or at the *constituent* level, which for syntactic material consists of words.

Is it necessary to add "social indexicality" as a fourth factor that any realistic exemplar theory must address? If Hay and Bresnan (2006) are right that a socially-informed exemplar syntax provides an empirically adequate account of grammar, one

should assume that social information should also be relevant to these priming effects involving sociolinguistically variable structures (cf. Guy, 2011). This possibility has been articulated within speech perception: Hay, Warren & Drager (2010) posit "exemplar priming" to explain why the dialect of the experimenter in speech perception tasks (whether a US or New Zealand English speaker) affects participants' perception during the experiment itself. Noting that more recently encountered utterances have a higher activation level than older utterances (the "recency" effects tested with priming paradigms), they claim, "Socially and contextually relevant exemplars may be more readily activated on a given occasion than less relevant exemplars, biasing perception and production toward these primed exemplars" (8). Priming can thus be used to test predictions made by exemplar theory about the likelihood of priming given speakers' prior and recent experience with grammatical variants and accompanying social information. The next section discusses the type of sociolinguistic variation--morphosyntactic variation--whose perception I will be examining, and rationalizes the use of the relevant linguistic forms to explore these exemplar-theoretic claims.

1.6 Morphosyntactic variation and perceptual ambiguity

The dissertation seeks to explore grammatical perception, and to the extent that claims about competence may be made on the basis of behavioral evidence, what perceptual evidence indicates about grammatical competence. Within sociolinguistic variationist research, it is often stated that grammatical variation is the most dramatically socially stigmatized, more so than phonological variation (e.g., Wolfram, 1991). If this is the case, it seems apparent that we should be able to locate social influences on grammatical perception, since such statements presume that social judgments are intrinsically linked to the perception of grammatical forms. Yet perception research has not tested grammar as a locus of sociolinguistic processing (Campbell-Kibler, 2010b), and most work on grammatical variation has been within the realm of production (however, even work on documentation of grammatical variation is lacking when compared to the vast body of research on phonological variation; see Szmrecsanyi & Kortmann, 2009). I aim to explore this type of linguistic variation from the position of the

perceiver (the listener/reader), rather than the speaker. How does grammatical variation play out in contexts of comprehension, and how do listeners shift expectations of grammatical form depending on social factors (if they do indeed do this)?

Within their native language, listeners are clearly capable of comprehending, to varying degrees, what is natively ungrammatical to them as well as what is natively grammatical, just as they can interpret vowel alternations that they themselves do not produce (and of course speakers themselves may have multiple native variants of a grammatical phenomenon). Yet I am not necessarily interested in the fact that we are capable of *comprehending* such forms--comprehension is a matter of mapping surface form onto underlying meaning, just as with mapping phonetic variation to a phonological category. Rather, I am interested in the *perception*--better put as the *expectation*, perhaps--of surface form itself, since surface form is where sociolinguistic variation manifests. In my perspective, then, the aim of exploring grammatical perception (as with phonetic perception) ought to be to ask what form of a sentence, out of several possible forms, a listener believes they have experienced, or expects to experience in the future. Crucially, the interest is not in whether one perceives a sentence as grammatical or well-formed (grammaticality judgments being inevitably confounded by language ideology and overt social evaluation), but actually in *which version of a sentence* one has perceived. This is akin to asking which vowel variant someone has perceived out of a set of possible variants in a given context (e.g., Niedzielski, 1999; Hay et al., 2006).

To test which version of a sentence someone has heard, then, requires the use of sentence stimuli that are ambiguous with regards to surface form. A listener's interpretation of such ambiguous grammatical form should reflect their expectations given the linguistic and social context of the utterance. Which factors are involved when someone determines whether more than one grammatical variant is possible in a situation--and then, which variant is more likely to be expected? These are very different questions from those that have traditionally been asked of sentence comprehension. Investigations of the interpretation of grammatical form have typically been limited to asking listeners about grammatical well-formedness or acceptability within syntax (see Schütze 1996 for discussion), and factors altering acceptability judgments within

psycholinguistics (e.g., Luka, 1998; Braze, 2003; Luka & Barsalou, 2005; Francom, 2009). Within psycholinguistics and neurolinguistics there is also a great deal of work on the disambiguation of underlying sentence structure and responses to syntactic anomaly, which seeks to probe underlying mental representations of syntactic structure (when behavioral methods are used) and the brain areas and functions that handle linguistic processes (when brain imaging is used). Yet to my knowledge, none of these questions has been considered in interaction with social or speaker context. As my interest is not in grammaticality judgments or *structural* ambiguity resolution, but rather in surface form ambiguity, the dissertation presents new methods which merge techniques from psycholinguistics and sociolinguistics.

The first step in developing these methods is to outline the type of grammatical ambiguity that can be exploited for testing within a perception paradigm. Studies of speech perception take advantage of the ambiguity possible between two phonetic variants that may be introduced independently of semantic meaning, or that need not alter semantic meaning (though distinctions in meaning may be used as a methodological resource, for instance in the lexical decision tasks undertaken by Hay et al., 2006). This is what is meant by the central analytic concept within sociolinguistics used to describe and quantify sociolinguistic variation: the *sociolinguistic variable.* A sociolinguistic variable is a unit of linguistic structure that has variant formal realizations corresponding to the same semantic content (or phonemic category) (Labov, 1972; Lavandera, 1978). This definition has led to lively debates within sociolinguistics regarding the status of grammatical variation (morphosyntactic or syntactic) in formal sociolinguistic theory (see especially Lavandera, 1978; Romaine, 1981; Cheshire, 1987, 2005). Though sociolinguists have been interested in grammatical variation both in terms of language change and synchronic language variation, they have sometimes struggled to fit grammatical variation into a variationist paradigm which relies on quantification and rule-based prediction of variable phenomena.

Much of the in-field debate has surrounded the need for *meaning* to remain unchanged through variant surface realizations in order for quantification to be capable of illucidating *social* variation, as opposed to variation conditioned by semantic or

pragmatic factors. As Cheshire (1987:260) writes, "The main criticisms that have been made against extending the linguistic variable to syntax concern the problems involved in establishing 'semantic equivalence.'" That is, syntactic alternatives for the "same content" often carry referential or pragmatic distinctions, making them qualitatively different from phonetic alternatives. With phonetic variants, extralinguistic manipulations may be used to show what role different sources of information play in listeners' resolution of a phonemic category. It is less clear how the same exploration of social influence might be carried out on sentence processing, since what is being manipulated is the interpretation of grammatical patterns, which seem inherently connected to referential meaning.

For the experimenter wishing to test the perception of syntactic variation, the need for semantic equivalence would then seem to pose a problem. Where syntactic variants are agreed to be of some essential referential equivalence (such as voice alternation between active and passive forms, or dative alternation between double-object and prepositional-object constructions), their relevance for sociolinguistics is questionable if they fail to carry socially-based distinctions. In fact, both Romaine (1981) and Winford (1984) claim that "pure" syntactic variation, involving word order, is *not* socially or stylistically conditioned, while morphosyntactic variation is. Hence, for instance, differences in word order (or passive form) would not be identifiably spoken by different speakers or dialect groups of a language, whereas differences in verb forms would. On the other hand, Bender (2007) has argued that syntactic contrasts (including those involving more than one word) *can* have purely social meanings, saying that "[s]ocial meaning can attach to any level of linguistic structure" (354). It is clear that structures such as copula optionality in African American English, the focus of Bender's study, are purely syntactic and carry social correlates (though Bender's methods rely on measures of grammatical acceptability among different listener populations, rather than grammatical perception where different talker characteristics are involved as contextual manipulations).

Indeed, copula deletion, as just one example, raises a seemingly fundamental problem in the experimental investigation of grammatical perception. How would one test whether a listener had perceived a copula to be present or not, when that perception

involves the presence or absence of a whole lexical item? The central method of experimental sociolinguistics since Niedzielski (1999) has been to present listeners with ambiguous or gradient input, and identify the social cues used in disambiguating that input. Carrying this method over to syntactic stimuli presents a difficulty, since the linguistic material that is in perceptual question is not easily rendered ambiguous or gradient, because the feature itself is categorical (e.g., a copula is either present or absent). Such could be said for many features of pure syntactic variation or alternation, including dialectal forms which have been investigated from a processing standpoint, such as the *needs* + past participle construction (e.g., "needs washed"; see Kaschak & Glenberg, 2004; Kaschak, 2006). And this raises the issue, aside from semantic equivalence, of the perceptual unit to be studied within grammatical variation: *prima facie,* grammatical patterns are more categorical and less gradient than phonological ones (and in fact this categoricity has been a major tenet of mainstream generative theories of grammar, wherein parameter settings are argued to be responsible for inter- and intra-language variation).

There is, however, a common type of sociolinguistic variation that is intermediary between the phonological and the "pure" syntactic. Morphosyntactic variation, particularly phenomena of agreement and concord, offers a way to explore sociolinguistic perception beyond the level of phonological variation without sacrificing the use of linguistic ambiguity as an experimental resource. For instance, in English, there are well-documented patterns whereby BE is regularized to cooccur across singular and plural nouns (*we was here; the dogs was eating; you was hungry; the shows is on*).

Work within formal syntax has attempted to explain this type of variation by explicating how different morphological markings of syntactic features or processes are triggered (e.g., Henry, 1995; Adger & Smith, 2010; Nevins & Parrott, 2010). An alternative type of generative explanation for morphosyntactic variation relies not on feature specifications but on configuration of syntactic structure (e.g., Rupp, 2005; Tortora & den Dikken, 2010). It is outside the scope of my discussion to go into detail about these formal accounts of morphosyntactic variation; none of these accounts relies on experimental evidence for support, and none entertain the possibility of exemplar-type

representations, formed from experience, as a foundation for the production of variation.

While I in no way mean to suggest that morphosyntactic variation ought to be the only type of grammatical variation studied within perception (as Romaine, 1981 might suggest, when she draws a hard line between morphosyntax and "pure" syntax), for methodological reasons, it seems a good level of variation at which to begin investigating social influences on grammatical perception. Morphosyntactic agreement variants are semantically equivalent, in that there is no referential difference between what is expressed by a standard and a nonstandard variant. These variants also potentially lead to linguistic uncertainty, making them good candidates for investigating in a perceptual setting where social information is at issue.

Take the examples in Table 1.1 as illustration. Each example shows common forms of subject-verb agreement in English (as discussed in Wolfram, 1991; Kortmann, 2006). In these alternate expressions of agreement, the difference is in form, not meaning: (a) and (b) are semantically equivalent. (For further discussion of morphosyntactic variants and semantic equivalence, see Pietsch, 2005:30). In a sentence processing context, if a comprehender has reason to believe that they might encounter either variant, the sentence frames leave room for grammatical ambiguity: (c) could be interpreted as either (b) or (d).

Table 1.1
Morphosyntactic Variation in English as a Source of Potential Ambiguity

(a) standard sentence	**(b) nonstandard variant of meaning in (a)**	**(c) ambiguous frame of (b) verb**	**(d) standard completion of ambiguous (c) frame**
she doesn't like it	she don't like it	___ don't like it	they don't like it
we were here	we was here	___ was here	she was here
she goes to work	she go to work	___ go to work	they go to work
there are movies showing	there is movies showing	there is ___ showing	there is a movie showing
the cars are out	the cars is out	___ is out	the car is out
the girls have been playing	the girls has been playing	___ has been playing	the girl has been playing

In Table 1.1 and throughout the dissertation, I label these subject-verb patterns as

"standard" and "nonstandard." My use of these labels to refer to these agreement variants is not meant to imply social evaluation of users of either "standard" or "nonstandard" forms; neither is it meant to indicate anything about frequency of use (as this will depend, at any rate, on the population of interest). Researchers have many different ways of categorizing alternative forms of agreement, including "nonagreement," "nonconcord," or terms that are specific to lexical items or constructions (e.g., "plural agreement," "singular concord," "invariant *don't*"). For the sake of convenience and readability of the dissertation experiments, results, and discussion, I apply "standard" and "nonstandard" as cover terms; this accords with the terms used by Murray & Simon (2004) and José (2007), among others. This terminology also permits me to refer to multiple morphosyntactic variables by the same terms, rather than specifying the precise agreement characteristics for different variables.

Such agreement variation as that illustrated in Table 1.1 is among the most widespread type of variation across varieties of English (Kortmann, 2006) and is considered socially diagnostic, with the forms I label "nonstandard" often being highly stigmatized (Wolfram, 1991; Murray & Simon, 2004). We might assume that for some listeners, when encountering an ambiguous sentence frame such as those above in (c), the standard completion is typically expected, while for others, it is the nonstandard (depending on native dialect). Yet even for standard speakers, the standard interpretation may not always be the preferred interpretation if constraints or cues other than strict, standard grammaticality are relevant to the processing task (on the possibility of "overriding" grammaticality constraints, see e.g., Kim & Osterhout, 2005).

As a grammatical feature of English, listeners constantly encounter subject-verb agreement forms, and it is likely that most English speakers have some experience with both standard and nonstandard agreement patterns. In particular, if an interlocutor expects that the talker is of a certain social type--or a certain individual--thought to use nonstandard features, nonstandard agreement patterns may be more likely to be expected. This should also work in the other direction, for standard patterns to be expected for standard-speaking social groups.

There is some precedent within the priming literature for the susceptibility of

agreement production to priming effects; though not from a sociolinguistic standpoint, Haskell and Thornton (2010) have argued that knowledge of agreement patterns is, at least partially, based on experience. They conducted a priming experiment to test for participants' production of subject-verb agreement mismatches with collective noun phrases. These were phrases whose head noun is grammatically singular in American English (e.g., *the class of children*). After reading a series of sentences with collective noun phrases embedded within a story, participants had to complete sentence fragments that also included collective noun phrases; the task elicited the verb form as part of the sentence completion. Participants' use of number agreement mismatches with a plural verb (*the class of children were* rather than *the class of children was*) was higher when they had been exposed to sentences using plural verbs as opposed to singular verbs. Haskell and Thornton's study suggests that subject-verb agreement use is sensitive to contextual information, and that patterns are represented as a reflection of experience. By using tasks that engage participants in completing sentences in favor of either standard or nonstandard agreement, we can accomplish the goal of testing grammatical perception without testing explicit grammaticality judgments--and we can do so for sociolinguistically variable structures.

The dissertation experiments collect listeners' interpretations of sentences involving potentially ambiguous verb frames like those in Table 1.1, by presenting participants with just such ambiguous frames, and having them choose between noun forms to complete a stimulus sentence. The experiments test whether listeners' perceptions of the grammatical form of the sentences is modulated via the manipulation of grammatical or social factors. In particular, the experiments expose participants to unambiguous standard and nonstandard forms within a priming paradigm, collecting their responses to target sentences that are ambiguous. A linking assumption is that these behavioral responses will shed light on listeners' stored knowledge of this type of variation.

In exemplar-theoretic models of phonological knowledge, it is assumed that listeners' perception is swayed by social factors because listeners have stored memory traces of phonetic material along with social material, and these sources of information

are dually activated via exposure to phonetic and social input (however, as mentioned earlier with regards to the storage of linguistic features, exemplar models are not clear in delineating *what* social information is stored, *how*, or *how much*). The dual activation makes it possible for social cues to bias perception, as listeners' processing systems match the input to stored exemplars. Similarly, if grammatical knowledge is stored as a collection of memory traces, then English speakers will likely have stored exemplars of both standard and nonstandard patterns, either of which could be more highly activated during sentence processing. Additionally, these grammatical patterns should be stored not independently of social knowledge, but in tandem with knowledge of social attributes that have been experienced with them. If one has stored exemplars from individual speakers--which is presumed by exemplar theory's storage of individual instances of linguistic experience--then speaker itself should be a factor in grammatical perception, represented and activated with grammatical patterns. Listeners should use these sociolinguistic connections when exposed to ambiguous linguistic input, such that varying both grammatical and social information ought to influence sentence interpretation.

This section has explained the use of morphosyntactic variation as a type of sociolinguistic variation for which we might expect to find sociolinguistic processing, and which can lead to perceptual ambiguity in sentence interpretation. The dissertation uses a structural priming paradigm to test the perception of morphosyntactic agreement patterns in two particular agreement variables; both the priming paradigm and the specific variables are discussed in the next chapter.

CHAPTER 2
METHODOLOGICAL OVERVIEW

In order to explore grammatical perception as discussed in Chapter 1, the experiments for this study use English constructions that show patterns of morphosyntactic variation in subject-verb agreement. Two sociolinguistic variable constructions, NP+*don't* and *there's*+NP, are tested in all experiments. Henceforth, because of potential confusion over calling these constructions "variables" while also discussing variables within an experiment (independent/predictor or dependent variables), I will use the term "construction" to refer to NP+*don't* and *there's*+NP, and I will use the term "variant" to refer to the different agreement manifestations of each construction ("standard" or "nonstandard") as discussed below. I profile these two sociolinguistic constructions before proceeding to the details of the experimental methodology.

The dissertation reports the results of seven experiments, all of which share the common goal of identifying priming effects as evidence for sociolinguistic processing of a kind predicted by exemplar theory. Three experimental design types are employed: *short-term priming*, *social priming*, and *long-term priming*. These three differ in their goals and procedures, as discussed at a general level in this chapter and in-depth in the chapters that follow. This chapter concludes with a discussion regarding the cognitive representation of the morphosyntactic constructions being tested. This links the experiments directly with exemplar-theoretic models of syntactic structure and with exemplar-theoretic predictions about grammatical perception.

2.1 Morphosyntactic variables

2.1.1 On "agreement"

In choosing a class of grammatical alternatives to test for priming effects, two characteristics were taken into account: actual variability and the potential for grammatical ambiguity. That is, I needed linguistic variables that are known to vary in production patterns, and with social properties; these variables also needed to be made rendered potentially ambiguous in an experimental context, so that study participants could be tasked with disambiguating input towards one variant or another. The discussion in Chapter 1.6 highlighted how agreement phenomena meet the criteria both for variation (variable patterns occur across varieties of English) and for morphosyntactic ambiguity (when encountering a sentence frame including only a verb or only a subject noun, one of two agreement forms may be interpreted as cooccurring, as outlined in Table 1.1 in Chapter 1). For the purposes of this dissertation, two specific clause constructions were chosen to investigate; they represent morphosyntactic variables whose perception might reasonably be expected to be affected by social information because of the variation that they demonstrate among speakers of English.

Before discussing these two constructions, a technical note is in order about my use of the term "agreement," which is often used interchangeably with "concord" (cf. Corbett, 2003). Both terms suffer from a lack of precision among scholars about the characterization of the syntactic phenomena they name. While "agreement" and "concord" are typically used to name the manifestation of a grammatical relationship between constituents in a sentence, they are sometimes used to refer only to one specific manifestation of that relationship. So one might say that when the verb and noun form match in number, one has *agreement* or *concord*, whereas when they do not, one has *nonagreement* or *nonconcord* (Crawford, 2005; Rupp, 2005; Tortora & den Dikken, 2010). Yet at other times, these terms are used neutrally to refer to *any* manifestation of this relationship, talking about one *type* of agreement or another (e.g., Murray & Simon, 2004).

How one uses the terms may be based upon a theory of what kind of entities

syntactic relations are: generative scholars tend to talk about *non*concord or *non*agreement, as if dialects that have such forms are somehow lacking. Sociolinguistic and usage-based views tend not to do this, perhaps in rejection of the prescriptivist assumptions perceived to be behind considering certain forms of agreement as grammatical defaults. It is thus important to clarify my use of these terms in the context of this dissertation. By "subject-verb agreement," I mean the cooccurrence of a subject noun and the verb that predicates of the noun. Specifically in English, this names the relationship between the number of the noun and the number inflection of the verb. I take "agreement" to be the morphological reflection of the subject and verb's cooccurrence, whether the verb realization is standard or not. I thus use the less restrictive sense, and do not take a stance on whether what I am calling "nonstandard" agreement is actually "nonagreement" (e.g., the *lack* of agreement), which is a term sometimes used by generative syntacticians attempting to locate the origins of surface form in underlying structure and/or derivation.

I am not sure which term carries less prescriptive connotations, but to situate this study sociolinguistically and foreground the issue of social variation, I use "agreement" in this general sense of subject-verb *relation*, which then may manifest in variant ways, as either standard or nonstandard. This is in line with more sociolinguistic-oriented studies of English dialect differences, and the term "nonstandard agreement" is used at least by Miller (1981), Spears (1991), Weldon (2003), Murray and Simon (2004), José (2007), and Walker (2007). "Nonstandard" and "standard" are general sociolinguistic terms that, while not unproblematic, locate linguistic variation in a social world where variants are differentially used by different social groups of speakers or within different social contexts, and critically, where variants are also differently evaluated across speakers and groups. Thus, despite the problems they engender, I maintain these terms for the purposes of describing my experiments and results.

2.1.2 Morphosyntactic constructions

In an overview of grammatical features of colloquial American English, Murray and Simon (2004) distinguish features that are regionally specific from features that are

"socially and stylistically diagnostic" and as such recognized as "vernacular" (Wolfram, 1991 also approaches dialect feature description in this way). In Murray and Simon's scheme, "nonstandard agreement patterns" are categorized as being socially, rather than regionally, diagnostic. However, as Feagin (1979:186) notes, "lack of agreement between subject and verb has been one of the stereotypes of Southern vernacular, or working class speech." African American English is also noted for subject-verb agreement patterns that it shares with other nonstandard varieties (Labov, Cohen, Robins, & Lewis, 1968; Wolfram, 1991; Weldon, 1994). The associations most (standard) English speakers may have with nonstandard agreement patterns may center on some combination of Southern or African American, rural, or working-class speech.

Murray and Simon (2004) also point out that of all of the grammatical features they mention, few variants are likely to be considered uninterpretable to a speaker who does not natively produce them; this is in contrast to pronunciation differences, which can often lead to comprehension problems (222). Though a listener may not have a particular agreement variant in their native variety, the form will rarely be difficult to interpret in terms of sentence meaning (the verb form being a relatively superficial feature as compared to the number of the noun, for the purposes of computing sentence meaning). That is, interpretation likely focuses on understanding the noun and interpreting the verb to accommodate the noun number that has been processed, with the form of the verb then readily available to carry stylistic marking (Wolfram & Schilling-Estes, 2006).[1]

Pietsch (2005) elaborates on the fact that agreement variation does not typically lead to misinterpretations of content. Pietsch discusses this in the context of the cognitive representation of grammatical variants, suggesting that surface-level form distinctions may be stored without carrying semantic meaning distinctions in a construction-based approach to grammar, which is somewhat difficult to achieve in a generative theory. Pietsch's discussion supports my supposition regarding the perceptual ambiguity of agreement variants: perceptual ambiguity is possible because comprehension itself

1. Though not as a component of regional or social dialect features, the processing of number agreement and agreement "errors" has been studied in the psycholinguistics literature, see for instance Bock, 1995; Bock et al., 2001; Bock et al., 2004; or Acuña-Fariña, 2009.

(understanding the message) is not limited by the variation--and further, because sentence meaning is not unclear, stylistic meanings to grammatical variants may be readily processed or learned.

Murray and Simon (2004:223) show that nonstandard agreement patterns are frequent in colloquial American English, particularly with the verbs BE, DO, and HAVE. To test the perception of grammatical variation, and the potential influence of social factors on that perception, two nonstandard agreement constructions were chosen for the dissertation experiments: a singular subject with the negative verb *don't*, and a plural subject with the existential form *there's*. These verb forms also occur in the standard constructions of a plural subject with *don't* and a singular subject with *there's*. These forms thus permit the presentation of sentence frames which include the full verb form but leave the number (singular or plural) of the subject noun ambiguous, as in (3a-b):

(3a)	$NP_{?}$ + *don't*	"The truck/trucks don't run"
(3b)	*there's* + $NP_{?}$	"There's a truck/trucks in the driveway"

The dissertation experiments use participants' choice between a singular and plural noun, in various sentence completion tasks incorporating these constructions, as a measure of whether participants believe they have experienced a standard or nonstandard variant (or of whether they believe a particular talker to have produced a standard or nonstandard variant).

Before proceeding to discuss previous research on these constructions, another note is in order regarding my conceptualization of the variation between their forms. When analyzing a syntactic (or morphosyntactic) "sociolinguistic variable," the typical formulation would be that the locus of variation is in the verb realization (e.g., a singular noun either occurs with a singular or plural verb). However, my experiments investigate this variation via explicit exploration of the interpretation of subjects, rather than verbs. The same reasons cited above as to why perception, rather than production, is investigated, apply here, but in a more task-sensitive way: asking participants to choose between a singular or plural form of identical verbs would be unachievable without

asking them to complete the task with verbal output (i.e., actually saying or reading a word). This introduces a highly salient metalinguistic component to the perception task, and further relies on participants to be likely to produce forms that they may not typically produce.

In contrast, asking participants to choose between a singular or plural noun can be done via photographic stimuli, rather than verbal stimuli, thereby at some level reducing metalinguistic attention, at least insofar as social judgment about grammatical form is concerned. This is important for the goal of measuring lower-level perception, rather than metalinguistic grammaticality judgments. The dissertation experiments invert the grammatical system somewhat. In production, we may think of the nouns as being controllers of agreement where the targets are the verbs, whose form may change to reflect agreement processes (as was done in Haskell & Thornton, 2010, in their study of priming agreement). In a perception task however, I am treating verbs as perceptual controllers, which ought to signal the number of the subject that is expected in a given sentence--seizing on the phenomena of agreement as one of surface co-occurrence between two elements. In other words, I am treating these forms truly as *constructions* in the sense of, for instance, Goldberg (2003).

Thus, while the classical formulation of a "sociolinguistic variable" consists of that labeled "classic" in Table 2.1, my formulation is given on the right side as the "experimental" formulation of the sociolinguistic variables in question.

Table 2.1
Sociolinguistic Variables: "Classic" versus "Experimental" Formulation Used in the Dissertation

Construction		**Classic Formulation**	**Experimental Formulation**
There + BE	Sociolinguistic variable	*there* + BE + NP_{PL}	*there's* + NP
	Standard variant example	*there are/'re dogs*	*there's a dog*
	Nonstandard variant example	*there is/'s dogs*	*there's dogs*
DO + *not*	Sociolinguistic variable	NP_{SG} + DO + *not*	NP + *don't*
	Standard variant example	*the dog doesn't*	*the dogs don't*
	Nonstandard variant example	*the dog don't*	*the dog don't*

Though these construction variants are attested by many sources as widely present across English, Szmrecsanyi and Kortmann (2009) point out that there is a general lack of quantification of morphosyntactic variation, which is one fundamental way in which the study of grammatical variation has been more limited within sociolinguistics than that of phonological variation. However, these forms are consistently attested as occurring within U.S. varieties (Murray & Simon, 2004; Wolfram, 1991) as well as Englishes around the world (Kortmann, 2006; Kortmann et al., 2004), and an additional reason I chose them is for the notable difference in their relative social markedness, with nonstandard *don't* apparently carrying a higher level of stigmatization, according to the literature, than nonstandard *there's,* which in fact seems to be moving into standard dialect (Kortmann, 2006; Crawford, 2005).

These diverging social statuses provide two different tests for priming in the dissertation experiments, with differential predictions stemming from an exemplar-theoretic explanation of priming. This prediction difference is rooted in the presumed *resting activation levels* of the standard versus nonstandard variants. A central feature of exemplar theory is that of frequency: exemplars of more-frequent items are more robust than exemplars of less-frequent items, and high-frequency items thus have a higher resting activation level--that is, they are more readily activated by input stimuli. The widespread presence of both of these variants supports the notion that most native English speakers will have had some experience with them, and thus have exemplars of both construction variants stored. Yet we would not expect the two variants (standard and nonstandard) to be as readily activated: we would expect a standard variant to be the "baseline" favored interpretation for most speakers in my subject population (which consists of members of the University of Michigan community), the most readily activated form with a higher resting activation level. We would furthermore expect priming to be less likely when the nonstandard variant is less frequent and more stigmatized, as seems to be the case for *don't* relative to *there's*. The difference in social correlates for the two constructions was appealing for testing precisely these types of claims, and for exploring the nexus of the effects of frequency of exposure, social markedness, and social context on morphosyntactic perception. To elaborate on the two

constructions' differences, in the section below I summarize what has been documented about each construction's occurrence.

2.1.3 Nonstandard *don't*

Murray and Simon (2004) list the occurrence of a singular, third-person noun or pronoun with *don't* as a common feature in Colloquial American English (as does Wolfram, 1991). They elaborate the structure of the NP_{SG}+*don't* variant by highlighting mismatching number agreement between subject and verb; (4a) gives their template explanation and (4b) gives one of their examples:

> (4a) singular subject + plural, present tense DO + contracted NOT
> (4b) *That meatloaf don't look too healthy.* (Murray and Simon, 2004:224)

This "singular subject + plural, present tense VERB" is a pattern not limited to use with *don't*. For instance, Wolfram (1991:289) notes the commonness in African American English of the lack of *-s* marking on full verbs cooccurring with third-person singular subjects ("he run"). In terms of the social distribution of nonstandard *don't,* Murray and Simon (2004) claim that it is among the socioeconomically varying, non-regional nonstandard grammatical features of Colloquial American English. They also note that in general, most morphosyntactic features that show social patterning in the US do so by social class, not region (echoing Wolfram, 1991). In addition to its documentation in specific communities as discussed below, nonstandard *don't* is attested in vernacular US varieties generally (Wolfram, 1991:292) and in varieties around the world (Eisikovits, 1991; Kortmann, 2006:610). This feature is also sometimes called "invariant *don't*," indicating that the *do*-form is used in third person regardless of subject number.

While there is no study investigating the widespread quantitative or stylistic distribution of nonstandard *don't* in American English, its use is documented in detail in several specific communities, including Appalachian English and Ozarks English (Christian, Wolfram, & Dube, 1984; Montgomery, 2004), African American English (Labov et al., 1968; Weldon, 1994), Alabama English (Feagin, 1979), Arkansas English

(Dumas, 1971), and outside of the US, Inner-Sydney English (Eisikovits, 1991). Eisikovits' work on Inner-Sydney English (Australia) is the only one to focus exclusively on subject-verb agreement variables and their social variation; thus, though this dialect is not one I expect my US participants to be familiar with, I discuss her findings at some length here. As Eisikovits reports in her Table 16.1 (237), the percent realization of third-singular *don't* as opposed to *doesn't* is over 60 percent in each of the varieties just listed.

In terms of social correlates to the usage of invariant *don't*, Eisikovits finds that among her working-class Inner-Sydney English speakers, males use the feature far more frequently than females, and that gender interacts with age such that older boys use the features significantly more than younger boys, while for girls, the difference between ages is very minimal (238-39). That is, there does seem to be some association with gender in terms of frequency of usage, at least in Australian English varieties. Eisikovits further suggests that invariant *don't* signals a kind of anti-establishment toughness, consonant with many gender-related findings about vernacular variants; this interpretation stems from the finding that males' usage increases greatly with age, suggesting a stronger affiliation with working-class values. Given that the use of invariant *don't* has some associations with social properties, according to Eisikovits, we might expect nonstandard priming to be more likely when the sentence form can be processed as attached to a person who is perceived to be likely to use the form--perhaps a male speaker, or perhaps a working-class speaker. The experiments explore these possibilities, by manipulating talker gender and social status.

In another classic study where subject-verb agreement patterns are investigated, Labov et al. (1968) found high rates of nonstandard *don't* among all speaker groups in their study of New York City adolescent males (including Puerto Rican, African American, and white speakers). Labov et al. note that "Negro Nonstandard English" (as they called it at the time) frequently does not show inflection on verbs with third-singular subjects, and this is particularly pronounced in negated verbs, especially *don't*. But in what Labov et al. call "White Nonstandard English" (his Inwood males), despite patterns being close to Standard English for agreement in the positive form of *do*, the patterns with *don't* were nearer to that of the black speakers (248). For these white speakers, *don't*

was the form occurring in 96.8% of cases with singular third-person nouns.

While Labov et al. (1968) included agreement variation among their variables of study among working-class speakers of different ethnoracial groups in New York City, Feagin (1979) investigated both working- and upper-class white speakers of Alabama English. Feagin finds that *don't* with singular subjects (which she calls invariable *don't*) occurs nearly categorically among the working-class--both urban and rural--but among the upper-class, the overall percentage is only 2.4% (among the urban working-class the rate is 91.8%, while among the rural working-class it is 100%) (Feagin, 1979:198). Both Labov et al.'s and Feagin's data, then, suggest a strong class-based association with this variable, where it is more prevalent among the working-class than upper-class (and, in Feagin's data, slightly more prevalent among rural speakers than urban ones). Nonstandard *don't* is one of several agreement variables Feagin discusses; her findings regarding existential *there's* with plural subjects are discussed in the next subsection. Feagin did not find any differences based on sex for invariant *don't*.

Also investigating Southern speakers, Christian et al. (1984) compared Appalachian English and Ozarks English, discussing the use of singular subjects with *don't* among speakers of both varieties. Christian et al. highlight the commonness of this variant among vernacular varieties, saying that "[t]he use of *don't* with third person singular subjects" is "characteristic of many non-mainstream varieties" (211). They find a total frequency of 80% and 78.9% for Appalachian and Ozarks English respectively. Looking at different kinds of subjects, Christian et al. find that for third singular pronouns, the rates are 81.3% and 77.9% for Appalachian and Ozarks English respectively, while for third singular full NPs, the rates are 74.2% and 81.5%. Thus Christian et al. (1984) claim that the type of subject does not strongly motivate differences in usage of the nonstandard variant; this is in contrast to Eisikovits (1991), who suggests that pronominal forms are more likely than full NPs to have invariant *don't*.

In sum, NP_{SG}+*don't* is common across varieties of English, including US English. Though it is unclear to what extent the variant is clearly associated with social variables on a large scale, the evidence suggests a class-based distribution in the communities of study; there is weaker evidence of its association with sex. The evidence suggests that

NP_{SG}+*don't* is a socially marked sociolinguistic variant, likely perceived stereotypically as distinct from "standard" English grammar, where standard is considered what is mainstream and free of social marking. This interpretation, generated from the literature, is born out by the norming judgments collected from the subject population on the sentence stimuli for these experiments, as discussed in Chapter 3.

2.1.4 Nonstandard *there's*

Among agreement variables investigated in the literature, perhaps the one that has been investigated from the biggest variety of viewpoints is the occurrence of plural subjects with existential *there* + BE (*'s/is/was*). In these cases, the notional subject follows the verb, while a dummy expletive *there* sits in the grammatical subject position; the verb's agreement with the notional subject in number is the locus of variation (where the standard pattern would call for *is/was/'s* + NP_{SG}, or *are/were/'re* + NP_{PL}). Much work has discussed the patterning of these agreement variants, both in recorded speech and corpora, as well as the potential generative mechanisms behind the manifestation of the nonstandard pattern (e.g., Rupp, 2005). I will first discuss the corpus studies, then the speech studies; the generative explanations for the phenomenon are outside of the scope of the dissertation.

In a study of the British National Corpus, Martinez-Insua and Palacios-Martinez (2003) looked at grammatical factors conditioning the occurrence of *'s/is* with plural subjects. Their main finding relevant here is that rates were higher in spoken than written registers, suggesting that this particular nonstandard form is associated with informal registers, at least in British English. On the other hand, in investigating US English in several corpora, Crawford (2005) found that the frequency of nonstandard agreement (which he calls "nonconcord") was higher in spoken registers yet similar in both conversational and academic spoken registers, questioning the validity of characterizing nonconcord as simply "informal." Rather, Crawford's analysis shows that the distinction between speech and writing may not always be relevant, though the distinction between contextual formality may be (so that academic speech is less likely to contain the nonstandard pattern than is casual speech). Riordan's (2007) study on US English

examined a wide range of grammatical and social factors to model the production of nonstandard *there's* in the MICASE corpus (collected at the University of Michigan). Riordan found that younger speakers use the nonstandard agreement more, and in the 31-50 age group, females use it more than males. However, because this sex difference was limited to one age group, it seems unlikely that this represents a widescale pattern (sex differences have not been reported elsewhere for this variable, to my knowledge).

The variable has also been investigated in original speech recordings. In one of the most oft-cited and earlier studies focusing on agreement variation in existentials, Meechan & Foley (1994) note the exceptionality of existential constructions in fostering nonstandard agreement in Canadian English, a variety not otherwise known to exhibit such agreement variation. This same type of "exception" is noted for nonstandard *don't* with regards Ozarks and Appalachian English, as reported by Christian et al. (1984), and white working-class New York City speakers, as noted by Labov et al. (1968). The uniqueness of nonstandard *there's* is also discussed in work such as Crawford (2005), who claims that the existential contracted form *there's* is an "unanalyzed chunk" of language, not subject to typical grammatical processing of subject-verb agreement--an idea that resonates with a construction or usage-based approach to grammar. Meechan & Foley (1994) found that the probability of nonstandard agreement in existentials was greater in rural than urban speakers, and in less-educated than more-educated speakers; however, education level was the only significant social factor in their model. This again suggests an association with social status--either as formality or class--and the authors actually suggest that standard agreement is acquired as part of later-learned grammatical rules (in other words, not acquired via the "natural" acquisition process, but rather via metalinguistic learning).

The regionally-based analysis of subject-verb agreement with *don't,* as discussed above, also has light to shed on variation in existentials. In Feagin's (1979) Alabama English study, she discusses plural subjects with existential *there* as another highly prevalent feature not only of Southern English, but of American English more generally, and she finds among her sample that "*there* + NP plural seems to promote nonagreement, even among the most standard speakers" (207). Feagin reports both present and paste

tense usage, finding that for both together, the rates of *is/was* with plural subjects was 97% for rural working-class speakers, 89% for urban working-class speakers, and 24% for upper-class speakers. While her upper-class speakers used the variant frequently, there was a great distinction between the upper- and working- class patterns. For only the present-tense variable (*is/are*), her reported rates are 41.9% for upper-class, 86% for urban working-class, and 94% for rural working-class. Thus, while the present-tense pattern is not nearly as dichotomous as that for invariant *don't*, there is still a class-based pattern, with upper-class speakers using the nonstandard variant less frequently than working-class speakers. The Inner-Sydney English speakers studied by Eisikovits (1991) also showed near-categorical use of the singular form of BE in this environment, leading Eisikovits to claim that "invariant BE" is the standard form for her local community in environments with *there*.

Overall, the evidence does not suggest a clear difference along a single demographic feature for the use of different agreement forms in existential *there* constructions that is generalizable across groups (such as sex or age). However, multiple findings suggest that nonstandard agreement in existentials may be associated with less formal registers and with working-class speakers. While *there's*+NP_{PL} is not as heavily socially stratified as NP_{SG}+*don't,* the nonstandard variant may still carry some connotations of informality and/or lower social status--more generally, the feature may be interpreted as nonstandard and perceived as more likely among speakers associated with other nonstandard patterns. Again, this perception is confirmed by the norming studies carried out on the experimental stimuli and discussed in later sections.

2.1.5 Comparison of *don't* and *there's*

These two constructions each represent common nonstandard agreement patterns, though it seems that their social stratifications are somewhat different. For both constructions, Feagin (1979) found that nonstandard agreement was more likely among working-class speakers than upper-class speakers, though this difference was much less for the existential *there's* than for invariant *don't* (which showed almost complete stratification across class). And in all of the reported literature, rates of nonstandard

there's agreement approached levels which could hardly be considered marginal. Due to this, Kortmann (2006:615-616) suggests that *there's*+NP_{PL} falls into a class of "pervasive [grammatical] features on a global scale" with a relatively broad social acceptance, at least in informal/spontaneous spoken English. In contrast, Kortmann claims that NP_{SG}+*don't* falls into a class of "pervasive features on a global scale, operating above consciousness" and with social stigmatization. This suggests that while *there's*+NP_{PL} may be moving into the "standard" grammar, NP_{SG}+*don't* is not. Further, standard English speakers are likely to have more stored exemplars of nonstandard *there's* than nonstandard *don't*, and if social information is represented along with grammatical constructions, then nonstandard *don't* may be cognitively represented with more highly stratified social features than nonstandard *there's*.

There are a number of other relevant differences between these two constructions aside from their distributional differences. In particular, grammatical differences regarding the nature of agreement in the two constructions are worth highlighting. First, semantic subjects appear in both constructions, but whereas in the *don't* constructions the agreement should be controlled by a noun which is both the grammatical and notional subject, in the existential constructions, the controlling noun is only the notional subject, not the grammatical one. That is, *there* acts as a dummy subject sitting in the syntactic (grammatical) subject position; this fact has often been argued to account for the prevalence in informal speech of singular concord with *there* (e.g., Quirk, Greenbaum, Leech, & Svartvik, 1985:1403). Second, at a surface level, in NP+*don't*, the subject precedes the verb, while in *there's*+NP, the subject follows the verb, which could potentially have implications for the perception of agreement patterns.

These featural differences between the two constructions may also influence the likelihood that their standard or nonstandard variants can be primed. In particular, Feagin (1979) suggests an implicational scale of nonstandard agreement patterns, where the most likely nonstandard variant for speakers (or a variety) to have is existential *there's*+NP_{PL}, and other nonstandard agreement variables imply the presence of *there's*+NP_{PL}. In fact, in Feagin's scheme, invariant *don't* is the second-most prevalent nonstandard agreement feature, such that the presence of invariant *don't* entails the presence of existential

there's+NP_{PL}, and the presence of other features (such as NP_{PL}+*was/is*) entails the presence of invariant *don't*. Such an implicational scale leads to predictions regarding listeners' perception of the two variants in an experimental context. Namely, listeners should be much more likely to perceive *there's*+NP_{PL} than NP_{SG}+*don't*; and, if a listener has a tendency to perceive NP_{SG}+*don't* (or is able to be primed to perceive it), this should entail their tendency to perceive *there's*+NP_{PL}. As will be seen in the discussions below, both in the experimental chapters and the general discussion, my findings regarding the likelihood of perceiving nonstandard agreement bear out these predictions.

2.2 Experiment classes

These two morphosyntactic constructions are used in the dissertation to test priming at both the grammatical and social levels in three different classes of priming experiments. This section overviews the three classes of designs, followed by an overview of the experiments used throughout the whole dissertation.

2.2.1 Short-term priming

The short-term priming experiments (Experiments 1-4 and 6) consist of a basic priming template where participants are exposed to a prime stimulus in a prime trial, and in an immediately proceeding target trial they are faced with a perceptual choice. These experiments are all designed to test the priming of nonstandard grammatical structures, to see if participants can be primed to interpret sentences as bearing standard or nonstandard agreement; they achieve this by varying the grammatical *and* social properties of the prime stimuli, along with the social properties of the target stimuli in Experiments 2, 3, 4, and 6. The experimental task is a semi-covert sentence completion task, where in the target trial, participants must complete sentences that indicate their perception of a sentence as bearing standard or nonstandard grammatical agreement. This design uses prime and target trials, grouped together throughout the experiment.

To make the structural choice less explicit and mitigate metalinguistic effects on the task (introduced by participants' knowledge about the social acceptability or grammatical "correctness" of nonstandard sentences, for instance), the experiments use

photographs of singular and plural objects to stand in for singular and plural nouns. Participants are primed by a sentence in either a standard or nonstandard agreement condition, followed by exposure to a target sentence in which the subject noun is missing. They must then quickly choose between two photographs--one corresponding to a singular noun, one to a plural--as to which one completes the sentence. In this way, participants are somewhat unconsciously choosing between a standard and nonstandard agreement pattern for the sentence, and I model factors influencing the likelihood of choosing a nonstandard structure (including grammatical variant of the prime construction and social features of the prime and target stimuli).

2.2.2 Social priming

In Experiment 5 and one component of Experiment 7, participants choose between talker photos, rather than noun photos, to investigate whether similarity in grammatical structure is used as a cue to talker (rather than vice versa). This is a test of the notion that social and linguistic influences are bidirectional, and that social and linguistic perception are mutually interdependent.

2.2.3 Long-term priming

To test whether social information may be relevant not just in immediate priming tasks but over the longer-term (and building off research, discussed above, which shows that social information may indeed be relevant only for long-term speech processing), Experiment 7 uses a delayed target priming design. The sentence completion task is similar to the others, but here, listeners are first presented with a block of unambiguous sentences using either standard or nonstandard agreement. In the next block, listeners are presented with the identical sentences but where the subject noun has been removed (as in the target trials for the immediate response priming design). Participants here are again choosing between agreement patterns in the target blocks, and the effect of priming can be measured in two ways: similarity of their choice to what they heard in the prime block, and reaction time in making the choice in the target block (where lower reaction time, and identical choice, reflects priming). So here, prime and target trials are organized into

blocks, rather than repeated in immediate proximity to one another.

2.3 Outline of experiment designs

In different experiments, the independent variables include not only the grammatical variant of the prime stimulus, but also the social information included with the prime and/or target stimuli. That is, they examine grammatical priming on its own as well as social and grammatical priming in tandem. This paradigm is thus capable of investigating multiple possible factors leading to sentence interpretation for sociolinguistic variables, thereby testing claims of exemplar-theoretic approaches to grammatical knowledge, and exemplar-theoretic explanations of syntactic priming. I also vary the mechanism and response measure itself in the priming tests, discussed in more detail in the experimental chapters.

Table 2.2 lists the experiments discussed in the chapters that follow. Each experiment tests some combination of prime grammatical and/or social cues and target grammatical and/or social cues for their effects on the target grammatical and/or social response. The table summarizes which cues are manipulated and the behavioral response.

Table 2.2
Overview of Experiments in the Dissertation

Experiment	**Prime manipulations**	**Target manipulations**	**Target response**	**Experiment class(es)**
1 (Ch. 3)	-Grammatical structure		-Grammatical variant	-Short-term
2 (Ch. 4)	-Grammatical structure -Talker gender (voice)	-Talker gender (voice)	-Grammatical variant	-Short-term
3 (Ch. 4)	-Grammatical structure -Talker gender (voice+photo)	-Talker gender (voice+photo)	-Grammatical variant	-Short-term
4 (Ch. 5)	-Grammatical structure -Talker status (photo)	-Talker status (photo)	-Grammatical variant	-Short-term
5 (Ch. 5)	-Grammatical structure -Talker status (photo)	-Grammatical structure	-Talker status (photo)	-Social
6 (Ch. 6)	-Grammatical structure -Talker (voice+photo)	-Talker individual (voice+photo)	-Grammatical variant	-Short-term
7 (Ch. 6)	-Grammatical structure -Talker (voice+photo)	-Talker individual (voice+photo)	-Grammatical variant -Talker status	-Long-term -Social

Experiment 1 tests whether a nonstandard prime stimulus increases the likelihood that a target structure will be interpreted as also being nonstandard. Experiment 2 tests whether talker gender affects target response, and whether targets which match the prime stimulus along a social dimension (gender) are more likely to be interpreted as also matching in grammatical structure. Experiment 3 expands the manipulation in Experiment 2 by adding photographic cues to speaker gender. Experiments 4 and 5 continue investigating the link between jointly activating social categories and grammatical properties, by manipulating the social status of the talkers in the prime and target trials. In Experiment 5, participants choose between likely talkers, rather than sentence completions, to see whether grammatical information is used as a cue to the social category of the speaker. Experiments 6 and 7 are concerned not with social categories as an index of grammatical form, but rather with how variants may be associated with individual talkers, and whether structural priming of nonstandard structures shows talker-specificity effects. Experiment 6 does this through a short-term priming paradigm like the other experiments, whereas Experiment 7 uses a long-term priming design.

2.4 Exemplar representations

A linking assumption of structural priming as a method is that people's behavior in choosing a structural alternative is reflective of mental representations of linguistic structure. This is the case regardless of whether one's theoretical framework is exemplar-theoretic or not (recall that the classic view of structural priming is that it probes independent syntactic representations, e.g., structure trees). But what is the substance of those representations? When it comes to morphosyntactic variation, it is somewhat hard to reconcile the representational accounts that have been put forward in the literature. Sociolinguists tend to posit frequency distributions of surface-level distributional descriptions without delving into speakers' mental representations; none of the community- or corpus-based literature cited above deals with cognitive representations or the underlying grammatical structures involved in morphosyntactic variation. One exception is Crawford (2005), who argues that *there's*+NP_{PL} is processed as a "chunk" of

language, without being analyzed as component parts; of the research on these particular morphosyntactic variables, Crawford's claim comes closest to pointing to construction exemplars as a type of stored linguistic unit.

In contrast to the sociolinguistic concern for how these variants pattern socially in production, generative theorists often ignore intra-language syntactic variation altogether, and the generative literature has only recently proposed parameter- or feature-based mechanisms for dealing with variation in the grammar (see Cornips & Corrigan, 2005; Wilson & Henry, 1998). There are alternative contemporary formulations of the source of this type of variation within the Minimalist framework in particular (for general discussion, see Adger & Trousdale, 2007). Tortora & den Dikken (2010) explain the possibility of singular concord--a singular verb with plural noun--in some English dialects by proposing that different morphological agreement markings on the verb arise from a sentence's subject occupying different structural positions in the syntactic derivation (that is, the subject sits in different relation to the verb when there is standard v. nonstandard agreement; this follows Henry, 1995). Tortora & den Dikken propose a taxonomy by which all English dialects differ in which of three positions are available for which kinds of subjects.

Alternatively to this configurational theory, Adger & Smith (2010) argue for a lexical feature-based approach to morphosyntactic variation (discussed briefly in Chapter 1). On this account, the lexicon (a discrete part of the grammar) includes lexical items with feature specifications that syntactic operations operate on. Surface morphological form is a function of spell-out to the interface levels following syntactic operations (in this case, spell-out to Phonological Form). Variation in which morphological forms are possible, then, comes down to feature specifications of different lexical items, an account which explains why in many dialects showing agreement variability, pronouns behave differently from full Determiner Phrases (among other dialect-specific facts). So rather than structural configurations resulting in lexical features being differently valued, lexical features themselves drive surface morphological differences.

These two competing accounts of morphosyntactic variation represent a step toward accommodating the facts of variation within a Minimalist framework (arguably

still the mainstream approach to grammar within linguistics), but they do not present viable models of grammatical competence if competence should also include social knowledge. Though Adger & Smith's U function might leave room for sociolinguistically-based selections of the grammar, they do not discuss this possibility in detail.

While the structural approach to morphosyntactic variation relies on different syntactic processes and the feature-based approach relies on differences in the lexicon, a usage-based approach to grammar is qualitatively distinct, relying on listeners' differential *experiences* with *constructions* that build up the grammar, rather than assuming grammatical categories innately (Abbott-Smith & Tomasello, 2006). Because my concern is listeners' perception of standard and nonstandard alternatives, rather than the processing of a specific dialect (with a singular set of structures), either of these types of generative-style explanations suffer from too much categoricity to explain the wide range of dialect features that individual speakers are capable of comprehending (that is, these generative models have distinct systems of grammar as fundamental tenets, such that claims like "Dialect A does this" and "Dialect B does that" are categorically taken to define the space of variation). Rather, my analysis focuses not on dialect systems, but on particular grammatical constructions, as the locus of representation (see Goldberg, 2003; Jaeger & Snider, 2008; Snider, 2008). That is, what I take to be represented in speakers' linguistic knowledge is not a set of parameterized rules, but rather exemplars of specific words and constructions, from which abstracted categories (which linguists might call "noun," "verb," "past tense," etc.) are formed. In the General Discussion, I will return to the question of representation, specifically to discuss whether my findings motivate the incorporation of social information into the grammar (and if so, how). Here, I will just provide a starting point for an exemplar-theoretic operationalization of the structures whose perception I investigate.

Unfortunately, the work on exemplar-based syntax is still in its nascent stages, and so descriptions are often unsatisfactory in the level of specification they provide. The basic agreed-upon feature is that an exemplar is not isomorphic with the token it represents: an exemplar is a *representation* of a token, and so one open question is what

processes take place for tokens to be turned into exemplars--what information is retained, disregarded, etc., in the representation. Yet beyond this, there seems to be no common interpretation of what a syntactic exemplar consists of, such that Bod (2006:293) says that "an exemplar in syntax can be a tree structure of an utterance, a feature structure or whatever syntactic representation one wishes to use to convey the syntactic analysis of a particular utterance." There are two examples of worked-out exemplar models of syntax that I overview here; these have been developed by Bod (2006) and Walsh et al. (2010).

Bod's (2006) model is Lexical-Functional Grammar-Data-Oriented Parsing (LFG-DOP), which he claims adequately simulates productivity for newly-produced constructions, as well as acceptability judgments for newly-encountered constructions--two features of syntactic behavior that an adequate theory must provide for (he calls this "grammatical productivity"). LFG-DOP uses phrase structure trees as representations, combining subtrees into new trees to analyze novel experiences; new forms are analyzed by probability: tree fragments that exist in the mental "corpus" are used to determine the most probable analysis based on the input. Recall that a key feature of exemplar approaches to grammar is that what is stored are not rules or procedures, but simply representations of words and constructions (Bod 2006:298). So while Bod's model consists of phrase structure trees as the foundational unit of storage, there are no stored rules for building those trees; all "building" is done by probabilistic composition. To constrain the grammar to produce only grammatical structures, LFG-DOP incorporates LFG-type feature representations. What is ultimately stored are then phrase structure trees tied to feature sets (where the feature structure of a tree encodes grammatical categories and relations, including agreement features, from the LFG feature inventory). An example is given below in Fig. 2.1 for the sentence *John fell*, reprinted from Bod (2006:312, fig. 21). Note that trees such as this would be broken down into tree fragments (in this case, involving just the noun or just the verb) as stored in memory as well.

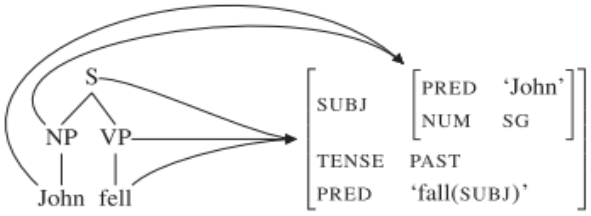


Figure 2.1. Example of LFG-DOP representation for *John fell*, from Bod (2006:312, fig. 21). Figure copyright Mouton de Gruyter; used with permission.

Snider's (2008) DOP-LAST (Data-Oriented Parsing-Local Activation Spread Theory) combines elements of Bod's original (1998) DOP model, including phrase structure trees as the units of representation, with Kapatsinski's (2006) LAST model of an explicitly associative network of exemplar representations. Because of the similarity to Bod's DOP model as discussed above, I do not discuss Snider's representations further here.

Walsh et al. (2010) develop a different model that is also intended to produce *grammatical productivity* (productivity that results in grammatical sentences). The representations in this model focus on storing information with each word exemplar about the left- and right- context in which the exemplar token was experienced. That is, each word is stored as two "half-words": one that specifies what happened to the left of the word, and one that specifies what happened to the right of the word. For example, as given by the authors, the sentence "The red hen" would be represented as six half-words: the_l, the_r, red_l, red_r, hen_l, hen_r. The frequency of any given word to occur in a left context of these words is stored with the X_l half-words, while the frequency of it to occur in a right context is stored with the X_r half-words. When making an analysis of new input, the model compares the left and right half-words of words in the new sentence to those in memory, and a similarity comparison score drives the ultimate interpretation. This model differs from Bod's in relying strictly on contextual features of the occurrence of word tokens, without building hierarchical structures into the model, and without building feature categories into the model. While Walsh et al.'s model may therefore seem less satisfying to a formal linguist than Bod's, Walsh et al. critique the DOP model as lacking any significant metric of similarity between exemplars, which is critical in explaining

phenomena such as priming. (In my estimation, Snider's merger of DOP and LAST may address this concern, but the authors do not discuss Snider's work.)

There is additionally more detail in the model of Walsh et al. (2010) as to the different levels at which units of linguistic knowledge may be stored. As they explain, the basic idea of exemplar-theoretic syntax is that "a grammar" emerges from the storage of exemplars and the inferences over exemplars. Walsh et al.'s model works from this foundation of the storage of single words, which they call "constituents," to also incorporate the storage of multi-word phrases, which they call "units." In their model, processing may happen at either level. A grammar does not consist of abstract rules specific to language, but rather sets of stored memory traces of constructions, and analogical processes that result in the production and perception of forms related to (or generated by) those stored in memory. While these two features are generally agreed upon by researchers developing these models, one key aspect under debate has to do with what kinds of abstractions emerge from exemplars, for instance for grammatical categories such as "verb," "subject," "singular," and possibly even categories like "nonstandard" (as this dissertation explores). This question is especially important for researchers trying to determine how linguistic productivity and generalization happen in the earliest phases of language acquisition (see Walsh et al., 2010:539-541, for discussion). Processing may be either item-based or category-based (which drives this distinction between levels in Walsh et al.'s model), and it seems that the grammar must accommodate both, though the extent of abstraction that is necessary to account for patterns of both perception and production is unclear.

Structural priming is a particularly good tool for exploring the distinction between item- and category-based processing: if priming is only lexically-specific (item-based), this gives strong evidence for construction-specific grammatical representations; if priming happens across different lexical items, this gives evidence for more abstract representations which can be applied to multiple instantiations of patterns (category-based). The fact that structural priming work has found priming across lexical items and at abstract levels, and yet that priming is stronger when lexical items are the same, suggests that grammatical categories do emerge from exemplars, but that word- and

construction-specific processing also occurs, and may be the most "automatic" form of processing (Abbot-Smith & Tomasello, 2006; Walsh et al., 2010). Walsh et al. (2010) build a computational model of grammar that accommodates processing at both item-specific and more abstract levels by incorporating two levels of representation: the unit level, which consists of constructions, and the constituent level, which consists of individual words.

Since my experiments all test for grammatical priming using the same verb from prime to target, they test processing specifically at the level of construction exemplar. In line with the exemplar-based approach, I will consider that the cognitive units of storage and activation being probed via grammatical priming are constructions involving the lexical (or lexicalized) items *don't* and *there's*. Pietsch (2005) provides an example of how constructions involving verbal agreement might be cognitively stored such that both inter- and intra- dialectal variability in verbal agreement are possible; because no explicitly exemplar-theoretic models (such as those of Bod, Snider, or Walsh et al.) accommodate sociolinguistic variation in grammar, I look to Pietsch. Though not working within exemplar theory per se, Pietsch's schema can be applied to the phenomena I am dealing with here for a preliminary specification of cognitive representations, and his representations are the only usage-based representations I have encountered that are meant explicitly to allow for grammatical variability (I don't mean to say that the exemplar models *exclude* variation, just that they do not discuss it).

For Pietsch, the grammar includes both "low-level" and "high-level" patterns, which differ by level of abstraction from individual instances. This is schematized in Figure 2.2, reproduced from Pietsch (2005). In his "construction inventory," mother nodes instantiate the highest level of abstraction, and daughter nodes instantiate progressively more specific patterns, down to individual, fully lexically specified constructions.

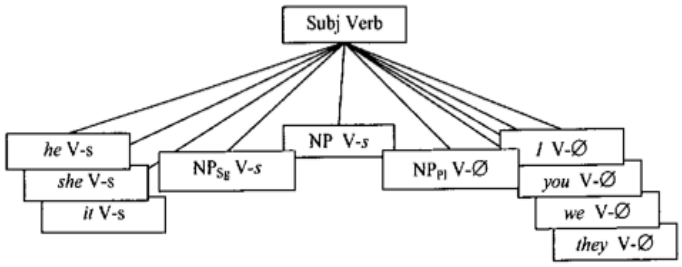


Figure 2.2. Pietsch's construction inventory for variable agreement in Northern English dialects (Pietsch 2005:42, fig. 2.3). Figure copyright Mouton de Gruyter; used with permission.

Pietsch's example provides a useful illustration of a possible framework for exemplar representation as well, where abstracted constructions build from categories (such as Subj Verb in the figure above) stored in the grammar, emerging as inferences from fully specified constructions (such as *they go*). Further, Pietsch's inventory implies the existence of individual lexical representations separate from their constructional occurrences, which is a key feature of Walsh et al.'s (2010) exemplar grammar, built from two separate exemplar databases. The *unit* database consists of multi-word construction exemplars. The *constituent* database consists of lexical exemplars, which also are represented with their left/right context. In a processing situation, the grammar searches the unit database for similar sentences, and in parallel searches the constituent database for the words in the sentence. If a similar-enough phrase is found in the unit database, the input is processed as syntactically analogous to that unit exemplar most highly activated. If no unit receives enough activation, however, then the phrase is processed as a composition of the constituent exemplars. Similarly, we could think of Pietsch's construction inventory as laying out a number of possible representations to be activated by linguistic input, at different levels of linguistic structure and abstraction.

In Figure 2.3 below, I have drafted a version of how my two test constructions might be represented in exemplar clouds, taking elements of both Pietsch's construction inventory and Walsh et al.'s (2010) more formally sophisticated exemplar model. The diagram includes unit exemplars representing phrases, and constituent exemplars

representing words. This also provides a starting point for formalizing what linguistic units might be stored with social information (e.g., exemplars of either constructions or words). This diagram is meant to serve as an illustration of the knowledge of possible cooccurrences of words, and of abstracted patterns of cooccurrence.

In the unit exemplar representations, there are exemplar clouds specific to combinations of noun-verb number (as in Pietsch's figure above), which form a mid-level abstraction for the phrasal patterns. However, these abstracted exemplar clouds should be interpreted to themselves be emergent from specific instantiations of speech where the noun phrase is fully specified, and in the constituent exemplar database, I've included specific nouns to signal this. Additionally, note that for a complete model of grammar, we would have to account for much more detail in the properties of these stored exemplars, especially in terms of additional parts of sentences in which each represented construction would appear, the fact that different types of noun phrases may be encompassed by the "NP" category, whether exemplar clouds for different constructions should overlap in various ways (especially those sharing lexical items BE and DO), etc. In other words, these representations are stripped down to an extremely simplified level, for the sake of illustrating the theorized locus of activation for my priming experiments.

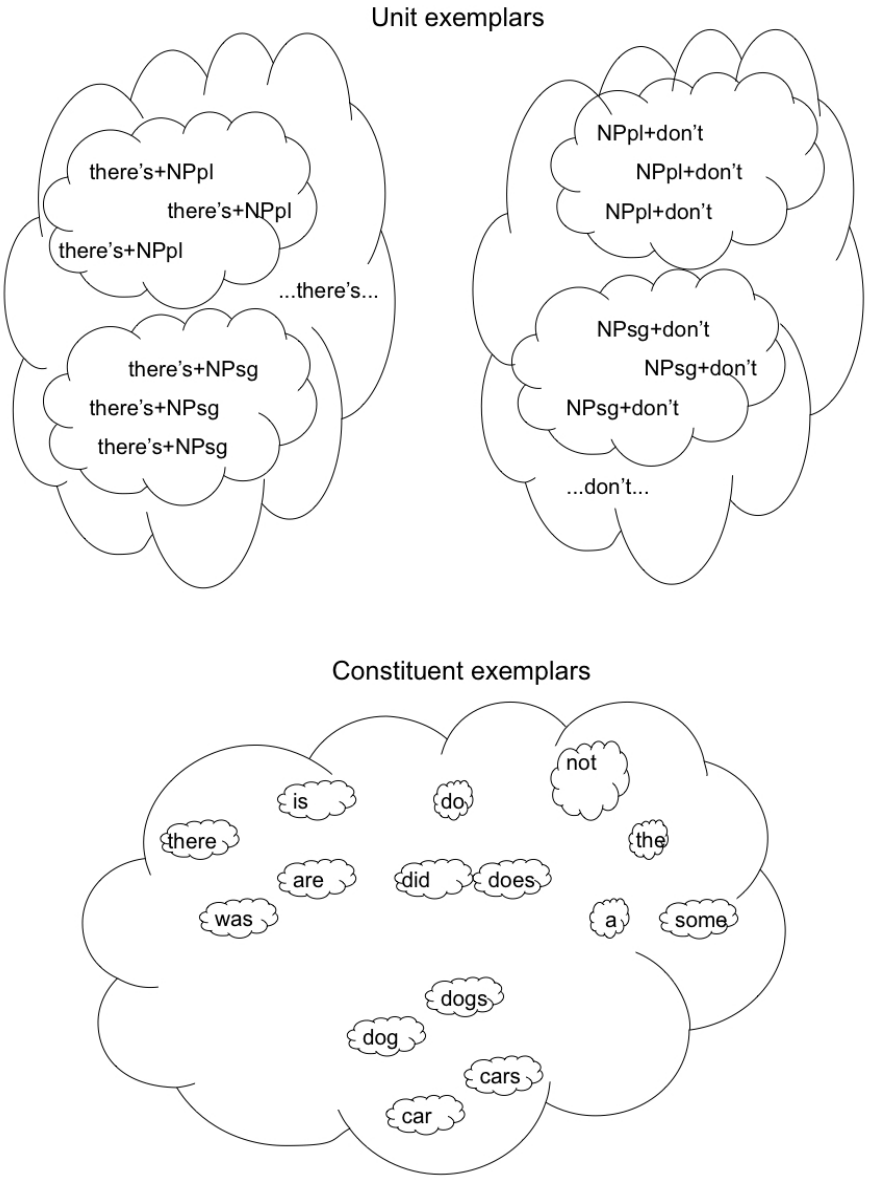


Figure 2.3. Unit and constituent exemplars: Simplified model of test constructions' representation.

From the perspective of the model in Figure 2.3, there are two possibilities for interpreting the perceptual choices that participants in my experiments are making: that the input sentences (in either standard or nonstandard form) are sufficiently activating

exemplars at either the construction (unit) level, or that constructional exemplars are not being activated sufficiently, and so processing happens via composition of exemplars accessed at the word (constituent) level. I want to suggest that grammatical priming will be evidence for activation at the construction level, and that particularly when participants complete a target sentence with a nonstandard choice, it means that the input has activated a nonstandard construction--a multi-word exemplar consisting of either NP_{SG}+*don't* or *there's*+NP_{PL}. Nonstandard prime stimuli, then, are expected to increase the likelihood that a nonstandard construction exemplar is activated.

In cases where priming does not occur, and for instance, a standard response is chosen following a nonstandard prime, this could mean that the input is being processed either via activation of the alternative constructional variant--the standard construction--or is being processed by composition of the constituent words, assuming that the standard patterns are in the participants' grammars. Lack of activation of nonstandard constructions is also presumed to correspond to a lower resting activation level for such constructions--hat is, they are less "ready" to be activated, because they are less frequent and hence stored with a lower probability level.

In sum, priming effects will be evidence for the activation of constructions similar to the input stimulus on some categorial dimension; as the experiments develop this idea of similarity, the possibility for nonlinguistic similarity as a dimension to add to the exemplar model will be considered. An assumption is that differences in acceptability, and the different types of social marking that these two nonstandard constructions possess, should lead to different priming behavior. Further, these differences in acceptability and social marking are represented in the exemplars in some way, in particular in resting activation level and frequency specifications--which is why priming behavior would reflect them. A fuller model of this type of grammar would include frequency information for different constructions and lexical items, and a large part of the General Discussion will involve assessing whether different types or strengths of nonlinguistic marking should also be included that lead to differing likelihoods of activation in a perception context. From the description given of these two morphosyntactically variable constructions in earlier sections, we might assume that

there's+NP_{PL} should be quicker to activate, as it is more common and less socially stigmatized in US English varieties than NP_{SG}+*don't,* which should be less easy to activate. These differences are confirmed throughout the experimental results, as discussed in the following chapters.

CHAPTER 3
GRAMMATICAL PRIMING AND MORPHOSYNTACTIC PERCEPTION

To begin exploring the perception of grammatical variation, Experiment 1 tested the hypothesis that the interpretation of sociolinguistically variable structures is susceptible to grammatical priming effects. Specifically, Experiment 1 tested the prediction that participants are more likely to interpret sentences as exhibiting nonstandard linguistic structures when they have just experienced nonstandard structures, as compared to when they have experienced standard structures. This outcome is presumed to stem from the activation of participants' mental representations of nonstandard constructions, where activation comes from recent exposure. This is the foundation of an exemplar-based explanation of syntactic, or what I call here more generally *grammatical*, priming.

Experiment 1 used the two sociolinguistic variables described in Chapter 2 in a sentence completion task. The design tested whether a previously encountered morphosyntactic pattern--standard or nonstandard agreement between the subject noun and verb--influenced the interpretation of another agreement structure. In each experimental trial, participants were exposed to a sentence in which one or more words were obscured in some way. A screen immediately following the sentence exposure contained two photographs, and participants were to choose quickly which picture corresponded to the obscured word(s). Example trials (more fully elaborated in section 3.3) are given in Figures 3.1 and 3.2.

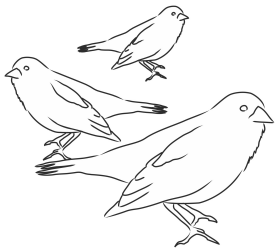
		Stimulus	
Prime Trial	*Sentence*	At the campsite, the mosquito don't fly into ########.	
	Response		
Target Trial	*Sentence*	"In the yard, the _____ don't sit on the feeder."	
	Response		

Figure 3.1. Sample prime and target trials for nonstandard *don't* construction, Experiment 1.[2]

2. The images shown in the experiment were color photographs. For the purposes of print quality in the dissertation, I am showing corresponding line images drawn by artist Ubin Li, which I commissioned to form a new stimuli set (not used for the dissertation experiments). These line drawings are available for use by other researchers; contact the author for details.

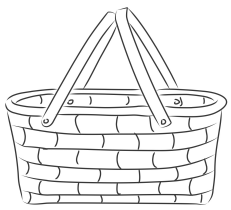
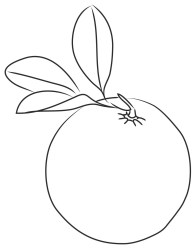
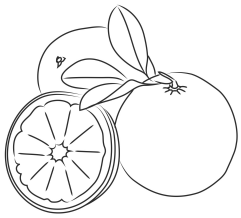
		Stimulus	
Prime Trial	*Sentence*	In ##########, there's notebooks from the class.	
	Response		
Target Trial	*Sentence*	"In the fridge, there's _____ ready to juice."	
	Response		

Figure 3.2. Sample prime and target trials for nonstandard *there's* construction, Experiment 1.

Text (visual) stimuli were used for the prime sentences to avoid introducing social information related to the speaker voice into the priming stimuli, to see if grammatical information on its own could influence participant choices in target trials. In prime trials, participants read a sentence in which a non-subject noun was visually obscured, and the two photographs represented nouns that could be confused graphically and/or auditorily (e.g., *basket/backpack*). In target trials, which were auditory trials, participants heard a sentence with the subject noun phrase completely replaced with white noise, and the photographs represented a singular and plural form of the same noun (e.g., *bird/birds*). In the target response, participants' choice of the singular or plural noun photo was taken to index their perception of the sentence's subject-verb agreement: for *don't* trials, a singular

choice would be nonstandard, whereas for *there's* trials, a plural choice would be nonstandard.

This sentence completion task was designed to elicit participants' perceptions of subject-verb agreement in the target sentence, and to investigate whether the agreement pattern experienced in the prime sentence influenced those perceptions. The design for Experiment 1 is discussed in further detail below; modifications to the design are discussed in the relevant following experimental chapters. First, because the items developed for Experiment 1 were used in all subsequent experiments (with differences where noted), I describe the construction of the experimental items at length.

3.1 Materials construction

3.1.1 Items creation

To create a set of sentences including the sociolinguistic variables to use throughout the dissertation research, 64 items were constructed. Each item consists of a prime, target, and filler sentence. Half of the items (32 items) employ the NP+*don't* structure, and half (32 items) employ the *there's*+NP structure; the prime and target sentences include these portions while the filler sentences do not. Thus, each "item" includes a prime sentence with either *don't* or *there's*, a target sentence matching in its use of either *don't* or *there's*, and a filler sentence that does not include either verb. As described below, each item's filler shared some non-critical sentence content with either the prime or target sentence. Some fillers were designed to occur prior to the prime sentence, while some fillers occurred following the target sentence (so an item could be ordered filler-prime-target or prime-target-filler). The difference in ordering attempted to disguise the repetition of the prime-target combination throughout the experiment.

Because of the nature of the experimental task in its use of photographs to stand for subject nouns, I began stimuli creation with a list of nouns for which imageability and image naming are already known to be high. Using the database from the International Picture Naming Project (Szekely et al., 2004), I first chose 32 simple nouns to serve as the "critical" (target) nouns, for which clear images of both the singular and plural forms

could be found. The singular and plural forms were paired as the target subject nouns (e.g., *chair/chairs*). Each noun was used once with each construction, so that every critical noun occurs twice in the items: once in a *don't* item, and once in a *there's* item. I then paired 128 other nouns to create potentially confusing pairs for the non-critical nouns in the prime and filler sentences. These pairs were phonologically related by having either overlapping consonants, vowels, or rhythmic structure (e.g., *scarf/heart; backpack/basket; tent/net*).

For all 192 words (128 non-critical nouns; 64 critical nouns), I gathered images from Web searches, finding pictures that were prototypical, clear, and of good size and quality. I digitally altered some of these images to eliminate imperfections (such as distracting objects next to the object of interest), and for a few of the nouns (e.g., *arm, screw*), I took original photographs using a digital camera. Unfortunately, I could not use the images already normed in the Szekely et al. (2004) database, since those do not contain plural noun photos. Thus, this existing database was useful to determine viable nouns for pictoral representation, but the stimuli present in the database did not themselves meet my needs.

From these noun pair lists, I created prime, target, and filler sentences with these nouns in the relevant critical or non-critical positions, to construct the items. I attempted to maximize both semantic plausibility and the plausibility of auditory confusion (but prioritizing semantic plausibility and sacrificing auditory similarity when necessary), so that either a singular or plural critical noun could be reasonably expected in a given sentence, and either of the non-critical nouns that were paired together could similarly work in the sentence. To disguise the structural manipulation to participants, the critical subject-verb configuration appeared linearly in different portions of the sentences across items (though always in the same position from the prime sentence to the target sentence for a given item). For critical items (primes and targets), the basic forms for the sentences are given in (6a) (for *don't*) and (6b) (for *there's*):

(6a) (PP) NP *don't* VP (PP)

(6b) (PP) *there's* NP (VP/PP)

In each item, the prime and target sentences were semantically unrelated, other than the repetition of the critical structure. However, filler sentences contained some similar lexical or semantic content as the prime, in the case of preceding fillers, or the target, in the case of following fillers. This was done in an attempt to mitigate the lexical similarities between the prime and target sentences, by introducing distracting similarities in content between the critical sentences and the filler sentences.[3] The examples in (7a-d) and (8a-d) are sample items for each construction, with both variants of the prime sentence given; the critical constructions are underlined. The words in square brackets correspond to participants' choice of photos to complete each sentence. Appendix A lists all items.

(7a) Filler:

A [spoon/pan] is missing at the campsite

(7b) Prime (nonstandard):

At the campsite the mosquito don't fly into the [tent/net]

(7c) Prime (standard):

At the campsite the mosquitoes don't fly into the [tent/net]

(7d) Target:

In the yard the [bird/birds] don't sit on the feeder

(8a) Prime (nonstandard):

In the [backpack/basket] there's notebooks from the class

(8b) Prime (standard):

In the [backpack/basket] there's a notebook from the class

(8c) Target:

In the fridge there's [oranges/an orange] ready to juice

(8d) Filler:

The juice must be kept away from the [rug/bed]

3. However, it is unclear that this manipulation was successful, and in later experiments, the number of fillers was reduced or eliminated.

I recorded 16 speakers (undergraduates), eight male and eight female, speaking all items, including both standard and nonstandard forms for the prime and target sentences.

3.1.2 Materials norms

All versions (standard and nonstandard) of all sentences, all images, and each talker's voice (speaking filler sentences) were included in a norming study, meant to ensure that the selected stimuli were adequate for the experimental purposes. Detailed description of the method and results of this study are included in Appendix B; the key findings are summarized here. None of the 16 voices was rated as extreme on the social dimensions of education, formality, accentedness, or youth. For the noun photos, accuracy of naming was generally high. For the sentences, nonstandard sentences were rated overall as less acceptable than standard sentences; and, nonstandard *there's* sentences were rated as more acceptable than nonstandard *don't* sentences. These results all suggested that the items were appropriate for use in the experiments.

3.2 Experiment 1: Grammatical priming

3.2.1 Design

Experiment 1 was a grammatical priming experiment, where for each item, participants encountered a prime sentence, which unambiguously contained either a standard or nonstnadard subject-verb agreement pattern involving either *there's* or *don't*, followed by a target sentence whose subject-verb pattern was rendered ambiguous by masking the subject noun. Immediately following each sentence, participants chose between two noun photos which one represented the word(s) from the sentence. In the target trials, this choice was between a singular and plural noun photo.

The independent variables are construction (*don't* and *there's*) and the agreement condition of the prime sentence (*standard* or *nonstandard*). The dependent variable is a binary measure of participants completing a sentence as overtly marking standard agreement (coded as a "1") or nonstandard agreement (coded as a "0") in the target sentence. The nonstandard choice corresponds to participants choosing a plural picture

for *there's* and a singular picture for *don't*. Responses were modeled using mixed-effects logistic regression, with subjects and items as random effects with varying intercepts (see Baayen, 2008; Baayen, Davidson, & Bates, 2008).

The hypothesis was that nonstandard agreement completions would be more likely following nonstandard agreement primes than following standard agreement primes. Additionally, because of the differing social marking of nonstandard *there's* and nonstandard *don't*, as also was evident in the norming results, a second hypothesis was that nonstandard agreement completions would be overall more likely for sentences including *there's* than for sentences including *don't*.

3.2.2 Materials

The 64 items were divided into the two sets of 32 each for *don't* and for *there's*. Within each set, each of the 32 items was randomly assigned to a prime condition (16 to *standard* and 16 to *nonstandard*) and to one of the 16 talker voices for the target sentence (an equal number of male and female voices were assigned to the two prime conditions across both structures). Half of the items were presented with a text-based filler, while half were presented with an audio filler. For audio filler trials, a different voice than that of the target trial was used.

Example trials are shown above in Figures 3.1 and 3.2. For prime sentences, image files were created that displayed the sentence with multiple graphical symbols (hash marks, #, and X's, x or X) obscuring a noun, and sometimes also its determiner. Different files did not use exactly the same symbol combinations; the files were prepared to visually obscure but not completely cover the words, and each word was dealt with independently. (This process was completed using presentation software, with slides turned into .bmp files for presentation in E-prime.)

For target sentences, auditory stimuli were manipulated to remove the signal from the critical noun portion of the sentence and replace it with white noise. The sound editing software Amadeus Pro was used to manipulate the auditory stimuli (in this and all other experiments). A mix of the standard and nonstandard versions of the recorded sentences were chosen to create the target stimuli (so as to avoid biasing interpretation

based on coarticulatory cues of the surrounding speech). Filler sentences were presented half in written form (like the prime sentences) and half in auditory form (like the target sentences), with the difference from the target sentences being that the masked noun was audible to varying degrees under the white noise. Hence, the masked words in prime and filler sentences were intended to be at some level audible/visible, facilitating the choice task, while the masked words in target sentences were completely absent, forcing a choice not based on immediate linguistic cues. Each of the 16 voices was used for four target trials and at least one auditory filler trial, and each voice occurred at least once each in the standard and nonstandard conditions (though the voices did not occur equally across the two constructions).

3.2.3 Participants

28 undergraduates participated for psychology course participation credit. All were native speakers of English and had lived in the United States from an early age (for at least 16 years), and reported no disabilities affecting their reading.

3.2.4 Procedure

All stimuli were presented and responses collected using E-Prime 2.0 experimental software, on Dell computers. Participant responses were recorded via keyboard input. Participants were instructed that they would be reading or hearing sentences in which some words were unclear, and they were to choose which of two images corresponded to the unclear words. Participants were not cued to the relevance of morphosyntactic structure or grammatical variation.

To ensure task understanding, the researcher remained in the room during five practice trials (two were written; three were spoken by two voices not included in the rest of the experiment). Participants were given the opportunity to repeat the practice trials if they wished; no participants chose to do this. Yes/No comprehension questions were also presented to participants throughout the session, always occurring following text-presented filler sentences and pertaining to the content of those sentences (e.g., "Is the dryer where the object was?"). Feedback was given in the comprehension trials, so that

participants were told whether they had answered correctly or incorrectly--if they answered incorrectly to a comprehension question, the program said, "Incorrect! Make sure to pay attention..." This was done to increase attention during the experiment, especially where reading sentences was concerned (since sentences appeared all at once on the screen, rather than word-by-word, this was thought to be important to ensure that prime sentences were being fully comprehended).

Photo pairs were positioned side by side in the middle of the computer screen. Items were randomized within two blocks. Two presentation lists were used, alternately assigned to participants. The presentation lists varied only in terms of the position of the pictures on the screen (List 2 reversed the position from List 1) and the location in the experiment of the blocks (so that items appearing in the first half of List 1 appeared in the second half of List 2).

Participants moved through the experiment by using any arrow key to advance to the pictures in the reading trials, then choosing a picture using the left or right arrow key. Pictures appeared automatically during listening trials. The text of prime and filler trials remained on screen for a maximum of 7000 ms and after that time advanced to the pictures automatically; all image choice screens (response screens) remained on screen for a maximum of 4000 ms and after that time moved to the next trial. The experiment lasted approximately 20-23 minutes for most subjects. The experiment ended with a five-question demographic questionnaire asking for participants to self-identify with their gender, region, race/ethnicity, and mother's and father's education levels.

3.2.5 Results

One item from the *don't*-standard cell was removed from analysis because post-experiment examination revealed that the auditory signal likely sounded like the word was singular ("hat") due to inadequate cutting of the stimuli; responses to this item were considered invalid for the purpose of investigating the hypotheses.

Overall, participants favored a standard agreement response, with 59.68% overall standard responses (N=1731). However, participants favored the standard response in the *don't* trials but the nonstandard response in the *there's* trials (Figure 3.3). Nonstandard

responses were more frequent in the nonstandard agreement condition than in the standard condition (Figure 3.4), as predicted.

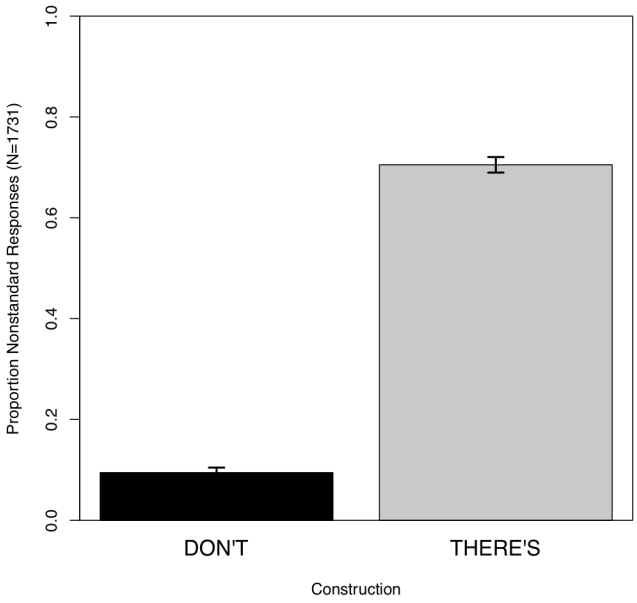


Figure 3.3. Construction effect: Proportion nonstandard responses for *don't* and *there's* trials, Experiment 1. Error bars represent standard errors for the group means.

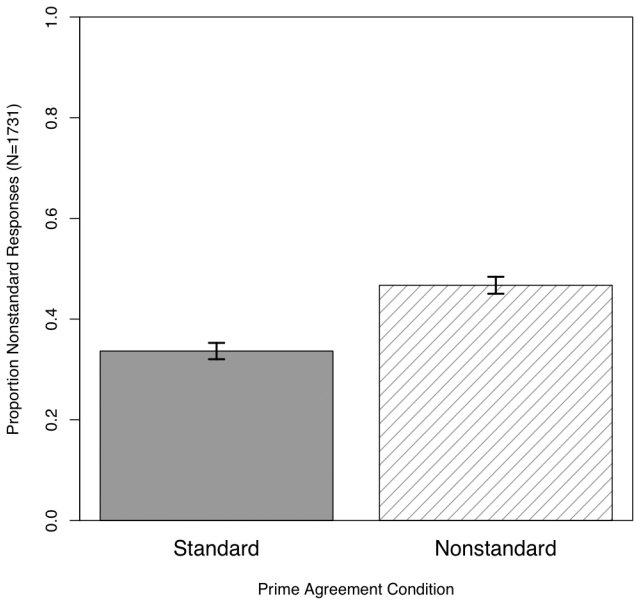


Figure 3.4. Prime effect: Proportion nonstandard responses for standard and nonstandard prime agreement conditions, Experiment 1.

When the crossed conditions of construction and prime agreement are considered, the association between the agreement condition of the prime sentence and the response choice is even clearer. Figure 3.5 shows four conditions that cross the two levels of construction and prime agreement; within both constructions, nonstandard responses are more frequent following nonstandard primes than following standard primes.

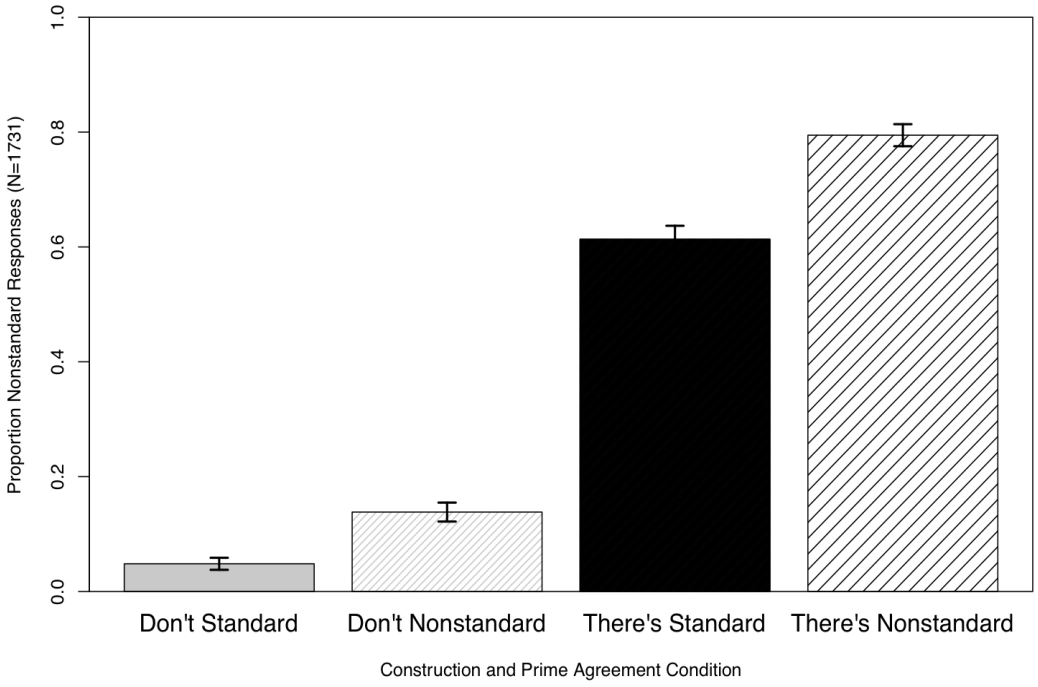


Figure 3.5. Nonstandard target responses by construction (*don't* and *there's*) and prime agreement condition (standard and nonstandard), Experiment 1.

For statistical analysis, I used the statistical computing environment `R` (R Development Core Team, 2011) and the function `lmer()` from the `{lme4}` package (Bates, Maechler, & Bolker, 2011). This function performs a mixed-effects logistic regression that uses a maximum likelihood estimation for model intercept and factor level coefficient estimates. This model is appropriate for a binary outcome variable with categorical predictor variables, and can account for subjects and items effects in a single model by including subjects and items as random effects. This is an alternative to performing separate ANOVAs across items and subjects for psycholinguistic data (see,

e.g., Baayen, Davidson, & Bates, 2008). In the model, the dependent variable is the likelihood of a "1" response (which corresponds to a standard response). For the independent variables, construction and prime agreement are included as fixed effects, and subjects and items are included as random effects with varying intercepts. The dissertation uses this type of modeling throughout the data analysis of the different experiments.

Table 3.1 gives the model summary, including parameter estimates for factor level coefficients, which can be interpreted relative to a "baseline" factor level. In this model, *don't* is specified as the baseline level for the construction factor, and *standard* is the baseline level for the prime agreement factor. Negative estimates correspond to a decreased likelihood of a standard agreement response. The negative coefficients here can thus be interpreted as predicting that nonstandard responses are more likely in the *there's* condition and in the nonstandard prime condition. Both effects are reliable at the p=0 level. These results support both hypotheses for Experiment 1: nonstandard responses are more likely following nonstandard prime sentences, and they are more likely for *there's* sentences.

Table 3.1
Target Responses Predicted by Construction and Prime, Experiment 1

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	3.63	0.35	10.33	<.001
Construction	*There's*	-4.23	0.3	-14.11	<.001
Prime Agreement	Nonstandard	-1.16	0.29	-4.01	<.001

3.2.6 Discussion

Experiment 1's results show that the choice of a target completion is related to the immediately preceding exposure to a prime structure. There is a priming effect for these agreement variants. These results show that exposure to a structure containing nonstandard morphosyntax makes it more likely that a following stimulus will be perceived as also being nonstandard. In general, this finding suggests that people's

expectations for sociolinguistic variants are influenced by recent exposure, just as prior research has shown that expectations for structural alternatives that are not typically considered to be sociolinguistic variables are malleable (such as, e.g., active vs. passive voice constructions). Such a finding supports the idea that participants have exemplars of both variants of both constructions, and that recent exposure to one structure activates the exemplars most closely matching it, making those exemplars more readily available for use in perception.

The great difference in the preference between responses for *there's* and responses for *don't* supports one further assertion. Plural concord (nonstandard agreement) with *there's* is more preferred than singular concord (nonstandard agreement) with *don't,* perhaps even approaching a standard form itself (as suggested by, e.g., Kortmann 2006). Overall, participants preferred nonstandard responses for *there's* sentences, regardless of whether the prime sentence contained standard or nonstandard agreement. Perhaps the *there's*+NP_{PL} construction has a high resting activation level for these participants, hence it is more available for priming in the first place than is the NP_{SG}+*don't* construction. This could reasonably be considered an outcome of differential experience in both hearing and producing these variants.

To assist in this discussion, Table 3.2 outlines the linking assumption of how grammatical priming should work for a sociolinguistic variable, here abstracted to alternate between variant X and variant Y. Given a prime stimulus containing one variant, and given a target stimulus that is ambiguous, the linguistic percept of the target is expected to correspond to the prime variant. (That is, a listener is expected to perceive the target sentence to be of the same form as the prime sentence.)

Table 3.2
Predicted Grammatical Priming where X and Y Represent Sociolinguistic Variants (e.g., NP_{PL}+*don't* and NP_{SG}+*don't*)

Prime stimulus	**Target stimulus**	**Linguistic percept**
X	?	X > Y
Y	?	Y > X

But priming behavior is expected to be mediated by the existence (or not) of exemplars that correspond to the forms encountered during the experiment. If participants have developed exemplars of both X and Y, then this table accurately describes the expectations of priming effects. However, if participants have developed exemplars only of X (but not Y), then it should be that the most well-established exemplar will always be the most likely percept, regardless of priming (recent exposure). This scenario is outlined in Table 3.3.

Table 3.3
Predicted Grammatical Priming with a Pre-established Exemplar of Variant X but not Variant Y

Prime stimulus	**Target stimulus**	**Linguistic percept**
X	?	X
Y	?	X > Y

Table 3.3 shows that when the listener has only exemplars already of X but not Y, then when they hear X as the prime, we do not predict that the target percept will be anything other than X. However, when the prime stimulus is Y, there is a possibility that this variant will be perceived subsequently--though it is still less likely than the variant that has a stronger exemplar. In other words, priming may increase the overall likelihood of variant Y's usage, but it will not increase the relative likelihood of variant X to variant Y. This is precisely what Experiment 1's results show for the *don't* construction: nonstandard trials increase the likelihood of nonstandard responses, but it is not enough to override the overall greater likelihood of standard responses. The opposite is true for the *there's* variants. Thus, it is a straightforward explanation of these results to claim that for this subject population, nonstandard *there's* and standard *don't* are the variants with stronger exemplars, compared to standard *there's* and nonstandard *don't*.

Yet there are two factors complicating this straightforward interpretation of the results. First, participants were exposed to all forms of the constructions, both standard and nonstandard, throughout the course of this experiment, which should itself have contributed to the strengthening of representations of these structures. That is, even if a

participant entered the experiment without any prior exemplars of nonstandard *don't*, for instance, their exposure to this variant during the experiment presumably led to a change in the store of exemplars. As shown by Kaschak & Glenberg, 2004, it seems that even totally unfamiliar grammatical structures are not disregarded by speakers upon their initial encounter, but rather are stored and used in future processing. The evidence here, though, seems to show that established exemplars have a greater effect on perception than just-acquired ones; that is, frequency of experience with a form trumps recency of experience with a form.

The second complicating factor pertains to the role of social information in sociolinguistic exemplar formation, and gets to the core goals of the dissertation. Suppose that it is the case that social information constitutes a substantial component of knowledge about language, such that it has effects on linguistic representation and processing. To the extent that speakers have knowledge of abstract sociolinguistic categories like "nonstandard" and "standard" (which will of course not be invariant across speakers or groups, but will vary according to community norms), these categories may affect how exemplars of constructions are represented. It is possible, and indeed probable, that exemplars for nonstandard *don't* are less likely to be activated (or nonexistent) precisely because they have been experienced as nonstandard. That is, while syntactic exemplar theory would posit that the differential activation between structures should be a matter simply of differing frequencies of experience, sociolinguistic knowledge complicates the picture.

The social properties of an exemplar alone could lead to their lower levels of resting activation, and may or may not be complemented by frequency. The possibility I am outlining is that someone could hear nonstandard *don't* quite frequently, but if it is processed and stored as "nonstandard," that could make the form less likely to be activated and deployed in subsequent processing. Likewise, someone could hear nonstandard *don't* exceedingly rarely, which would also lead to low rates of activation and use in processing. So the lower rates of the perception of nonstandard *don't* could be a function of frequency, of inferred social correlates of the form, or of some combination. Exemplar theory must be able to account for patterns like those found here, which may

involve adding factors other than frequency and vague notions of "social information" to the "contents" of linguistic exemplars. What level of social information is stored with grammatical variants ("standard," "nonstandard," "White," "Black," "male," "female")? With what level of linguistic specificity is this information stored ("subject-verb agreement," "NP_{SG}+*don't*", "*he don't*," "*the dog don't*")? What is the influence of social information on exemplar storage and activation? The remaining experiments in the dissertation attempt to address some of these questions, in isolating different types of social information and their influences on priming effects. Experiment 1 lays the foundation for using this experimental paradigm, with modifications, to investigate the interaction of exposure to grammatical and social information.

3.3 General discussion: From grammatical to sociolinguistic priming

Experiment 1 was not intended to address social factors: it used multiple different voices in the target structures, and there were no voices at all in the prime structures--design choices made intentionally to limit the amount of social inference participants might make about the prime and target sentences. The remaining experiments work from this foundation of grammatical priming of morphosyntactic variants to expand the investigation to social information about a talker, introduced by vocal and visual cues.

If grammatical priming effects result from the activation of linguistic exemplars, and if linguistic exemplars are stored with rich representations of their linguistic and social contexts, then manipulating the social context of the perceptual situation should affect the activation of linguistic exemplars (just as manipulating the linguistic context does). Introduction of social talker information to the task could strengthen grammatical priming effects, by strengthening the activation of the primed structure, and thereby increasing the likelihood that target structures will be expected to match prime structures in form. Conversely, social information could weaken grammatical effects, by mitigating the expectation of similarity between prime and target. We can think of grammatical and social cues as potentially competing cues, each being capable of biasing the activation of one structure (or set of structures) over another. When these cues together match an expected pattern, we would predict enhanced activation of the exemplar matching that

socio-grammatical pattern. However, when the combination of these cues doesn't match an expected pattern, then we might expect perception to be influenced primarily by either the social or the grammatical cue more strongly.

Again, a hypothetical schematization may be helpful in considering these possibilities. Table 3.4 outlines expected priming behavior when both social and linguistic information are included in the stimuli. Here, I make the schematization concrete by employing the linguistic and social variables used in the next chapter. I have concretized the example by inserting [$^{female}NP_{PL}$+*don't*] and [$^{male}NP_{SG}$+*don't*] as the exemplar levels, where each linguistic variant is associated with a gender property. For the linguistic percept, where only one possible percept is expected, only one variant appears. Where more than one variant might be expected to be perceived, they are ranked in expected order of likelihood. This schema assumes that exemplar representations exist for the combinations [$^{female}NP_{PL}$+*don't*] and [$^{male}NP_{SG}$+*don't*], but not [$^{male}NP_{PL}$+*don't*] or [$^{female}NP_{SG}$+*don't*]. This can be glossed as a listener's experience being that a female speaker will use the standard variant, while a male speaker will use the nonstandard variant. Note that this non-overlapping distribution is useful just for illustration; obviously, no sociolinguistic pattern is this clear-cut. The table shows the expected linguistic percept when a prime stimulus, including both grammatical and social information, is followed by a target stimulus, which includes only social information.

Table 3.4
Predicted Sociolinguistic Priming, Assuming Exemplars for [$^{female}NP_{PL}$+*don't*] and [$^{male}NP_{SG}$+*don't*] and Independent Effect of Target Stimulus Social Cue

Prime stimulus	**Target social stimulus**	**Grammatical percept**
$^{female}NP_{PL}$+*don't*	female	NP_{PL}+*don't*
	male	NP_{SG}+*don't* > NP_{PL}+*don't*
$^{female}NP_{SG}$+*don't*	female	NP_{PL}+*don't* > NP_{SG}+*don't*
	male	NP_{SG}+*don't* > NP_{PL}+*don't*
$^{male}NP_{PL}$+*don't*	female	NP_{PL}+*don't* > NP_{SG}+*don't*
	male	NP_{SG}+*don't* > NP_{PL}+*don't*
$^{male}NP_{SG}$+*don't*	female	NP_{PL}+*don't* > NP_{SG}+*don't*

	male	NP_{SG}+*don't*

The schema in Table 3.4 works on the assumption that linguistic percepts will always be more likely to be consistent with pre-existing exemplars. Within this hypothetical example, when the target stimulus is female, NP_{PL}+*don't* will always be the more likely percept. When the target stimulus is male, NP_{SG}+*don't* will always be the more likely percept. However, the effect of priming is to manipulate the likelihood that alternate forms will be perceived, so that in all but the first and final rows of the table, both variants are possible. The schema also assumes that the social cue of the target stimulus is the strongest cue to grammatical form.

If we assume alternatively that the strength of grammatical exemplars is the overwhelming influence on perception, then we would expect that whichever of X or Y is more readily activated would be the most likely percept in all cases. Priming would work to introduce the possibility of the alternate variant, and the alternative would be more likely when the social information in the target matched the social information in the prime. This is shown in Table 3.5, where the standard form is assumed to be the stronger exemplar (relative to the nonstandard form).

Table 3.5
Predicted Sociolinguistic Priming, Assuming Exemplars for [$^{female}NP_{PL}$+*don't*] and [$^{male}NP_{SG}$+*don't*] and Independent Effect of Exemplar Strength of Standard Variant

Prime stimulus	**Target social stimulus**	**Grammatical percept**
$^{female}NP_{PL}$+*don't*	female	NP_{PL}+*don't*
	male	NP_{PL}+*don't*
$^{female}NP_{SG}$+*don't*	female	NP_{PL}+*don't* > NP_{SG}+*don't*
	male	NP_{PL}+*don't* > NP_{SG}+*don't*
$^{male}NP_{PL}$+*don't*	female	NP_{PL}+*don't*
	male	NP_{PL}+*don't*
$^{male}NP_{SG}$+*don't*	female	NP_{PL}+*don't* > NP_{SG}+*don't*
	male	NP_{PL}+*don't* > NP_{SG}+*don't*

As yet another possibility, consider what would be expected if participants had exemplars of *every* sociolinguistic combination possible: [$^{female}NP_{PL}$+*don't*], [$^{male}NP_{SG}$+*don't*], [$^{male}NP_{PL}$+*don't*], and [$^{female}NP_{SG}$+*don't*]. Assume that these exemplars are furthermore all represented equally. In that case, we would predict that for every combination encountered in the prime, the percept would replicate the prime combination when the target matched the prime in social information, and would indeed replicate the prime stimulus as closely as possible.

Table 3.6
Predicted Sociolinguistic Priming, Assuming Established Exemplars of [$^{female}NP_{PL}$+*don't*], [$^{male}NP_{SG}$+*don't*], [$^{male}NP_{PL}$+*don't*], and [$^{female}NP_{SG}$+*don't*]

Prime stimulus	**Target social stimulus**	**Grammatical percept**
$^{female}NP_{PL}$+*don't*	female	NP_{PL}+*don't*
	male	NP_{PL}+*don't* > NP_{SG}+*don't*
$^{female}NP_{SG}$+*don't*	female	NP_{SG}+*don't*
	male	NP_{SG}+*don't* > NP_{PL}+*don't*
$^{male}NP_{PL}$+*don't*	female	NP_{PL}+*don't* > NP_{SG}+*don't*
	male	NP_{PL}+*don't*
$^{male}NP_{SG}$+*don't*	female	NP_{SG}+*don't* > NP_{PL}+*don't*
	male	NP_{SG}+*don't*

This complicated set of possibilities cannot be examined in one project alone, but I hope that this discussion can highlight the ways that a priming investigation can be used to understand the cognitive organization of language, in a way that takes both social and linguistic cues seriously. Experiments 2-7 examine the interacting influence of social and linguistic cues on grammatical perception, the possibilities of which have just been sketched. The first step is to take a somewhat generic social property and test whether its presence in the prime and target stimuli influence participants' grammatical perception of morphosyntactic variants; this is the subject of the gender experiments in Chapter 4.

CHAPTER 4
TALKER GENDER AND GRAMMATICAL PRIMING

4.1 Social factors and grammatical priming

Structural priming effects reflect the activation of similar structures. If social features are mentally represented as components of linguistic exemplars, specifically in this case constructions or agreement patterns, then we expect for social features to also influence the perception of agreement. Following the results of Experiment 1, I designed several experiments testing whether participants are more likely to expect that the prime and target structures will be similar when the prime stimulus and target stimulus are both spoken by talkers who are similar along some *social* dimension. Experiments 2 and 3 tested whether the gender of the talker in the prime and/or target sentences affects grammatical priming.

In terms of the syntactic priming literature, social or speaker information has not been investigated experimentally as an independent influence on syntactic interpretation. Thus, these experiments make a novel contribution to the work on syntactic priming; if sociolinguistic variables are found to be subject to social priming effects in addition to grammatical priming effects, it may be that the processing of other syntactic alternatives is subject to social effects as well.[4] Further, there is production evidence to suggest that the likelihood of priming is affected by talker, at least at the level of individual talker. For example, in an extensive corpus study investigating "morphosyntactic persistence" (i.e., the repetition of structure, though without the implication of cognitive processes that the

4. This is an especially intriguing possibility to consider in light of the fact that there is evidence that at least some of the structures studied by psycholinguists doing syntactic priming work do vary across social dimensions such as contextual formality. For instance, Biber (1988) shows that the active/passive voice alternation is clearly sensitive to genre, such that passive constructions are more likely in scientific text and panel discussions but less likely in fiction and casual conversation.

term "priming" carries) on five morphosyntactic variables, Szmrecsanyi (2006) found that though persistence effects did not differ by talker social characteristics (either social groups, such as age or sex, or dialect variety, such as British or American English), it was consistently the case that persistence was much more likely to occur in intra-talker discourse than in inter-talker discourse. That is, a switch in talker led to a decreased likelihood that a primed structural alternative would be repeated. As Szmrecsanyi explains it, people are more likely to repeat variants that they themselves have just produced than variants that someone else has produced.

Assuming that this is in general the case for English--that a change in talker results in decreased priming--then language users, having experience with these patterns, may be sensitive to the fact that someone is less likely to repeat what someone else said than to repeat what they themselves said. Experiments 6 and 7 investigate the possibility of individual talker effects directly. Experiments 2, 3, and 4 extend the talker effects located by Szmrecsanyi to other social categories to test whether not just when a different person is the target speaker, but when a person of a different *type* is a target speaker, repetition (priming) will be less likely to occur. If an exemplar account of sociolinguistic representation is accurate, a switch in social category from prime to target should affect the likelihood of priming effects in sociolinguistic variables.

Experiments 2 and 3 test the largest level of generality used in this study, by investigating gender as a macro-level, inferred social property of individual talkers. Gender is not a primary social category along which the *don't* or *there's* constructions vary, but differences have been noted for *don't,* where Eisikovits (1991) found that her Inner Sydney males used the nonstandard variant more than the females. Gender differences have also been noted in some cases for nonstandard *there's,* where females of some age groups are more likely to use the nonstandard form than males of the same age group (Riordan, 2007). However, both of these studies represent small groups of speakers, and neither shows especially clear patterns that are generalizable to US English speakers as a whole; as discussed in Chapter 2 and above, both of these variables show clearer distribution along the lines of social class than gender.

Yet a generally consistent sociolinguistic finding is that males are more likely to

use nonstandard patterns than females (e.g., Labov, 2001). Thus, we might expect that especially for the *don't* construction, participants would predict that males would use the nonstandard variant more often than females, and/or that females would use the standard variant more often than males. This could result in participants being more likely to choose nonstandard patterns in male trials than in female trials. Listeners may have abstracted sociolinguistic patterns from experience, which are part of their knowledge of language, and these patterns may be applied to novel processing situations. That is, even if participants do not have established exemplars mapping nonstandard *don't* to male speakers, they may encounter nonstandard *don't* and apply a "nonstandard + male" pattern from other exemplars, increasing the likelihood of linking nonstandard *don't* with maleness.

A useful way to think about the differences between types of social categories and their relevance to perception is through the notions of *direct* and *indirect indexicality* (Ochs, 1992). Linguistic forms come to non-referentially index, or signal, social properties or contexts that they vary with. But they may also index properties indirectly, through other properties. My study participants may have previous associations between male speakers and nonstandard language, therefore gender may be an *indirect index* of nonstandard subject-verb patterns. That is, the variables may signal maleness through the mediating index of nonstandardness. On the other hand, Experiments 4 and 5 look at social status--a social property that *is* attested as patterning directly with these variables; there is evidence for a *direct* indexical relationship between the variables and status. Finally, Experiments 6 and 7 test individual talker identity, assuming that *any* linguistic variable could potentially be perceived to vary by individual. I consider this indexicality to be a *potential* indexicality. Table 4.1 summarizes these indexical relationships between the manipulated social factors and the morphosyntactic variables tested in the study.

These relations give a basis from which to interpret differences in findings across the social factors manipulated, which I discuss in each experimental chapter and in the concluding Discussion. These three social factors provide a comparison set for understanding how different types of social attributes, which may be differently related to grammatical variability, may affect perception.

Table 4.1
Indexical Relations between the Manipulated Social Factors and the Morphosyntactic Variables

Experiments	**Social factor**	**Indexical relation to variables**
2 and 3	Gender	Indirect
4 and 5	Social status	Direct
6 and 7	Individual talker	Potential

Experiments 2 and 3 use gender as a readily inferred and fundamental social cue for the purpose of investigating to what extent this type of social information might be relevant in grammatical priming. Gender has been shown to be salient in other experiments regarding speech perception, even when the variation being tested is not straightforwardly associated with gender (Hay et al., 2006; Strand, 1999). And, gender is easily introduced into the experimental task through auditory means, without unintentionally altering other linguistic cues (to manipulate dialect or accent would necessarily introduce other varying linguistic cues, sacrificing the isolation of the grammatical patterns of interest).

This chapter reports on two experiments where gender is manipulated, specifically to see if gender-matching between prime and target sentences leads participants to be more likely to experience grammatical priming. The goal is to see whether social similarity between the prime and target sentences, along the dimension of gender, enhances participants' expectation of grammatical similarity between the prime and target sentences, fostering a greater likelihood of choosing a target completion that matches the prime sentence form. That is, when the prime is nonstandard and spoken by a male, participants will be more likely to complete the target as nonstandard when the target is also spoken by a male relative to when the target is spoken by a female (and so on, for the other conditions). The difference between Experiments 2 and 3 is one of how this gender cue is introduced: in Experiment 2, only vocal cues are used; in Experiment 3, visual cues are added to the vocal cues.

4.2 Experiment 2: Gender in the priming paradigm

The basic design of Experiment 2 is identical to that of Experiment 1, except that all stimuli were presented auditorily. This permitted the easy introduction of voice as a cue to talker gender, facilitating the manipulation of talker gender across trials.

4.2.1 Design

The independent variables are construction (*there's* v. *don't*) and agreement of the prime (standard v. nonstandard), and prime-target gender condition (MM, FF, MF, FM). The dependent variable is target response (standard v. nonstandard).

I again hypothesized that nonstandard agreement completions would be more likely following nonstandard agreement primes than following standard agreement primes, and that nonstandard responses would be more likely for *there's* sentences than for *don't* sentences. Regarding gender, I hypothesized that male-voiced target trials would be more likely to have nonstandard responses than female-voiced trials. Further, I predicted that matching gender conditions (MM and FF) would show greater priming effects than nonmatching gender conditions (MF and FM). That is, I predicted that the target structure would more likely match the prime structure when the target gender was the same as the prime gender.

4.2.2 Materials

The same items were used as in Experiment 1. Items were in the same prime agreement condition as in Experiment 1, but within each condition the items were randomly assigned to four gender conditions: Male Prime-Male Target (MM), Female Prime-Female Target (FF), Male Prime-Female Target (MF), Female Prime-Male Target (FM). New audio stimuli for primes and fillers were created, with white noise supplementing (not erasing) the nouns in the prime sentences. The same 16 voices and the same 192 noun photographs were used, and the same target sound files were also used. For this reason, the same item was also removed from analysis as in Experiment 1; this item was in the *don't*, standard, MM cell.

4.2.3 Participants

43 University of Michigan undergraduates received course credit for participating. All were native speakers of English and had lived in the United States from an early age (for at least 16 years). Four participants were removed from analysis: two were disrupted during the task; one had provided her voice for the experiment; and one wore hearing aids (39 subjects are included in this analysis).

4.2.4 Procedure

The Procedure was identical to that of Experiment 1, except that the experimenter did not remain in the room during the practice trials. The session lasted approximately 18-22 minutes for each subject. Yes/No comprehension questions were presented to participants throughout the session, following filler trials. Items were randomized within four blocks, and the order of blocks was randomized. Photo pairs were positioned in the middle of the screen. Two presentation lists varied the order of photographs for each response screen. All image choice screens (response screens) remained on screen for a maximum of 4000 ms. There was a 1500-ms pause following filler and target trials and a 250-ms pause following prime trials; this was done to subtly increase the link between the prime and target stimuli. The same demographic survey used in Experiment 1 was administered at the end of the experiment.

4.2.5 Results

The results show evidence of grammatical priming, but not gender priming. Nonstandard responses were again more prevalent following nonstandard prime sentences and in *there's* trials, shown in Figure 4.1 (N = 2431). Nonstandard responses were significantly more likely in *there's* trials ($p<.001$) and nonstandard-primed trials ($p<.001$), as Table 4.2 shows.

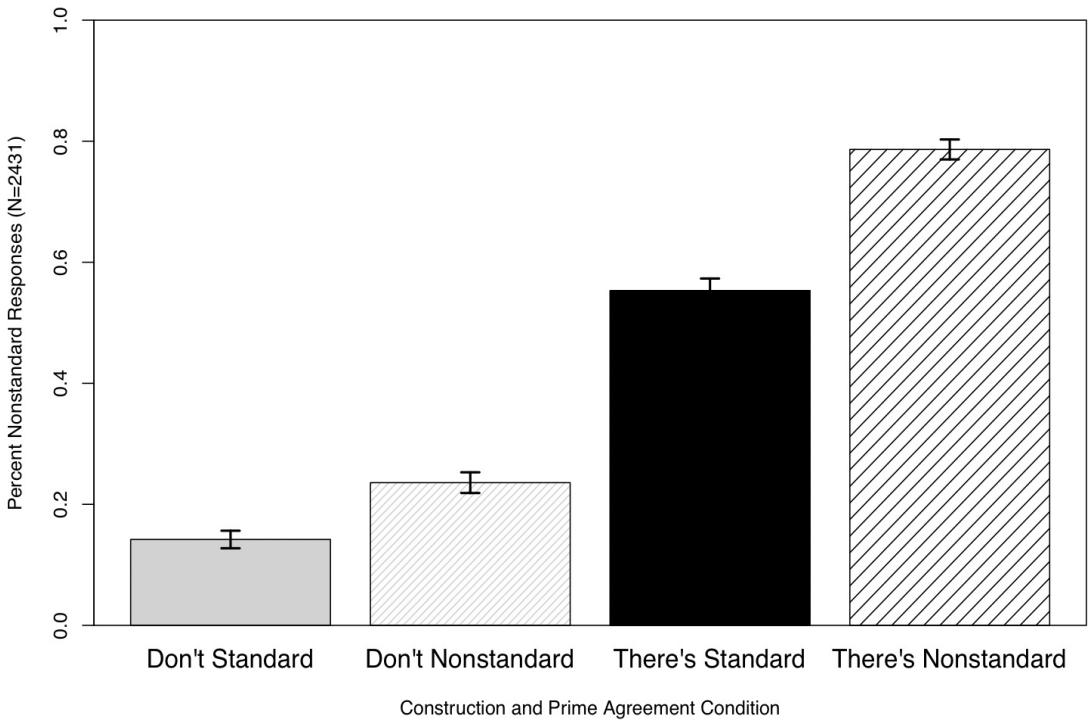


Figure 4.1. Nonstandard responses by construction and prime agreement conditions, Experiment 2.

Table 4.2
Grammatical Priming Effect, Experiment 2

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	2.25	.23	9.86	<.001
Construction	*There's*	-2.63	.22	-12.02	<.001
Prime Agreement	Nonstandard	-1.00	.22	-4.59	<.001

The gender variables (gender match and gender combination) aimed to investigate whether different combinations of gender between prime and target increased or decreased the likelihood that the target response would match the grammatical form of the prime trial (whether in standard trials the target response will be standard, and in nonstandard trials the target responses will be nonstandard). To model this likelihood, I created a new dependent variable called *grammatical match*, which codes whether or not

the agreement form in the target response is the same as the agreement form in the prime sentence. For all standard trials, standard target responses received a "1" and nonstandard responses received a "0." For all nonstandard trials, nonstandard target responses received a "1" and standard responses received a "0."

Same-matching gender trials were no more likely to have matching target responses than different-gender trials. However, in only the standard trials, grammatical match was less likely in the male target conditions than in the female target conditions. These differences are highlighted in the means in Table 4.3, and they are illustrated in Figure 4.2. The results of the model shown in Table 4.4 suggest the tendency of male target voices to be associated with nonstandard target responses; participants are less likely to repeat the form of the prime in standard trials for males.

Table 4.3
Grammatical Match by Construction, Agreement, and Target Gender, Experiment 2

Factor	**Factor Level**	**Proportion Grammatical Match**
Construction	*There's*	0.62
	Don't	0.54
Agreement	Standard	0.65
	Nonstandard	0.51
Target Gender	Male	0.55
	Female	0.61
Agreement: Target Gender Interaction	Standard:Male	0.58
	Standard:Female	0.70
	Nonstandard:Male	0.51
	Nonstandard:Female	0.52

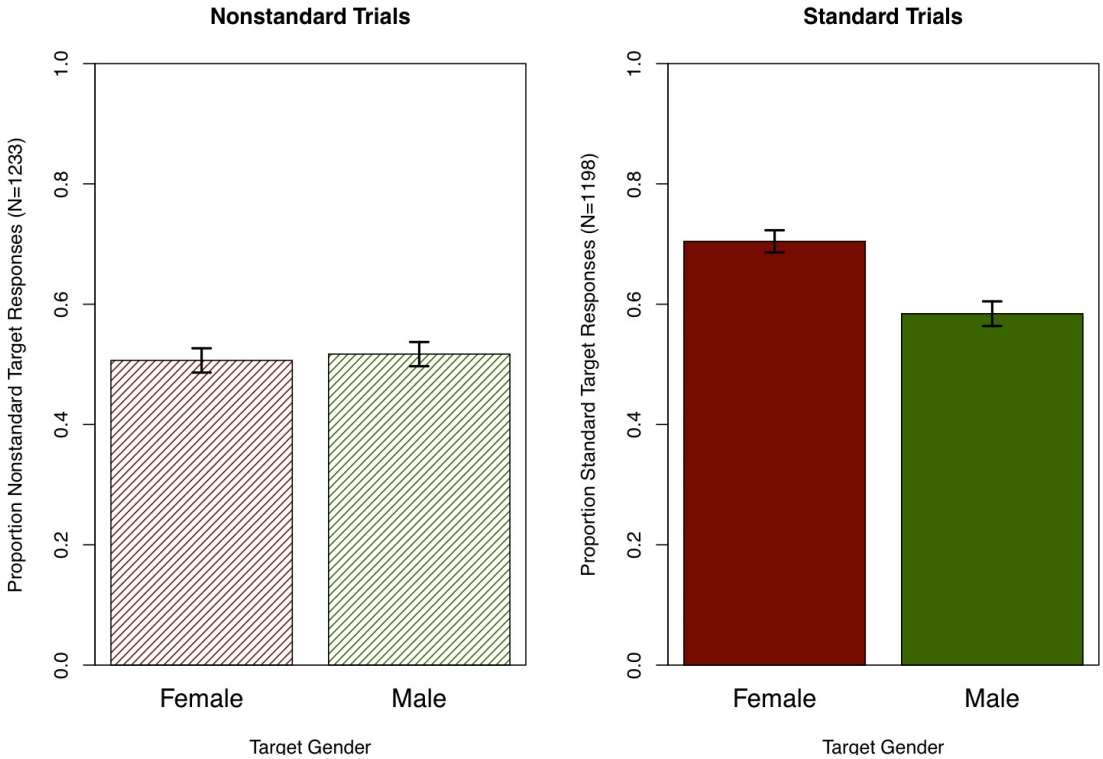


Figure 4.2. Target gender effect: Grammatical matching by target gender for nonstandard and standard trials, Experiment 2.

Table 4.4
Target Gender Effect on Grammatical Match for Standard Trials Only, Experiment 2

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Sig. level**
	(intercept)	2.39	0.29	8.28	<.001
Construction	*There's*	-2.28	0.3	-7.61	<.001
Target Gender	Male	-0.71	0.3	-2.39	<.05

4.2.6 Discussion

Experiment 2 found that the grammatical priming result was replicated from Experiment 1: nonstandard target responses were more likely after nonstandard prime sentences, and they were more likely for *there's* sentences than for *don't* sentences. The primary social prediction--that matching genders between prime and target trial would foster greater grammatical priming--was not confirmed. This may indicate that social

information from the prime does not carry over into the interpretation of a target structure. Male target voices did elicit more nonstandard responses, significantly so in the standard trials, confirming the prediction that male voices would be more likely associated with nonstandard forms than would female voices.

The results suggest that social and grammatical information do interact during the processing of variable morphosyntactic structures, and that social properties of a speech situation are in some way encoded in linguistic representations, such that differences in the social properties of an input stimulus result in different perceptual outcomes. However, the lack of an effect overall for same-gender versus different-gender prime-target stimulus pairs calls into question whether social matching, conceived of at a large granularity such as gender, affects priming; or, whether any effects of social matching on top of grammatical priming are too miniscule to be detected in the experimental paradigm used here. A second experiment was intended to attempt to replicate, and possibly clarify, the results of Experiment 2 with regards to gender. Experiment 3 used the same paradigm as Experiment 2, but attempted to heighten the cues to talker gender by introducing photographs in addition to vocal cues.

4.3 Experiment 3: Adding visual cues to gender

To extend the exploration from Experiment 2's manipulation of gender--a social feature pervading across sociolinguistic findings regarding variation and perception--Experiment 3 attempted to heighten the social cues to gender in the experimental setting. In Experiment 3, talker photographs accompanied the auditory stimuli, which represented either male or female talkers. This follows literature finding that photographs and other visual information can cue social features, including Strand (1999) for gender; Hay et al. (2006) for gender, age, and social class; and Staum Casasanto (2009) for race. Experiment 3 thus sought to see whether adding additional information signaling social attributes of the talkers could clarify the results of Experiment 2, with there being four main predictions: that nonstandard responses would again be greater for trials which were preceded by nonstandard primes, that nonstandard responses would be greater for *there's* trials, that nonstandard responses would be greater for male-target trials, and that priming

would be greater for matching gender trials.

4.3.1 Design

As in Experiment 2, the main dependent measure was target completion (standard v. nonstandard), and a separately analyzed dependent measure was grammatical match (match v. no match). The independent variables were construction (*don't* v. *there's*), prime agreement (standard v. nonstandard), gender of the target trial (male v. female), and prime-target gender combination (same v. different; MM v. FF v. FM v. MF).

4.3.2 Materials

The only difference in the design of Experiment 3 from Experiment 2 was the addition of one photograph matched to each talker's voice throughout the experiment. A total of 16 photographs were chosen to use from the Radboud Faces Database (Langer et al., 2010), a database of photographs of males and females in identical dress but with different facial expressions and gaze directions. The 16 photos were taken from the Caucasian males and females, to avoid introducing racial differences. I thought it important to maximize the perceptual difference between the male and female voices, thus, the male and female photos were selected with different facial expressions. This difference meant that the male faces were shown with closed mouths, while the female faces were smiling.

4.3.3 Participants

52 participants participated for course credit or payment. Two participants were removed from analysis who reported not being native English speakers.

4.3.4 Procedure

The procedure was identical to that of Experiment 2 with the exception of the presence of talker photos. When a talker photo appeared, it appeared in the center of the screen for the duration of the trial sentence. It disappeared at the conclusion of the sentence audio, when the noun photo pairs appeared on the response screen. An example

trial is shown in Figure 4.3.

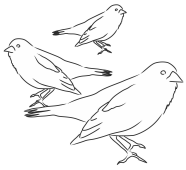
<table>
<tr><th></th><th></th><th colspan="2">Stimulus</th></tr>
<tr><td rowspan="2">Prime Trial</td><td>Sentence
+
Photo</td><td colspan="2">"At the campsite, the mosquito don't fly into the ____."
  </td></tr>
<tr><td>Response</td><td>  </td><td>  </td></tr>
<tr><td rowspan="2">Target Trial</td><td>Sentence
+
Photo</td><td colspan="2">"In the yard, the _____ don't sit on the feeder."
  </td></tr>
<tr><td>Response</td><td>  </td><td>  </td></tr>
</table>

Figure 4.3. Example nonstandard *don't* trial, MF condition, Experiment 3.

4.3.5 Results: Grammatical and gender priming

Nonstandard responses were again more likely in the trials for *there's* sentences than in the trials with *don't* sentences, as shown in Figure 4.4 (N=3182). Nonstandard responses were also again more prevalent in nonstandard prime trials; however, the agreement status of the prime was not a significant factor predicting target choice in the overall model for this experiment, given in Table 4.5. However, prime agreement is

significant for the *there's* trials only (β = -.51, SE(β) = .24, z = -2.1, p<.05).

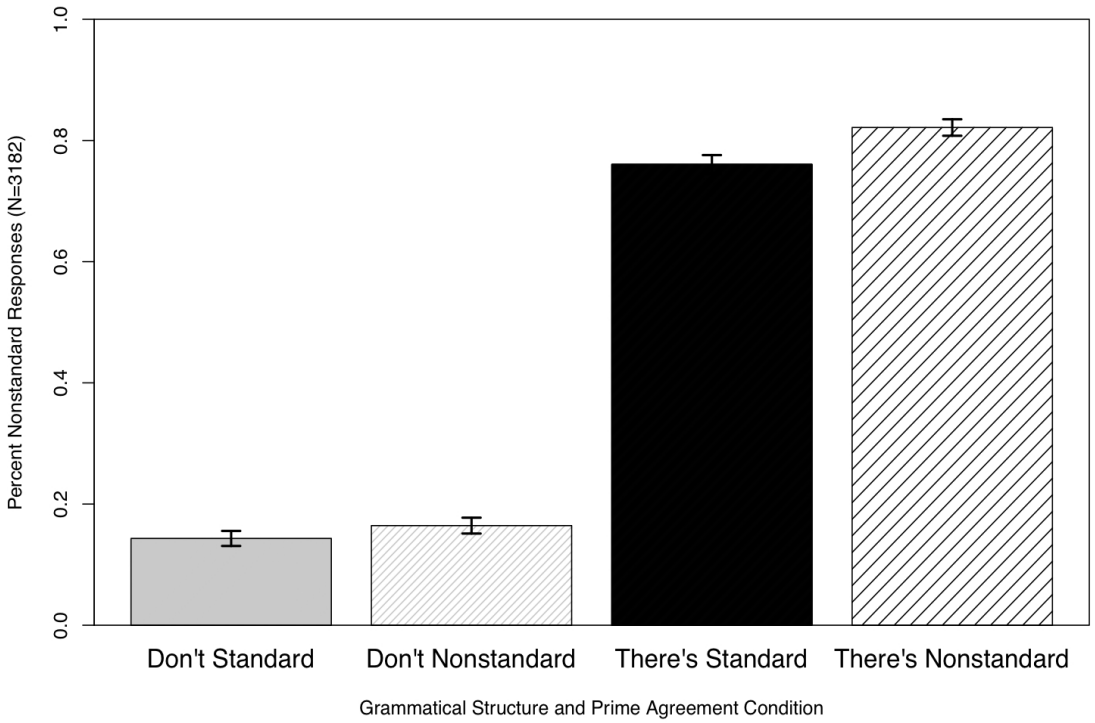


Figure 4.4. Nonstandard responses by construction and prime agreement condition, Experiment 3.

Table 4.5
Grammatical Priming Effect, Experiment 3

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Sig. level**
	(intercept)	2.06	0.17	12.36	<.001
Construction	*There's*	-3.4	0.16	-20.82	<.001
Prime Agreement	Nonstandard	-0.3	0.16	-1.89	<.1

There was again no overall difference in the likelihood of priming in the same- versus different- gender conditions, and nor did any gender combination predict priming; target gender was also not a significant predictor of responses in this experiment.

4.3.6 Results: Participant demographics

In Experiment 3's results, neither the grammatical priming effects were as apparent as they were in Experiments 1 and 2, nor were the gender effects clear. To investigate possible reasons for this, demographic variables for participants were modeled as predictor variables. There was no effect of participant gender on target responses (25 males, 25 females). However, participants' self-provided ethnoracial identification was a significant predictor variable ($p<.05$). The ethnoracial categories included in the demographic survey were collapsed into five levels: Asian American (N=8), Black/African American (N=5), Hispanic/Latino (N=1), White (N=33), and Other (N=3). "White" was selected as the baseline factor level for the regression.

Participants identifying as Black/African American were more likely to complete targets with nonstandard target responses, particularly in *don't* trials. This is shown by the proportions in Figure 4.5 and the model output in Table 4.6. This group is almost three times as likely to complete target sentences in *don't* with the nonstandard response as other groups are.

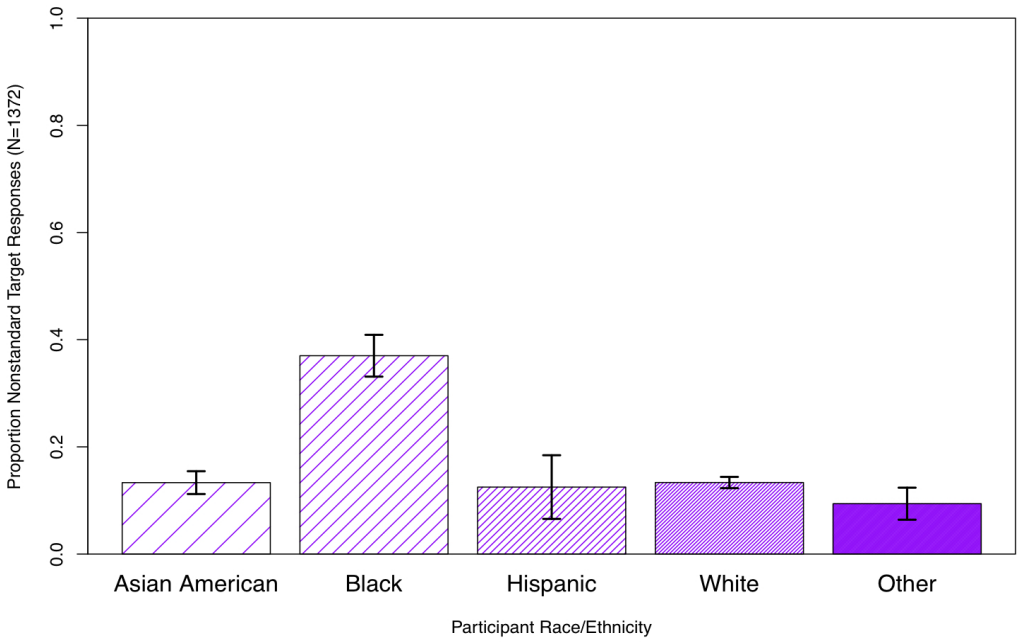


Figure 4.5. Race and nonstandard target responses, *don't* trials only, Experiment 3.

Table 4.6
Race Effect in *don't* Trials, Experiment 3

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Sig. level**
	(intercept)	2.42	0.27	9	<.001
Prime Agreement	Nonstandard	-0.16	0.27	-0.57	
Race	Asian American	-0.06	0.45	-0.13	
	Black/African American	-1.72	0.51	-3.37	<.001
	Hispanic/Latino	-0.17	1.13	-0.15	
	Other	0.28	0.7	0.39	

While variability in agreement has been shown to vary with speaker class, African American English is one dialect associated with ethnoracial groups that employs nonstandard *don't*, among other nonstandard subject-verb agreement patterns (Labov et al., 1968; Wolfram, 1991; Weldon, 1994). Self-identifying Black/African American participants may have a greater probability of producing nonstandard subject-verb agreement patterns; they may speak this variety or be exposed to it in their communities or cultural activities, more than the other participants. The finding also calls into question the researcher's expectation that grammatical priming should occur: these participants are more likely to complete the *don't* target trials overall with more nonstandard choices, but this is regardless of the agreement status of the prime. This could indicate that for these participants, perception is not being affected by priming. Rather, the target trials alone are probing immediate competence (knowledge), and these participant groups may have different frequencies of patterns stored, such that the nonstandard *don't* pattern is stored with higher frequency (higher resting activation level) than the other participant groups. Clear production data for these morphosyntactic variables, which this study did not collect, would shed more light on this question.

4.3.7 Discussion

Experiment 3 did not find the anticipated priming-enhancing effects for prime-target gender matching when cues to gender were enhanced by adding photographs. The effect of the prime sentence's agreement form was also only significant in the trials

involving *there's*; the trials involving *don't* did not show a significant influence of grammatical priming. However, an unexpected participant demographic effect of ethnoracial identification was found, where regardless of the grammatical condition of the prime, participants identifying as Black completed far more *don't* trials with the singular photo as compared to other participant groups. While the number of these participants is small, the finding suggests that subjects are exercising elements of their own competence when performing this task. Within the theoretical framework of exemplar theory, this element of performance is predicted if participants' knowledge differs. Indeed, though the NP_{SG}+*don't* pattern occurs across both black and white speakers of American English, it is consistently listed among the features of African American English in particular.

In terms of the grammatical priming effect, it is possible that introducing the talker photographs in Experiment 3 actually had the opposite effect of what was intended: by adding to the amount of information participants needed to process during the trials, perhaps the grammatical condition of the prime was rendered ineffective in some trials, especially the *don't* trials. That is, while the goal was to enhance participants' associations between structures in a prime trial and the talker who accompanied them, particularly the gender of the talker, it is possible that the increased social information actually diminished participants' attention to the grammatical information, thereby rendering both grammatical and social effects too delicate to detect in this kind of rapid-paced response task. Another confound in participants responding to gender alone could be the different facial expressions displayed by the male v. female photographs; participants could have been focused on the talkers' affect rather than gender, or simply distracted by it. I had thought that using different facial expressions would facilitate the processing of gender as a distinctive binary category, but it may have led participants to attend to other factors.

More crucially, while each talker's voice was paired consistently with the same photo throughout the session, it is also the case that all talkers used all grammatical variants in the experiment (as was also true in Experiment 2). It could be that because all talkers used all variants, no consistent link could be formed between talkers and constructions or sociolinguistic variants. That is, within the experiment, the variants did

not come to index the category of gender. Inasmuch as we expect participants' responses here to reflect experienced connections between grammatical variation and gender, we expect the relation to be one of indirect indexicality. In this case, it is unlikely that participants have experienced gender as being linked directly with the linguistic forms encountered in the experiment (NP+*don't* and *there's*+NP). It is more likely that gender would be associated indirectly with these particular linguistic forms by virtue of the forms being standard or nonstandard. That is, categories of "standard" or "nonstandard" would mediate between the linguistic forms and gender categories, indexing "female" or "male." But in this experiment, such an indirect correspondence was not built in to the design. Perhaps a design which involved only one social group (e.g., one gender) using each variant (standard or nonstandard) would have increased the likelihood of using gender as a cue to grammatical structure. This insight is applied to the other experiments in the dissertation.

4.4 General discussion: Gender and grammatical priming

In exploring the manipulation of talker gender in the prime and target sentences in Experiments 2 and 3, I was building upon the finding of Experiment 1 that the interpretation of sociolinguistically variable subject-verb agreement patterns was affected by recent exposure to standard or nonstandard patterns--the effect of grammatical priming. In using gender as the social feature of interest, I tested whether gender similarity in the prime and target sentences would heighten priming effects. While target trials were slightly more likely to be completed as nonstandard when spoken by males than by females, there was no clear effect of the prime sentence's gender. If gender were a property mentally represented with these patterns, we would expect that the exposure to a variant-gender match in a prime trial would heighten the effect of the gender cue in the target trial. In other words, if I am expecting that a male talker will use a nonstandard pattern, then being primed with a male talker using a nonstandard pattern should heighten the expectation because it's activating that match, which I have previously stored knowledge of. The experimental results do not give evidence of this process, but they do show evidence of accessing a more general link between gender and

standard/nonstandard forms.

Another way to look at Experiments 2 and 3 is as testing for participants' capacity to *learn* links between the grammatical patterns and gender groups as an outcome of the experimental session. This would suppose not that one gender should only be associated with one pattern, but rather that for any given ambiguous target trial, a similarity in gender should mean a similarity in grammar. The idea was to see if an indexical link could, in effect, be created in a very short time, as people have been shown to acquire novel grammatical structures in a very short time (e.g., Kaschak & Glenberg, 2004). These results also do not support the claim that such understanding was acquired by participants in the experiment. However, because both genders used both standard and nonstandard patterns, specific links that may have been acquired could not be tested for (and because no clear production patterns were known to be associated with gender, a dichotomy between genders and patterns was not incorporated into the design). In the remaining experiments, the possibility of learning during the experiment is more adequately addressed, as each variant (nonstandard or standard) is only ever used by one social status group (Experiments 4 and 5) or one individual (Experiments 6 and 7).

Nonetheless, combined with the participant results of ethnoracial group, the gender results do support the overall prediction of exemplar theory that participants' responses to priming is (at least partially) an outcome of their prior socio-grammatical knowledge. First, the fact that participants identifying as Black in Experiment 3 showed a much greater likelihood of choosing nonstandard responses, especially for the *don't* sentences, suggests that differential frequency information in exemplar storage manifests in the sentence completion task. Second, if all participants have not experienced this morphosyntactic variation as being related to gender, then socio-grammatical priming may not have been effective here simply because there exist no socio-grammatical representations. And because no *consistent* socio-grammatical combination was present in these experiments, since the conditions were fully crossed, neither were any socio-grammatical combinations (indexicalities) acquired over the course of the experiments. The next chapter discusses experiments that test social status, which participants may more likely have experienced as correlating with agreement variation.

CHAPTER 5
SOCIAL STATUS AND SOCIOLINGUISTIC PRIMING

If the lack of gender-matching effects in Experiments 2 and 3 were due to a lack of pre-existing sociolinguistic mappings for the tested variables, then we might expect more robust effects of social manipulations when the social factors have already been experienced by listeners as mapped, whether categorically or variably, onto the linguistic forms in question. For subject-verb agreement variables, social status provides such a factor. In Experiments 4 and 5, social status is manipulated as a dichotomous social factor (high-status versus low-status).

As discussed in Chapter 2, both nonstandard agreement patterns investigated in the dissertation have been shown to vary along lines of social class. In several studies cited there, NP_{SG}+*don't* was found to occur much more frequently among working-class or lower-status speakers (and Southern speakers, who in the United States are also often perceived as lower-status or stigmatized speakers; see Campbell-Kibler, 2006) than among upper-class speakers. Though less regularly identified as a class-related variable, at least two studies (Feagin, 1979; Meechan & Foley, 1994) also show that *there's*+NP_{PL} is more frequent among working-class or speakers with less education. It therefore seems likely that most speakers of US English have experienced this aspect of the variability of these two constructions.

In other studies *there's*+NP_{PL} has also been found to be more frequent in less formal contexts, relating to register rather than social class (Crawford, 2005). However, it could be argued that lower formality also indirectly indexes class or status, again using the notion of indirect indexicality (Ochs, 1992). The variant *there's*+NP_{PL} could activate a category of informality or non/standardness, and through that category the variant could activate lower social status; or, a perception of lower talker status could activate the

related category of informality/nonstandardness, which could make the nonstandard variant more likely (or the inverse, for the standard variant and formality/high-status). Alternatively, the variant *there's*+NP_{SG} could activate a category of formality or standardness, then index high-status through that intermediary category.

Experiments 4 and 5 manipulate social status as a social variable to test for mutual influences of social and grammatical information. While Experiment 4 follows the prior experiments in investigating social influences on grammatical choice, Experiment 5 tests the other potential direction of this relationship: grammatical influences on perceptions of who the talker is likely to be.

5.1 Experiment 4: Social status and morphosyntactic perception

Experiment 4 uses a short-term priming paradigm where the social status of talkers is cued by photographs representing social class. This technique for introducing social status into the experimental setting has been used successfully by Hay et al. (2006), who found that class-cuing photographs influenced listeners' behavior in a lexical identification task involving variable vowel realizations. The same general design was used as in Experiments 2 and 3, with the goal of exploring whether matching social status between prime and target trials fosters greater priming than mismatching status. However, some adjustments were made to the design in response to the results from Experiments 2 and 3, as discussed below.

5.1.1 Design

Experiment 4 was a short-term structural priming experiment with manipulated social status cues in the prime and target stimuli. The dependent variables are again target completion (standard v. nonstandard) and grammatical match (match v. no match). Response times were also collected, from the onset of the target response screen to the button press for a picture choice. The independent variables were construction (*there's* v. *don't*), prime agreement status (standard v. nonstandard), target talker status (high v. low), and prime-target status match (same v. different; HH v. LL v. HL v. LH).

The status photos were matched to prime conditions throughout the experiment,

so that the standard trials also correspond to the high-status prime trials and the nonstandard trials correspond to the low-status prime trials. Thus, an HH trial is a trial where both the prime and target talker photo were high-status, but also where the prime was standard. Figure 5.1 illustrates sample trials and Table 5.1 lists the conditions.

I predicted that nonstandard choices would be more likely for *there's* than for *don't* trials, and that nonstandard choices would be more likely following nonstandard (low-status) primes. I further predicted that grammatical matching would be greater for trials where the talker status was the same from prime to target than for trials where the target status was different from the prime status. For response times, I predicted that different-status trials would have longer latencies than same-status trials, indexing surprisal at a switch in talker status.

Table 5.1
Prime Agreement and Social Status Conditions in Experiment 4

Prime trial	**Target trial**
Standard/High-status	High-status (HH)
	Low-status (HL)
Nonstandard/Low-status	High-status (LH)
	Low-status (LL)

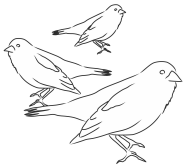
		Stimulus	
Prime Trial	*Sentence* + *Photo*	"At the campsite, the mosquito don't fly into the ____."  (nonstandard/low-status)	
	Response		
Target Trial	*Sentence* + *Photo*	"In the yard, the _____ don't sit on the feeder."  (high-status)	
	Response		

Figure 5.1. Sample experimental trials for Experiment 4 for a trial in the *don't*-LH condition (low-status/nonstandard prime, high-status target).

5.1.2 Materials

The same 64 items were used as in previous experiments. Only the eight female voices were used, to eliminate any gender-related effects. Each of the eight female talkers

was matched with a single picture for the duration of the experiment (to create the impression of an individual voice-photo-status match). Additionally, the talkers were assigned to be either prime talkers or target talkers, so that four talkers were only heard in the prime trials, and four talkers were only heard in the target trials.

Of the four prime trial talkers, one each was assigned to each construction-prime condition combination. That is, all nonstandard *there's* trials were spoken by one talker, all nonstandard *don't* trials were spoken by one talker, all standard *there's* trials were spoken by one talker, and all standard *don't* trials were spoken by one talker.[5] The photograph assigned to each talker also corresponded to the standardness of the trials they spoke: nonstandard talkers were shown with low-status photos, and standard talkers were shown with high-status photos. Because only one prime talker was assigned to each construction-prime condition, and each construction-prime condition corresponded to a single photograph, the link between construction (*there's* or *don't*), grammatical variant (standard or nonstandard), and talker status (high or low) was constant throughout the prime trials.

The four target talkers were not split up in this way. Each target talker appeared in each prime and construction condition. After each prime trial, any of the four target talkers may have been heard. This created the conditions of matching or mismatching talker status from the prime to the target trials. Table 5.2 outlines these conditions. Each construction-prime condition has its own talker, while each target status condition has two different possible talkers.

5. For the status manipulation, I thought it was important that the *there's* talker be separate from the *don't* talker, since the status associations are less clear for the *there's* construction. If nonstandard *there's* is not perceived as being associated with a lower status, I did not want a talker's use of that structure to detract from their perception as being a lower-status talker if they also used the nonstandard *don't* construction.

Table 5.2
Talker Photo/Voice Conditions in Experiment 4

Prime	*Don't*-LowTalker			
Target	Low1	Low2	High1	High2
Status Combination	LL		LH	
Prime	*Don't*-HighTalker			
Target	High1	High2	Low1	Low2
Status Combination	HH		HL	
Prime	*There's*-LowTalker			
Target	Low1	Low2	High1	High2
Status Combination	LL		LH	
Prime	*There's*-HighTalker			
Target	High1	High2	Low1	Low2
Status Combination	HH		HL	

Prime audio files were created with white noise over the non-subject noun, and target files were created with white noise replacing the subject nouns, as in Experiments 2 and 3. For this experiment and Experiments 5-7, tokens of *the___don't* and *there's* were extracted from each talker's files, and the article and verb portion of the original target file were replaced by splicing in one of these tokens. This was to eliminate phonetic cues to the subject noun based on coarticulation with the preceding article or verb.

A set of photographs was created using nine female undergraduate-age models, each in three guises: low-status, high-status, and neutral. The photographs were taken by a photographer (Whitney J. Miller), and each model was compensated for her time. The women were recruited by myself and the photographer through personal contact. The photographs used two main cues to status: clothing and setting. For the low-status guise, models were photographed wearing plain t-shirts, tank tops, work shirts, or sweatshirts, and stood in front of settings such as apartment buildings, garages, and mobile homes. For the high-status guise, models wore button-up collared blouses, blazer jackets, or sport

coats, and stood predominantly in front of large homes. One model was photographed in front of commercial spaces--a fancy clothing boutique for the high-status and a dollar store for the low-status--but these photos were not used in the experiment. The models were instructed to use a neutral expression while posing for the photo, and were only photographed above the waist. Sample photos are given in the sample trials in Figure 5.1.

The high- and low-status photograph of each model were put through a norming task, described in detail in Appendix B. From these norming results, eight photos were chosen--four low-status and four high-status, from eight different models--to use in Experiments 4 and 5. These were chosen for their clear ratings as either low or high on the status-related rating measures of education, class, and successfulness. Each of these eight photos was then paired with one of the voices corresponding to the low or high status. Each model only appeared in one guise in the experiment.

Finally, for Experiment 4, most of the filler trials were removed, because it was unclear that the existence of the filler trials in previous experiments was adequate in masking the experimental manipulation, based on participants' post-experiment comments, and I desired to minimize the amount of information exposed to participants. Because the grammatical priming effect is a small one, it seems that compounding the information load of the experiment may have decreased the chances of finding either grammatical or social effects in Experiments 2 and 3. Thus, only 16 fillers were used in Experiment 4 (rather than 64). These fillers were the ones that had contained comprehension questions following them in Experiments 2 and 3.

5.1.3 Participants

42 participants participated for experimental credit. Two participants were removed from analysis because their sessions were disrupted.

5.1.4 Procedure

Participants used the right-most button on a serial response box to choose items on the right side of the screen, and the left-most button to choose items on the left side of the screen.

The instructions to participants directed them to choose the picture corresponding to which word(s) they thought that particular talker was more likely to have said. This was an attempt to focus participants' attention on the talkers' patterns, rather than their own production patterns. After the instructions, four practice trials were presented, which participants could repeat if they wished. Then, participants were shown the eight pictures of the talkers before the experimental trials began; the instructions said they were to become familiar with the photos. The photos advanced automatically after 5000 ms each on screen; they were presented in random order. The experiment then began after a short pause.

Items were organized in groups of four trials of the same construction-prime condition, so that the same construction-prime condition was heard four consecutive times. Trials were divided into four main blocks, and within each block were four repetitions of the different construction-prime conditions. The four main blocks were presented in an offset selection style (so that each participant started with the block following the block that the previous participant had seen first). Each main block thus had one sub-block each of four items of *there's*-standard, *there's*-nonstandard, *don't*-standard, and *don't*-nonstandard. Each sub-block of four trials contained two trials of each target talker (two low and two high), so that each sub-block had two same-status trials and two different-status trials. Within the four major blocks, the construction-prime sub-blocks were randomly presented, and items within those blocks were also randomly presented. Table 5.3 explicates this main block structure (there were four of these main blocks).

Table 5.3
Conditions and Sub-blocks within Each Main Experimental Block, Experiment 4

Sub-block	***Don't*-Standard**	***There's*-Standard**	***Don't*-Nonstandard**	***There's*-Nonstandard**
Status combination trials (randomized)	HH	HH	LH	LH
	HH	HH	LH	LH
	HL	HL	LL	LL
	HL	HL	LL	LL

Before each sub-block was a 5000-ms pause. Before each prime trial was a 1000-ms pause. The prime talker photo appeared onscreen for 1000 ms before the audio played. The photo remained onscreen through the duration of the audio, and the response screen, with the two noun photos, immediately appeared and was on screen for a maximum of 4000 ms. Before each target trial was a 1500-ms pause. The target talker photo then appeared onscreen for 1500 ms before the target audio played. After the target audio, the noun photos appeared for up to 4000 ms. The filler/comprehension trials proceeded as in Experiment 3. Two lists were used that varied the order of items within the sub-blocks and major blocks, and that placed photo pairs in the reverse configuration.

The same demographic survey was used at the end of the experiment as in previous experiments.

5.1.5 Results: Target responses

Inspection of responses to individual items revealed that there were two items from the *don't*-standard-HH condition whose overall standard response proportions were under 75%. It is odd that nonstandard responses with *don't* would occur without being primed, especially when the target talker was a high-status talker (in addition to the prime sentence being standard, and the prime talker being high-status). It is possible that a short timing of the white noise segment corresponding to the target noun could have cued a singular noun for some subjects. These two items were removed from the analysis.

The target responses show evidence for both grammatical priming effects and social status effects. Nonstandard target responses were significantly more frequent for *there's* trials and for nonstandard trials, as shown by Figure 5.2 and the regression output in Table 5.4.

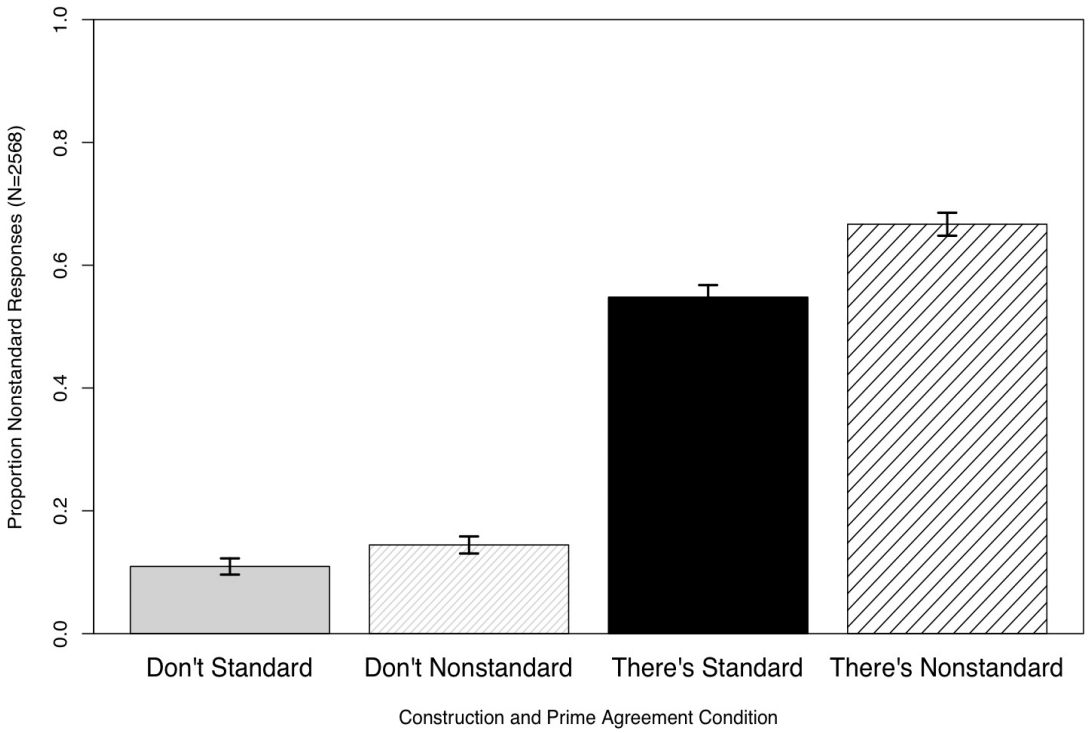


Figure 5.2. Nonstandard target responses by construction and prime agreement, Experiment 4.

Table 5.4
Grammatical Priming Effect, Experiment 4

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	2.60	0.22	11.63	<.001
Construction	*There's*	-2.86	0.16	-17.56	<.001
Prime Agreement	Nonstandard	-0.52	0.16	-3.37	<.001

To test for grammatical priming directly, the dependent variable of grammatical match was again created (coding standard trials as "1" for standard target responses, and nonstandard trials as "1" for nonstandard target responses). The proportion of grammatical match by construction, prime agreement, and prime-target status combinations is given in Table 5.5.

Table 5.5
Grammatical Match across Conditions, Experiment 4

Construction	**Prime Agreement**	**Status Combination**	**Proportion Grammatical Match**
Don't	Standard (H)	High (HH)	0.90
		Low (HL)	0.88
	Nonstandard (L)	High (LH)	0.12
		Low (LL)	0.17
There's	Standard (H)	High (HH)	0.45
		Low (HL)	0.46
	Nonstandard (L)	High (LH)	0.71
		Low (LL)	0.63

There is no overall effect of status matching, but for both variables, the nonstandard/low-status prime combinations show differences between the matching and non-matching status conditions (shaded in Table 5.5). For just the trials in the nonstandard/low-status prime conditions, the interaction between construction and status combination is significant. The output in Table 5.6 tests for grammatical match as the dependent variable; the baseline factor level of status combination is LH (so the effect tested is that of the status-matching target (LL)). For *don't* trials, priming is more likely when the target is low-status, while for *there's* trials, priming is less likely when the target is low-status.

Table 5.6
Status-matching Effect for Nonstandard Prime Trials, Experiment 4

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	-2.47	0.30	-8.30	<.001
Construction	*There's*	3.57	0.31	11.62	<.001
Status Combination	Low-Low	0.46	0.31	1.51	
Construction: Status Combination	There's:Low-Low	-0.92	0.41	-2.23	<.05

In all experiments discussed so far, priming for nonstandard *don't* has been small and, in the case of Experiment 3, nonsignificant. I have interpreted this as a reasonable outcome based on the status of nonstandard *don't* as the most socially stigmatized among the four morphosyntactic variants being investigated here. Yet for Experiment 4, there are more nonstandard responses to *don't* trials in the cases where a low-status talker follows a low-status/nonstandard utterance than in cases where a high-status talker follows. This suggests that for variables that carry social marking such as this, there is an enhancing influence of the social cue in the target trial. The fact that the opposite trend is found in *there's* trials suggests that these "nonstandard" structures are not correlated with social status for these participants; the presence of either a high- or low-status talker simply does not activate a particular variant for this construction. If anything, it seems that the "nonstandard" grammatical variant *there's*+NP_{PL} is actually associated more with high-status talkers than with low-status talkers. If so, this could be explained by high-status talkers activating a "standard" socio-grammatical category--or another abstracted category that is positively evaluated socially--which is then mapped to the variant, which is itself perceived as standard.

5.1.6 Results: Response times

Participants' response times in the target trials also show substantive differences between the matching and unmatching status conditions, especially for *don't* trials. I used the function `lmer()` to perform linear regression models on the response time data. Significance levels for *t* values were obtained using the `pvals.fnc()` function from the `{languageR}` package (Baayen, 2010). For these analyses, I removed any observations that were more than two standard deviations from the overall mean, leaving 2346 observations.

The agreement form of the prime sentence did not affect target response times, but participants' target responses (standard or nonstandard) and construction did. The cell means in Table 5.7 show that for *don't*, standard responses are faster than nonstandard ones, with the opposite pattern for *there's*. These patterns suggest the automaticity of responses for the *there's*+NP_{PL} and NP_{PL}+*don't* variants, with the alternative forms taking

longer to process. Both factors and their interaction are significant predictors of response times, as shown in the output in Table 5.8.

Table 5.7
Response Times by Construction and Target Response, Experiment 4

Construction	**Target Response**	**Mean Response Time (ms)**
Don't	Standard	1188.67
	Nonstandard	1261.56
There's	Standard	1374.01
	Nonstandard	1138.32

Table 5.8
Effects of Target Response and Construction, Experiment 4

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**t value**	**Significance level**
	(intercept)	1306.75	56.85	22.99	<.001
Target Response	Standard	-111.53	36.39	-3.07	<.01
Construction	*There's*	-99.25	44.30	-2.24	<.05
Target Response: Construction	Standard:*There's*	224.05	44.39	5.05	<.001

Because of the different response time patterns for the two constructions relative to participants' target responses, I conducted separate analyses of the social status variable for the two constructions.

For *there's*, neither the agreement form of the prime nor any social status condition was a significant predictor of response times.

For *don't*, in addition to standard target responses predicting faster response times, the LL condition predicted longer response times, shown in Figure 5.3 and the output in Table 5.9. As shown in Figure 5.3, the response times fall in the following order: LL > HL/LH > HH. That is, it seems that timing is delayed when a trial includes either a nonstandard prime, a low-status talker, or both. This suggests that this specific social status information is leading to increased processing time.

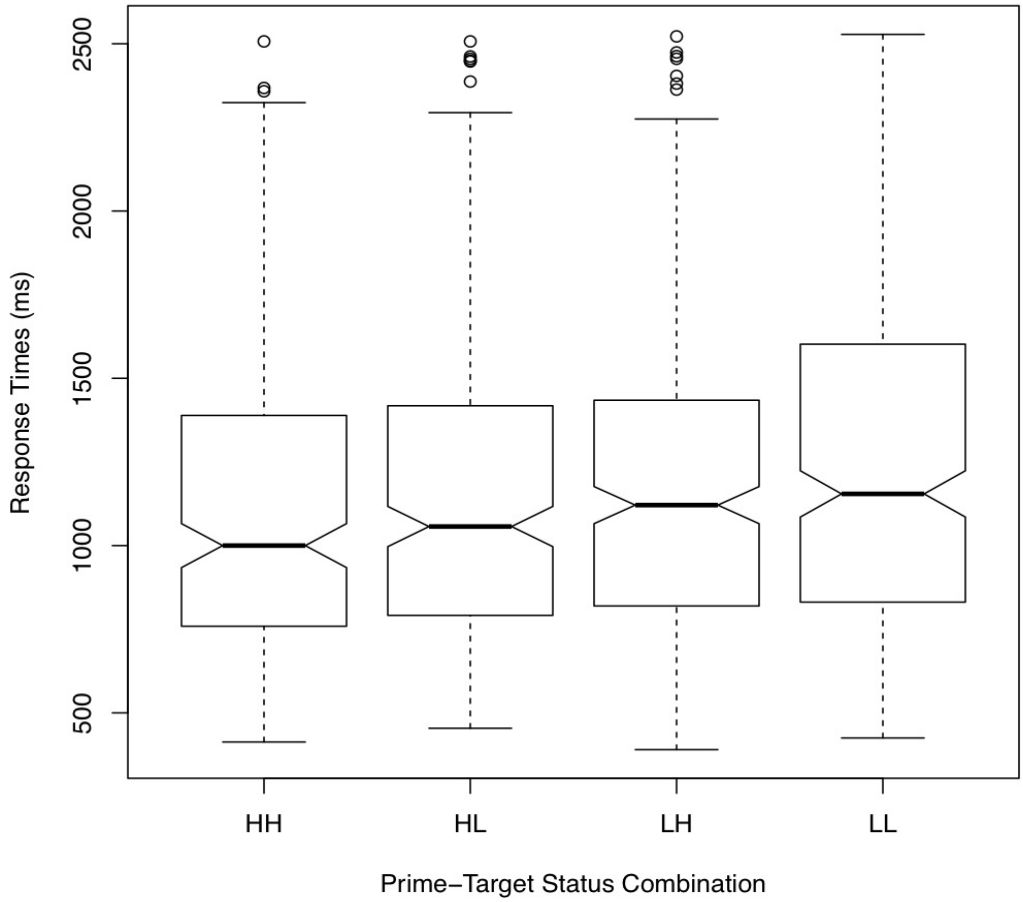


Figure 5.3. *Don't* status effect: Mean target response times by status combination, Experiment 4.

Table 5.9
Target Response and Status Effects on Response Times in *don't* Trials, Experiment 4

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**t value**	**Significance level**
	(intercept)	1198.69	78.15	15.34	<.001
Target Response	Standard	-80.95	38.94	-2.08	<.05
Status Combination	High-Low	88.26	71.83	1.23	
	Low-High	67.02	71.87	0.93	
	Low-Low	146.70	71.89	2.04	<.05

5.1.7 Discussion

The grammatical priming results were again replicated in Experiment 4. There was no main effect of matching talker status between the prime and target trials enhancing the likelihood of priming. However, there was a social effect, evident in both grammatical matching and response times. In *don't* trials, the matching status condition of LL garnered more priming than the mismatching status condition of LH, suggesting an enhancement of the nonstandard/low-status prime by the low-status target. This is evidence that grammatical priming is sensitive to social category information when a listener may have reason to believe that social information matters. That is, with the standard form as the baseline expected form for *don't,* and with nonstandard *don't* being associated with social group variables, participants seem to be activating the knowledge of those associations in interpreting the target sentences.

When participants in this experiment encountered a nonstandard *don't* sentence paired with a low-status talker, this exposure activated prior knowledge that these are two sources of connected, or at least potentially connected, sociolinguistic information. That activated knowledge was used in interpreting the following target sentence. In this condition, participants also took more time to make their responses; matching status led to longer processing time. This result resonates with findings from speech perception showing that social factors, such as ethnicity, do not influence processing until after the earliest stages of phonetic recognition (e.g., McGowan, 2010), and that talker-specificity effects only occur in more difficult and longer-duration processing tasks (e.g., McLennan & Luce, 2005).

Experiment 4 found support for the idea that for a social factor that is related to the sociolinguistic variable in question, social information is relevant when people process grammatical structures. This result follows a prediction of an exemplar-theoretic model of sociolinguistic knowledge: that social information is capable of activating--or reactivating--exemplars that contain social and linguistic representations. Experiment 5 was designed to follow up on these findings, investigating another side of this relationship: whether grammatical information may be inferred from social information.

5.2 Experiment 5: Social status, agreement variation, and social perception

How people infer social information from linguistic information comprises much of the central work in recent sociolinguistics, where the focus has moved from simply documenting linguistic variation to exploring how that variation is implicated in social perceptions, relationships, power dynamics, and so forth. In the last decade, the "social meaning" of linguistic variation has been one key area of focus that encompasses the study of how linguistic variation constructs, reproduces, or alters social structures, from micro-level relationships and stances to macro-level social categories and institutional formations (see Eckert, 2008; Moore & Podesva, 2009). At a cognitive level, to talk of the "social meaning" of linguistic variation is to talk of the social inferences that are made on the basis of linguistic input, whether they be phonological variants (Campbell-Kibler, 2006; Staum Casasanto, 2009), discursive variants (Moore & Podesva, 2009), or syntactic variants (Bender, 2007). This is the element of sociolinguistic perception that involves "the extraction of social information from speech" (Campbell-Kibler, 2010b:378).

Experiment 5 follows this sociolinguistic work in investigating participants' categorization of talkers on the basis of linguistic features. Experiment 5 investigates sociolinguistic priming by measuring participants' *social* perception, in particular if participants use expectations about what type of talker is likely to produce a grammatical variant (standard or nonstandard). Does exposure to a social-grammatical match (for instance, a nonstandard sentence with a low-status talker) activate an exemplar, and in a subsequent trial, does similarity in grammatical structure (another nonstandard sentence) lead to a greater likelihood that that exemplar will again be used in perceiving the social "context" of the sentence (choosing a low-status talker as the probable talker)?

In the prime trials, participants heard a full prime sentence in either the standard or nonstandard form. After the prime sentence, participants saw two photographs: two high-status talkers for the standard primes, and two low-status talkers for the nonstandard primes. They were to choose which talker most likely said the sentence (but this was not a meaningful choice, since in the primes, the choice was between talkers of the same social status). In the target trial, participants read a full sentence on the screen, which

included the full subject-verb pattern, and afterwards they saw two photographs: a high-status talker and a low-status talker.

5.2.1 Design

The main independent variables in Experiment 5 are construction (*there's* v. *don't*) and prime-target grammatical match (same v. different), which can also be viewed as a four-level factor of agreement combination (SS v. NN v. NS v. SN, where "standard" = S and "nonstandard" = N). Figure 5.4 shows example trials for Experiment 5. The prime and target conditions and target choices are outlined in Table 5.10.

		Stimulus	
Prime Trial	*Sentence Audio*	"At the campsite, the mosquito don't fly into the tent."	
	Response	 (low-status)	 (low-status)

Target Trial	*Sentence Text*	In the yard, the bird don't sit on the feeder.	
	Response	 (low-status)	 (high-status)

Figure 5.4. Sample experimental trials for Experiment 5, for a trial in the *don't*-NS condition (low-status/nonstandard prime and nonstandard target).

Table 5.10
Prime and Target Agreement and Social Status Conditions, Experiment 5

Prime trial	**Target trial**
Standard/High-status	Standard (SS)
	Nonstandard (SN)
Nonstandard/Low-status	Standard (NS)
	Nonstandard (NN)

I examine participants' talker choices in two ways. First, did participants choose a low-status or high-status talker in the target trial? This is the dependent measure of *talker choice*. For consistency with the grammatical priming analyses that code for standard choices, I coded a high-status talker choice as "1" for the statistical models. Second, did the chosen target talker's status matches the prime talker's status? This is the dependent measure of *social matching.* A value of "1" for social matching means a participant chose a target talker whose status was consistent with the status of the preceding prime (a high target talker following a high prime, or a low target talker following a low prime). Response times in target trials were also collected.

I predicted that low-status target talkers would be chosen more frequently following nonstandard target sentences. I also predicted that social matching would be greater when the grammatical variant was the same from prime to target than when it was

different. This means that for the high-status prime trials, it should be more likely that participants will choose a high-status target talker when the target sentence is standard than nonstandard (and the reverse, for low-status prime trials). In terms of response times, in accordance with the findings from Experiment 4, I predicted that low-status responses for *don't* trials would take longer, especially in the NN condition (on parallel with the LL condition from Experiment 4 having the longest response times).

5.2.2 Materials

The same 64 items were used as in the other experiments. Once items were assigned to either the standard or nonstandard prime condition, they were further split into the same v. different grammatical match condition. Standard items in the "same" condition had standard targets, while standard items in the "different" condition had nonstandard targets (and likewise for the nonstandard prime trials). The experiment was designed in much the same way as Experiment 4, but with talker photographs in place of noun photographs, and written target sentences rather than spoken target sentences. Target sentences were written in order to avoid introducing vocal cues to identity or status (on parallel with the use of written prime sentences in Experiment 1). In prime trials, participants heard the audio file of a full prime sentence, and this was followed by two photographs of a talker from the same status. High-status talkers were shown with standard primes, and low-status talkers were shown with nonstandard primes. Thus, there were in total two high-status prime photos, two low-status prime photos, and four target photos (two high-status and two low-status). The same eight photographs were used as in Experiment 4.

There were eight talkers in this experiment. Two were used for the *don't* trials, and two were used for the *there's* trials; one for each construction used all standard sentences and one used all nonstandard sentences, as in Experiment 4. To construct the experiment, each talker was matched with a photograph whose status matched the talker's grammatical sentence form (that is, nonstandard talkers were matched with low-status photos). However, during the experiment, participants did not experience a one-to-one match between talker voices and talker photographs, since after each audio presentation

of a prime trial, two photos appeared for possible talkers, both of which matched in status. Thus, presumably participants had no reason to believe that the voice "belonged" to either photograph, and their choice of photograph to match each prime voice could change throughout the session.

Further, participants only ever saw two photographs in the standard prime trials and two photographs in the nonstandard prime trials, and these four photographs were never seen in the target trials. This was done to avoid confusion from having photographs that participants may have already mapped to linguistic structures, on the basis of the prime trials, as available options in the target trials.

Audio files were created for the prime trials for each of the four prime talkers; these were not edited with white noise so the whole sentence was fully audible. For the target trials, sentences were presented onscreen in quotation marks in Arial black font.

5.2.3 Participants

42 participants participated for experimental credit. One participant is excluded from analysis, as they did not log any responses during the session.

5.2.4 Procedure

The experiment consisted of four main blocks, each with four consecutive trials from the four crossed construction-prime conditions: *don't*-nonstandard, *don't*-standard, *there's*-nonstandard, and *there's*-standard (this is the same as the main block and sub-block configuration of Experiment 4). Within each of these sub-blocks, two trials had the same status of talker from prime to target, while two trials had a different status. Consecutive presentations of the same prime conditions were used to maximize the absorption on the sociolinguistic variants. Each main block therefore consisted of 16 trials. Before each construction-prime sub-block was a 3000-ms pause. Within each main block, the order of the sub-blocks was randomized. Within each sub-block, the order of the four trials was also randomized. Two lists were used, with items randomly assigned to different sub-blocks in each, with the constraint that the items appearing in the first half in one list would appear in the second half in another. The position on-screen of all photo

pairs was opposite in the two lists.

Before each prime trial was a 1000-ms pause. The prime audio then played, and immediately afterward the talker photos appeared. The talker photos remain onscreen for a maximum of 4000-ms. Participants used the left- or right- button on the response box to make their choice (they could choose which to use). Before each target trial was a 1000-ms pause. The target sentence then appeared and remained onscreen for a maximum of 10000 ms. Participants used either the right or left button to advance past the sentence once they had read it, and then the two talker photos appeared for participants to make their choice.

Four practice trials were given, two with text and two with audio. The two audio trials used the same female voice; in all practice trials, the same two talker photographs were shown, chosen from the Radboud Faces Database (so they were not photographs that indicated social status). Practice trials could be repeated if desired. Following the practice trials, a familiarization block of the speaker photographs appeared as in Experiment 4. The speaker photos were randomly ordered.

The instructions to participants read, "Throughout the session, you will hear or see sentences. After each sentence, you'll see pictures of two possible speakers on the screen. Your task is to immediately choose which speaker is more likely to have said that sentence. Respond as quickly as possible using the response buttons." The demographic survey proceeded at the end. The experiment lasted 18-25 minutes for most participants.

Only 16 fillers were used, eight followed by comprehension questions and eight without. The two photographs appearing in each filler trial always consisted of one high-status and one low-status, and could be any of the eight photographs.

5.2.5 Results: Talker choice

The results give evidence that status choice is affected by grammatical variant, and that grammatical matching enhances social matching. As predicted, low-status talkers were chosen more frequently in nonstandard target trials, shown in Figure 5.5, and in *don't* trials. Table 5.11 shows that talker choice is predicted by construction and target agreement; the effect of target agreement is also smaller in *there's* trials than in *don't*

trials.

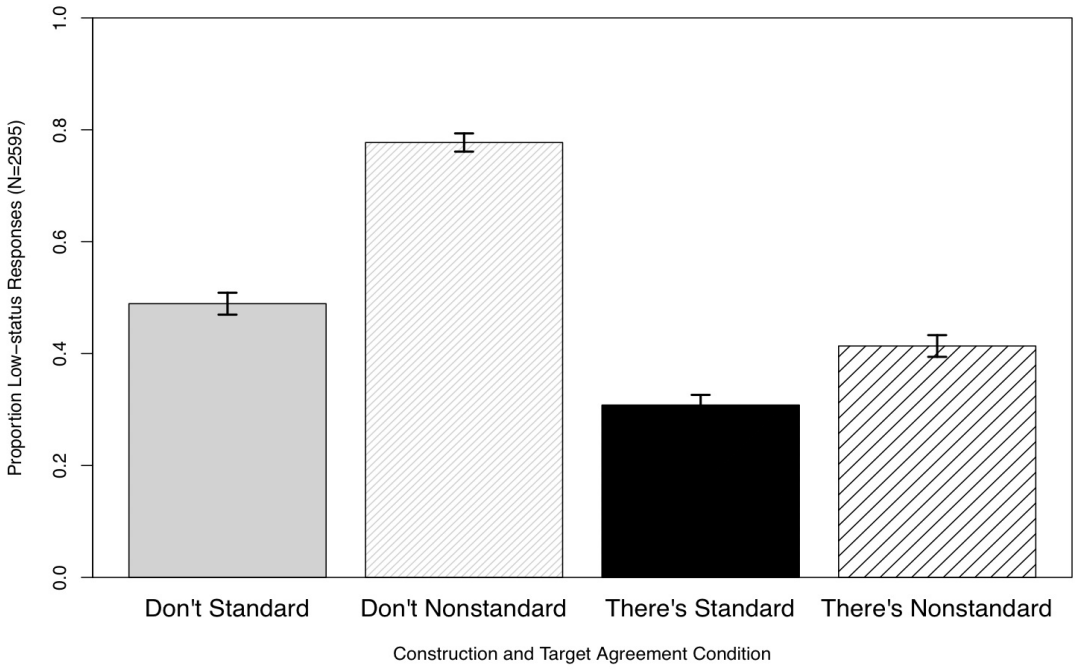


Figure 5.5. Low-status target responses by construction and target agreement, Experiment 5.

Table 5.11
Status Choice Predicted by Construction and Target Agreement, Experiment 5

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	0.05	0.17	0.28	
Construction	*There's*	0.85	0.24	3.62	<.001
Target Agreement	Nonstandard	-1.37	0.24	-5.74	<.001
Construction: Target Agreement	*There's*:Nonstandard	0.85	0.34	2.51	<.05

For this talker choice task, target sentence agreement is a strong predictor whereas prime agreement is not. This contrasts with Experiment 4's sentence completion task, where

prime agreement was a predictor but target talker status was not.

To examine the effect on talker choice of different prime-target agreement combinations, I isolated agreement combination pairs that shared the same target form but differed by prime form. For each construction, I tested for differences between the SN and NN conditions, and between the NS and SS conditions. This permits us to examine effects of the prime stimuli compounding the known effects of the target sentences.[6] For reference, the means across all agreement combination conditions are listed in Table 5.12.

Of these comparisons, only the standard-target trials for the *don't* construction show a significant difference by prime. In standard-target *don't* trials, participants were more likely to choose a low-status talker in the nonstandard prime condition (NS) than in the standard prime condition (SS) (β = -.69, SE(β) = .24, z = -2.85, p<.01).

Table 5.12
Low-status Target Responses across Agreement Combinations, Experiment 5

Construction	**Agreement Combination**	**Proportion Low-status Response**
Don't	NN	0.79
	SN	0.76
	NS	0.57
	SS	0.41
There's	NN	0.42
	SN	0.41
	NS	0.34
	SS	0.27

5.2.6 Results: Social matching

As predicted, social matching was enhanced by grammatical matching. As shown in Figure 5.6, participants more often chose a target talker whose status matched that of

6. Recall that in Experiment 4, I examined pairs that had the same prime agreement but differed in target status, because in that experiment the prime agreement was the primary predictor of grammatical choice.

the prime talker when the grammatical form was the same from prime to target (β = .94, SE(β) = .24, z = 4.0, p<.001). Standard-primed trials were more likely to elicit high-status talkers when the target sentence was also standard (and likewise for low-status talkers in nonstandard-primed trials).

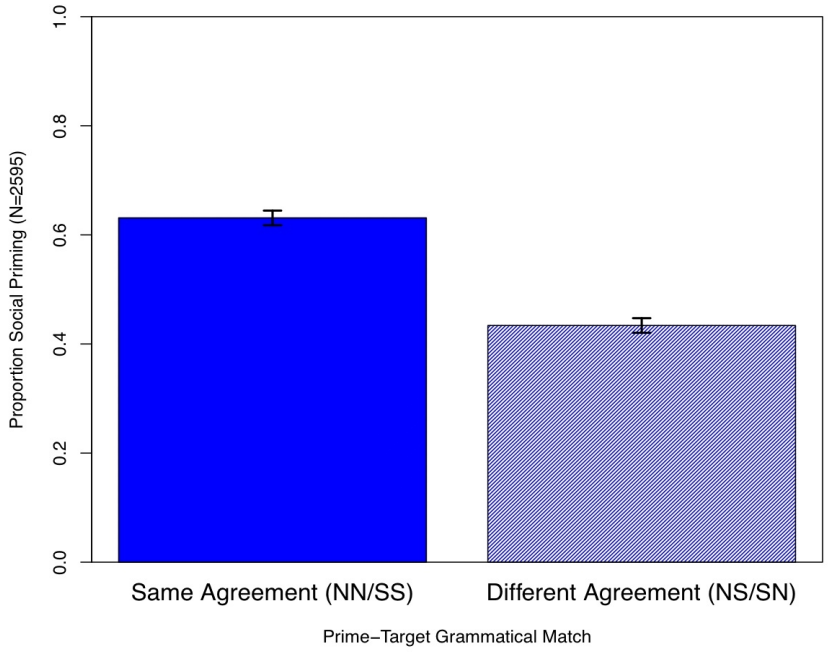


Figure 5.6. Social matching: same vs. different agreement in prime and target, Experiment 5.

Further, the likelihood of social matching differed across different prime-target status combinations. Figure 5.7 shows social matching by the different agreement combinations, separately for each construction.

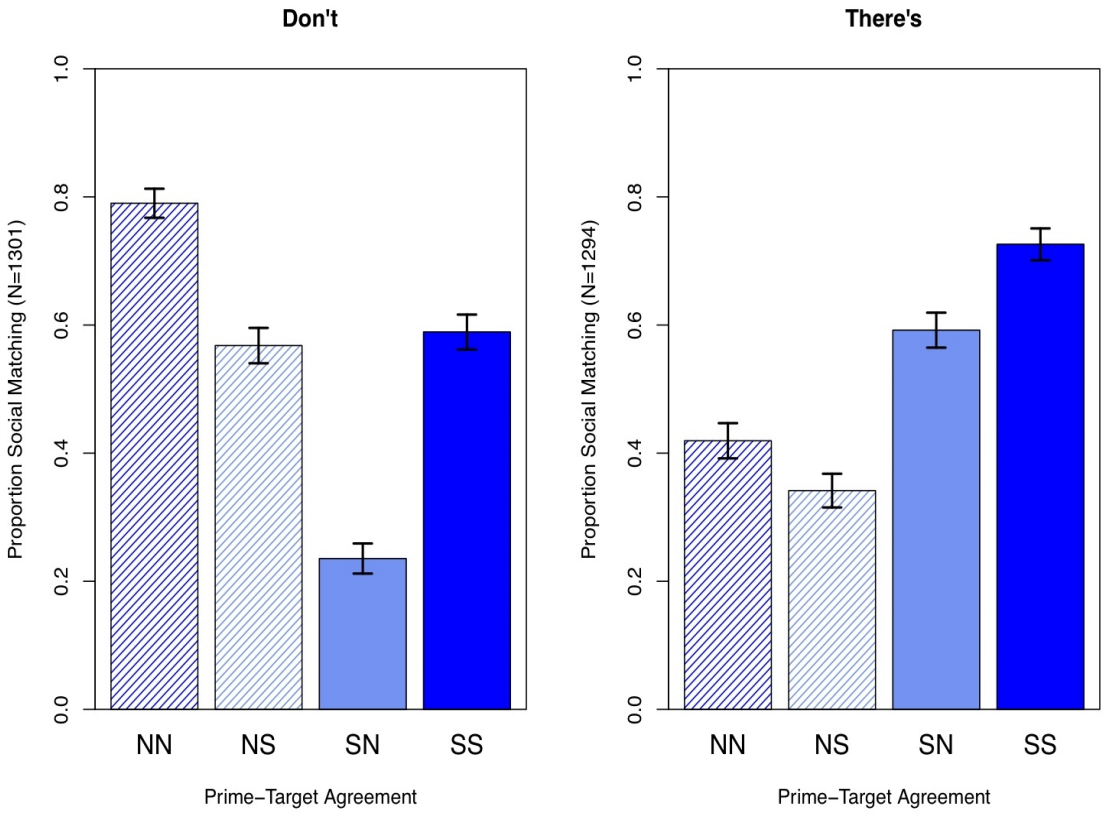


Figure 5.7. Social matching across agreement combinations and constructions, Experiment 5.

In the *don't* trials, NN has the highest proportion of social matching. The high-status talker is only favored in the SS condition--which is the only condition that did not include a nonstandard sentence in either the prime or the target. Even in the NS trials, the nonstandard/low-status prime seems to have activated the expectation of a low-status talker. The standard target sentence in NS reduces the choice of a low-status talker relative to NN, but it does not completely mitigate it. And the nonstandard target sentence in the SN condition seems to be the dominant cue in choices; the standard/high-status prime talker expectation does not persevere to the target when a nonstandard sentence follows.

The relatively low proportion of matching in the SS condition is evidence that participants are exercising knowledge that for the standard variant, either talker is possible, while for the nonstandard variant, the link to a low-status talker is clearer. This

is exactly what would be expected if listeners store real experiences with sociolinguistic variants: standard forms are not necessarily associated with any type of talker, while nonstandard forms are; this is the definition of a socially "marked" form.[7]

For *there's*, all combinations favor a high-status response. The high incidence of priming in the SS condition can be explained by the fact that the standard form is less expected, therefore it is more likely to elicit a stronger association with a type of person than the nonstandard form. This bolsters the interpretation that nonstandard *there's* is not represented with socially marked information. Though having matching grammatical information in the prime and target sentence is overall more likely to lead to social matching, the basic preference is for high-status talkers--for *there's*, the social matching to grammatical form is not strong (in contrast to the matching patterns for *don't*).

5.2.7 Results: Response times

Response times show effects of target sentence agreement, prime agreement, and talker choice. There is no main effect of grammatical matching, however: same-variant trials did not show differences from different-variant trials. Response times falling outside of two standard deviations from the overall mean were removed, resulting in 2460 observations.

Table 5.13 gives the mean response times across conditions. For *don't* trials only, participants were faster when the target sentence was nonstandard than when it was standard, and when their choice was low-status rather than high status. Contrary to prediction, they were fastest in choosing a low-status talker for a nonstandard target sentence. For *there's*, target agreement was not a significant predictor of response time, but participants responded more quickly when choosing a high-status talker. They took longest when choosing a low-status talker for a standard target sentence. These two

7. For ease of interpretation and brevity, I have limited the in-text discussion here to a descriptive account. However, agreement combination is a significant factor in priming for both constructions at the $p<.001$ level. For *don't*, $F1(3,40)=40.90$; $F2(3,28)=37.66$. Post-hoc Tukey pairwise comparisons show that differences between all levels are significant ($p<.001$) except for the NS-SS pair, which do not significantly differ. For *there's,* $F1(3,40)=25.83$; $F2(3,28)=8.08$. All levels of comparison are significant ($p<.01$), except for the NS-NN pair.

extremes--shortest times for *don't* and longest times for *there's*--are shaded in Table 5.13. The regression model output given in Table 5.14 supports these differences.

Table 5.13
Response Times by Construction, Target Agreement, and Talker Choice, Experiment 5

Construction	**Target Agreement**	**Talker Choice**	**Mean Response Time (ms)**
Don't	Standard	High-status	1333.07
		Low-status	1327.92
	Nonstandard	High-status	1369.52
		Low-status	1112.09
There's	Standard	High-status	1175.82
		Low-status	1408.24
	Nonstandard	High-status	1221.56
		Low-status	1273.50

Table 5.14
Target Agreement and Talker Choice Effects on Response Times, Experiment 5

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**t value**	**Significance level**
	(intercept)	1302.93	43.90	29.68	<.001
Construction	*There's*	38.59	35.69	1.08	
Talker Choice	High-status	83.79	28.02	2.99	<.01
Target Agreement	Nonstandard	-143.40	27.80	-5.16	<.001
Construction: Talker Choice	*There's*:High-status	-199.63	38.93	-5.13	<.001
Construction: Target Agreement	*There's*:Nonstandard	121.01	38.49	3.14	<.01

These results provide further support that the nonstandard form for *don't* is more readily mapped to a social type than any other form; the low-status choices to nonstandard *don't* trials were the fastest of any condition. This is in contrast to the finding from Experiment 4, however, that nonstandard responses to low-status *don't* trials were the slowest. I take this up in the discussion.

For the *don't* trials where participants chose low-status talkers, response times also show more nuanced differences between agreement combinations. The means given in Table 5.15 and the distributions in Figure 5.8 show that SS and NN have the most longest and shortest times, respectively.

Table 5.15
Don't Trial Response Times across Talker Choice and Agreement Conditions, Experiment 5

Target Talker Choice	**Agreement Combination**	**Mean Response Time (ms)**
Low-status	SS	1388.45
	NN	1100.90
	NS	1285.09
	SN	1123.55

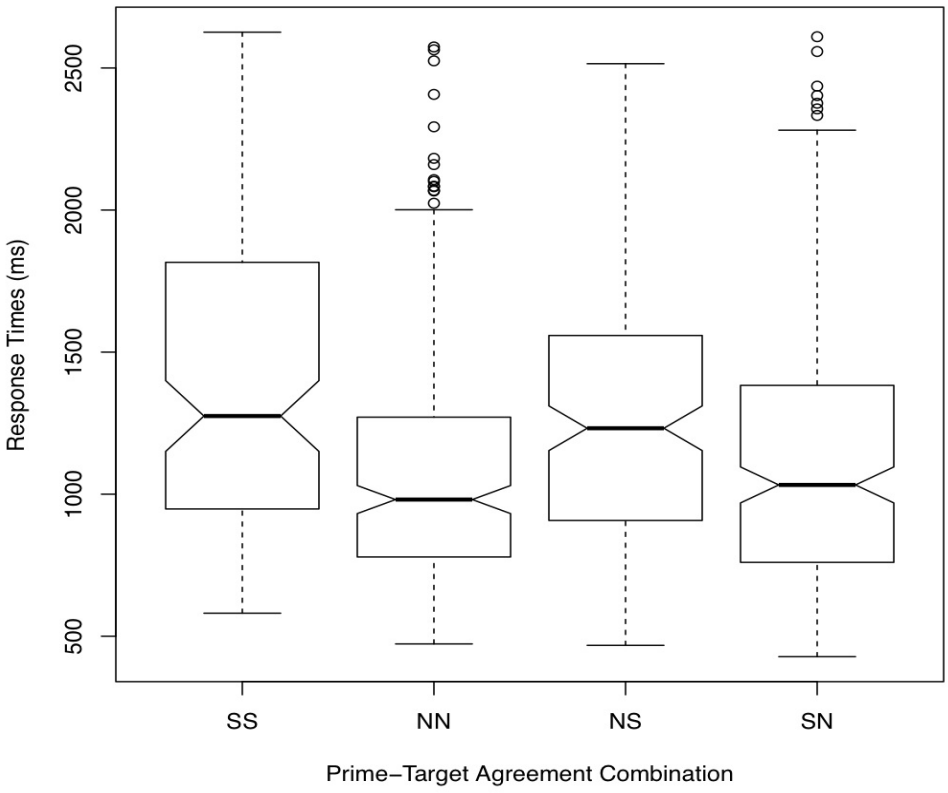


Figure 5.8. Low-status choices in *don't* trials: Response times by agreement combination, Experiment 5.

Agreement combination is a significant factor predicting response times ($F1(3,38)=12.74$, $p<.001$; $F2(3,28)=20.13$, $p<.001$). Post-hoc Tukey tests show that all pairs are significantly different ($p<.01$) except for NN-SN and NS-SS. This is another illustration of the main effect of target sentence agreement: low-status responses in the NN condition are the fastest, while low-status responses in the SS condition are the slowest.

Overall, the response times give evidence that nonstandard *don't* in a target trial is the quickest variant to assign to a talker because it bears the strongest association with social status. Standard *don't* is assigned to either social status, as are both variants of *there's*, with longer response times indexing difficulty in choosing between talkers.

5.3 General discussion: Social status and sociolinguistic priming

The two experiments reported in this chapter tested for a relation between the perception of social status and the perception of morphosyntactic variants. I had a higher expectation of priming effects for the social status manipulation than for the gender manipulation. This expectation was motivated by the supposition that English-speaking participants would likely enter the experiment with knowledge (exemplars) linking this linguistic variation to social status.

Nonstandard responses were more likely following nonstandard prime trials, confirming again a grammatical priming effect. Experiment 4 additionally provides evidence for *sociolinguistic* priming, shedding more light on the interesting distinctions between the two constructions investigated here; the results of the social manipulation cannot be adequately discussed without highlighting these differences between constructions. First, the agreement form of the prime interacts with the social status of the target talker differently in nonstandard *there's* trials than in nonstandard *don't* trials. For both constructions, the difference in grammatical matching between same- and different-status trials is only apparent when the prime is nonstandard. That is, for both standard prime conditions for the *don't* trials (HH and HL), the grammatical matching rate is 90%, while for the *there's* standard trials, the matching rates are 45% for HH and 46% for HL. However, for the nonstandard trials, the story is different. For nonstandard *don't* trials,

matching is at 12% for LH and 17% for LL, showing a slight increase with matching social status. For nonstandard *there's* trials, matching is at 71% for LH and 63% at LL, showing a decrease with matching social status.

To explain this difference in differences, I suggest, requires appeal to--and provides evidence for--the differing social associations of the two constructions. The higher frequency of nonstandard responses following nonstandard *don't* trials only when the target talker is low-status indicates that this variant is indeed associated, for these participants, with lower social status. The exposure to a nonstandard/low-status utterance activates knowledge of this association, which is then more likely to be used in subsequent processing when the social status of the talker is low (that is, when the target talker's social attributes are component to the representation of that grammatical variant).

The higher frequency of nonstandard responses following the nonstandard *there's* trials, however, is divided in the opposite way according to the status of the talker: nonstandard responses are even more likely when the target talker is high-status than low-status. This corroborates the general acceptance of the nonstandard *there's* construction, where the high-status target talker is perceived as a reasonable match for the nonstandard form, regardless of the preceding prime. In other words, the prime is not activating an existing match between the nonstandard variant and a low-status talker. The response times to the target trials in Experiment 4 also support these explanations: mean response times differ little between the different *there's* conditions, whereas for the *don't* conditions, the LL condition has a considerably longer mean response time than the others (and it is longest when the response is nonstandard). I interpret this as evidence that social and linguistic information are interacting as participants choose their grammatical responses to these trials.

While Experiment 4 focused on the social as a cue to the linguistic, Experiment 5 used the same social category information (social status) to explore the linguistic as a cue to the social. Experiment 5 found that social matching--the choosing of a talker after a target sentence whose status matched the status of the talker in the prime trial--was enhanced by the matching morphosyntactic agreement form in prime and target. This was the case for both constructions, though the constructions again differed with respect to the

more fine-grained prime-target agreement combinations. For *don't*, the condition with the highest social matching was NN, while for *there's,* the condition with the highest social matching was SS. These conditions represent the disfavored (that is, least likely) morphosyntactic variant for each construction according to the prior experiments (including Experiment 4), and it follows that they would be most susceptible to a matching relationship between the grammatical variant and a social variant.

Further, for the *there's* structures, the high-status talker was favored in every condition, whereas for the *don't* structures, the low-status talker was favored in all but the SS condition. This suggests that high-status talkers may be considered "baseline" talkers for these participants, but sentences (nonstandard *don't*) that are truly perceived as nonstandard lead to dramatic shifts away from this baseline preference. Nonstandard *don't* clearly indexes low social status for these participants. Even when decontextualized from an authentic social, interactive speech situation to a laboratory setting--and even when participants are reading rather than hearing it--this linguistic variant cues a social category. This can be taken as strong support for an account of linguistic knowledge that posits socio-indexical information as part of that knowledge, where (at least some) linguistic exemplars include social indices. Such a mode of knowledge would also explain the results of Experiment 4, for nonstandard responses to *don't* were more likely when both prime and target sentence were spoken by low-status talkers.

Additionally and importantly, participants are apparently exercising knowledge of a limited bidirectionality between sociolinguistic variables and social types, such that low-status talkers are perceived as producing both standard and nonstandard *don't*, but high-status talkers are not perceived to produce the nonstandard form. The application of this knowledge is shown by the preference for the low-status talker in *don't*-NS and *don't*-SN, but even more so in *don't*-NN (in other words, anytime a nonstandard sentence is present). Response times in Experiment 5 also support this interpretation: overall, participants took longer to decide who the talker was for *there's* trials and standard *don't* trials, while the fastest responses were for nonstandard *don't* trials. This indicates that when a social-grammatical association is being drawn upon from the grammatical to the social, processing is faster than when an association is not clear. There are two

suggestions made by the response time data: specifically, that robust exemplars that index nonstandard *don't* to social status, and generally, that grammatical information is an extremely strong cue to social perception (but only when an exemplar includes robust social information).

The results of Experiment 5 support the view that any unit of linguistic structure may be a carrier of social meaning (i.e., may be indexed to social properties; Bender, 2007). However, that the effect was limited to nonstandard *don't* also suggests that an adequate sociolinguistic model of grammar must incorporate some aspect of frequency of experience; knowledge of social-grammatical links must be acquired. It must also be possible for the activation of these links to be gradient, rather than categorical, since not all exposures to a nonstandard *don't* sentence resulted in a low-status target response. Exemplar theory takes frequency and probability as central aspects of the model, and the differences found here between constructions, and prime-target status combinations pose a challenge to any theory that does not.

While for both Experiment 4 and Experiment 5 the response times for the nonstandard *don't* conditions support the interpretation of participants' overall choices, the relative timing is actually in the opposite direction for the two experiments. When listeners were choosing a sentence completion after hearing a nonstandard *don't* sentence, and when the talker was a low-status talker, listeners took longer to make choices than in other conditions (and, this condition had the highest incidence of nonstandard target responses). But when listeners were choosing a talker who was likely to have spoken a nonstandard *don't* sentence, they were faster than in other conditions (and, this condition had the highest incidence of low-status talker choices). For the *there's* trials, there was not nearly as much variance between the different agreement conditions.

In fact, the combination conditions for *don't* are inverted from Experiment 4 to Experiment 5: while the LL status condition is slowest for the sentence completion trials, the NN agreement condition is fastest for the status choice trials. Figure 5.9 summarizes the order of response time means for both experiments, with sample prime and target trials.

It seems that linguistic cues trigger greater social distinctiveness than do social

cues for linguistic distinctiveness. When disambiguating linguistic input, the most marked condition results in the longest response times, whereas when disambiguating social input, the most marked condition results in the shortest response times. This is illuminating for our understanding of the mutuality of social and grammatical perception. The processing of each may affect the other, yet these two cases do not necessarily follow exactly the same time-course. Their processing may rely on different mechanisms or on different procedures. In general, it seems that (nonstandard) linguistic cues activate (or constrain) social choices more readily than do social cues for linguistic choices.

Target Response	**Relative RT**	**Combination**	**Sample Prime**	**Sample Target**
Sentence Completion	*Slowest*	Low+Low		
	Middle	L+H/ H+L		
	Fastest	High+High		
Talker Choice	*Slowest*	Standard+ Standard	"In the cafe, the chefs don't slice the cake."	"In the city, the cars don't drive safely."
	Middle	S+N/ N+S	"Near the tire, the logs don't look safe."	"After eating, the turtle don't walk fast."
	Fastest	Nonstandard+ Nonstandard	"At the campsite, the mosquito don't fly into the tent."	"In the yard, the bird don't sit on the feeder."

Figure 5.9. Relative mean response times in prime-target combinations for *don't* trials, comparison between Experiments 4 and 5.

One reason for the nonequivalent patterns for talker choice and sentence completion could be participants' own grammatical competence, combined with the nature of the sentence completion task. As shown in Experiment 3, different participant ethnoracial groups demonstrated different behavior in terms of the sentence completion task, which is presumably related to their native dialect/idiolect/competence. It is not accurate to say that the sentence completion task is *purely* a comprehension or perception task; while participants are instructed to respond with what they think the talkers in the experiment say in each trial, this clearly cannot be done independently of participants' own likelihood of producing--or perceiving--these morphosyntactic variants. Interference from native competence makes the grammatical choices noisier than the social choices, since the social choices do not rely on participants' own linguistic patterns in the same way, nor do they rely on identification with the talkers they are exposed to. Participants are thus more likely to process the social choices as a function of the grammatical stimuli than they are to process the grammatical choices as a function of the social stimuli.

The findings discussed in this chapter suggest that there are social category effects on the processing of linguistic variation. Experiments 6 and 7 investigate whether there are also talker-specificity effects.

CHAPTER 6
TALKER SPECIFICITY AND SOCIOLINGUISTIC PRIMING

The results so far show that while talker gender did not clearly affect the likelihood of priming for morphosyntactic variants, talker social status was a significant factor in priming, though its effect was varied by morphosyntactic construction. The more compelling results for social status suggest that participants had prior representation of associations between social status and subject-verb agreement variation, and that those associations were used in the tasks of sentence completion (Experiment 4) and talker choice (Experiment 5). Behavior in the experiments fits with an exemplar-theoretic explanation for linguistic perception, though the results were still not comprehensive--a matching social status alone between prime and target trial was not sufficient to increase the likelihood of priming. In this chapter, *talker specificity* is investigated as a potential component of sociolinguistic priming.

In any given trial in Experiments 2, 3, and 4, the talker's voice always differed from the prime to target stimulus. This attempted to manipulate the effect of social similarity along the dimension of talker gender or social status. However, in Experiments 2 and 3, the gender combination of the prime and target stimuli (that is, whether the target stimulus was in the same gender as the prime stimulus or not) did not have a clear effect on the likelihood of priming. In Experiment 4, there was a complex effect of status matching only in certain prime-target combinations for *don't*. Experiment 5 showed that participants were more likely to choose the same type of talker in the target as in the prime when the grammatical forms matched. The social status results suggested that this social property had been previously experienced by participants as related to the linguistic variation in question--that their exemplars included representations of both linguistic form and social type.

Yet if sociolinguistic categories emerge as abstractions over exemplars, then the building blocks of social categories should be experiences with individual speakers on individual occasions of speaking. Clopper and Pisoni (2004) found both talker-specific and dialect-specific learning in the task of dialect categorization, suggesting the development of robust talker-specific exemplars of linguistic forms. Individual talker identity thus should be active in priming and should affect listeners' structural preferences. The level of individual talkers' associations with linguistic form, which we can think of as always being a *potential* association--in that any speaker may have unique idiolectal baselines--is important for showing that exemplars are viable constructs that may lead to larger category formation (linguistic, social, or sociolinguistic). Individual talkers should form the foundations for the emergence of social categories, in the same way that individual linguistic tokens should form the foundations for the emergence of grammatical/phonological/lexical categories.

The experiments described in this chapter test whether priming is affected by individual talker identity between prime and target. There is evidence that grammatical priming (broadly construed) should be sensitive to switches in individual identity, most clearly in the corpus work by Szmrecsanyi (2006). Szmrecsanyi showed that, for a number of different morphosyntactic variables, structural persistence was much more likely produced by the same talker than by two consecutive talkers--that is, people are more likely to repeat a structure that they themselves have used, but less likely to repeat a structure that someone else has used. There seems to be a general tendency for greater consistency in structure among one talker than between talkers. Research in speech perception also supports talker-specificity effects (see discussion in Chapter 2; e.g., McLennan & Luce, 2005; for a review, see Nygaard, 2005), showing that both learning and priming effects can be influenced by a change in talker from one iteration (the prime) to the next (the target). In summary, switches in talker identity (operationalized either as voice or speech rate) from the prime to the target have been shown to dilute priming effects, but in some studies, only when the processing task is a difficult one. Further, from a pragmatic standpoint, Regel et al. (2010) found that subjects were able to learn a speaker's communicative style as either ironic or unironic, and that this pragmatic

knowledge about individual speakers' styles was used in subsequent language comprehension.

Experiments 6 and 7 ask whether the processing specifically of sociolinguistic morphosyntactic variants may also be affected by similarity or difference in individual talker identity. These are tests for talker-specificity effects in sociolinguistic priming. Experiment 6 uses the short-term priming paradigm of the other experiments discussed by the dissertation, while Experiment 7 introduces the long-term priming design.

6.1 Experiment 6: Talker identity in short-term priming

Experiment 6 tested the role of individual talker identity in priming the nonstandard variants of NP+*don't* and *there's*+NP. Experiment 6 explored this by manipulating the individual identity of the talker from the prime to the target stimuli, where some trials had an identical talker in both the prime and target trial (cued by both voice and photograph). This tested the hypothesis that priming is less likely when the talker changes from the prime to the target stimuli than when the talker is consistent from the prime to the target stimuli. If a change in talker identity from prime to target stimuli results in a lower likelihood of grammatical priming than a consistent talker identity does, we can take this as evidence that grammatical exemplars may be stored with, and activated by, social information specific to experiences with individual speakers.

6.1.1 Design

Throughout the experiment, only two female talkers occurred speaking all prime and target trials, and each talker was accompanied by a consistent photograph throughout the experiment. One talker used all nonstandard prime trials, and the other used all standard prime trials; I refer to these as the "nonstandard" (N) and "standard" (S) talkers. In the target sentences, talkers' presentations were made morphosyntactically ambiguous by the white noise manipulation replacing the subject nouns. The design is outlined in Table 6.1.

Table 6.1
Talker Conditions, Experiment 6

Prime trial	**Target trial**
Standard/ Standard talker	Standard talker (same)
	Nonstandard talker (different)
Nonstandard/ Nonstandard talker	Standard talker (different)
	Nonstandard talker (same)

There are two dependent variables to be tested: target choice (standard v. nonstandard) and grammatical match (match v. no-match). The independent variables are construction (*don't* v. *there's*), prime agreement (standard v. nonstandard), prime-target talker match (same talker in target v. different talker in target), and experimental block (1 v. 2 v. 3 v. 4). Experimental block allows me to investigate performance as a function of time in the experiment, to see if participants' associations with individual talkers increased over the course of repeated exposure to a talker using either the standard or nonstandard pattern. That is, participants may *learn* which talkers are more likely to speak which way over the course of the experiment and adjust their responses accordingly, such that priming becomes more likely as the experiment progresses. Thus, I am testing for priming in the short-term (from prime to target sentence), but also learning in the long-term (over the course of the session).

I predicted that nonstandard responses would be more likely in *there's* trials, and nonstandard responses would be more likely in trials where the prime (hence, also the talker) was nonstandard. I also predicted that a talker identity match between prime and target would increase the likelihood of listeners' target grammatical response matching the prime construction in agreement form. Priming should also become more likely over the course of the experiment, as participants gain more exposure to the link between the two talkers and the types of sentences each one uses.

6.1.2 Materials

The same 64 items were used as in the other experiments; 32 for *don't* and 32 for

there's. Once items were assigned to either the standard or nonstandard prime agreement condition, within each agreement condition, items were randomly assigned to be in the "same talker" or "different talker" condition.

Only female voices were used for all trials, in order to avoid possibly confounding effects of talker gender. One female voice was the standard voice and only used standard primes throughout the session; the other female voice was the nonstandard voice and only used nonstandard primes. New prime and target files were created from the standard and nonstandard talkers' recordings. Two different female filler voices were used for the filler trials, and were randomly assigned to items.

Each talker's voice was accompanied by a photograph. Thus, four photographs were used: two for the prime/target talkers, and two for the filler talkers. The photos were taken from the Radboud Faces Database (Langner et al., 2010), and were chosen from the Caucasian female models in the "neutral" expression with frontal gaze. All four photographs show the models from the shoulders up, with the models wearing black t-shirts and hair in a ponytail; the four models chosen were also similar in age (young adult). Thus, there was no obvious difference between talkers in terms of expression, emotion, class, or race; and, the pictured models could plausibly match the voices of the actual talkers, who were also white, female, young adults. Sample experimental trials showing both talker photographs are in Figure 6.1.

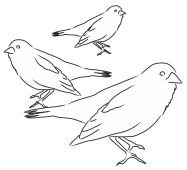
		Stimulus	
Prime Trial	*Sentence* + *Photo*	"At the campsite, the mosquito don't fly into the ____." 	
	Response		
Target Trial	*Sentence* + *Photo*	"In the yard, the _____ don't sit on the feeder." 	
	Response		

Figure 6.1. Experiment 6 sample experimental trials, for a trial in the *don't*-nonstandard-different talker condition (standard talker in target).

6.1.3 Participants

46 total participants participated in the experiment. 26 participants participated for 1/2 hour of experimental course credit. 20 participants participated for $8 in compensation. One participant was removed due to mean reaction times on all trial types falling below two standard deviations from the mean.

6.1.4 Procedure

The procedure was identical to that of Experiment 3. Participants used the arrow keys on the computer keyboard to make choices between noun photographs on the screen. The session lasted 18-25 minutes.

Items were randomized for presentation within four blocks. Two presentation lists varied the order of photographs for each response screen, as well as the order of the four blocks (so that the items appearing in the first half of the session in one list appeared in the second half in the other). Before each trial, the talker photograph appeared on the screen for 500 ms before the audio of the stimulus began playing. All image choice screens (response screens) remained on screen for a maximum of 4000 ms. The talker photo then remained on the screen for 500 after the audio stimulus. There was a 1000-ms pause accompanied by a blank screen following all trials.

Yes/No comprehension questions were used throughout the session. After the four experimental blocks, participants were presented with the same demographic survey as in the other experiments.

Participants were given four practice trials. The practice trial talkers and talker photographs were different from those used in the experiment itself; there was one male and one female practice talker. Participants could repeat the practice trials if they chose.

6.1.5 Results

The results of Experiment 6 show evidence once again for structural priming, but not for talker-specific priming, nor for increased priming over the course of the experiment. As shown in Figure 6.2 and Table 6.1, both construction and prime are significant predictors of target choice. Nonstandard responses are more likely for *there's* trials and for nonstandard trials (the interaction term is not included because it did not lead to a better statistical model). Note that the responses shown in Figure 6.2 are collapsed across talkers; the nonstandard talker was no more likely to elicit nonstandard target responses than was the standard talker.

There was no talker-specific effect on responses, as shown in Figure 6.3. The dependent measure of "grammatical match" was created to test this. For standard prime

trials, standard responses receive a "1" and nonstandard responses receive a "0"; for nonstandard prime trials, nonstandard responses receive a "1" and standard responses receive a "0." The "1" responses are shown in Figure 6.3 by same- and different-talker conditions.

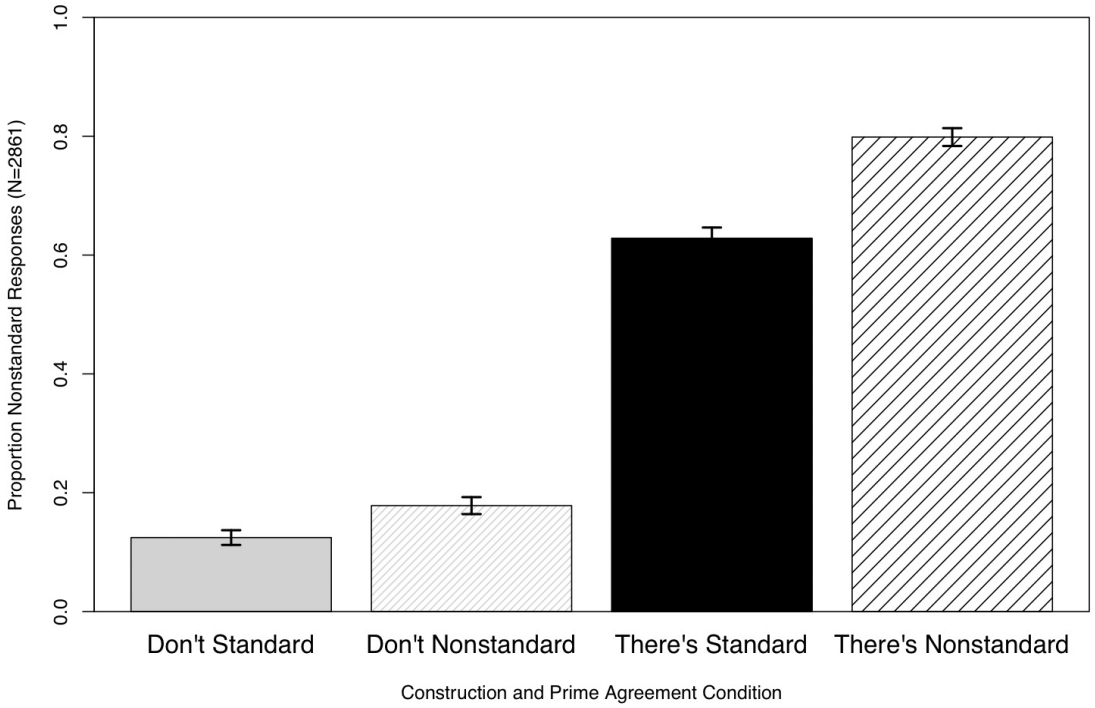


Figure 6.2. Nonstandard responses by construction and prime agreement conditions, Experiment 6.

Table 6.2
Grammatical Priming Effect, Experiment 6

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	2.51	0.22	11.54	<.001
Construction	*There's*	-3.24	0.19	-16.96	<.001
Prime Agreement	Nonstandard	-0.78	0.19	-4.15	<.001

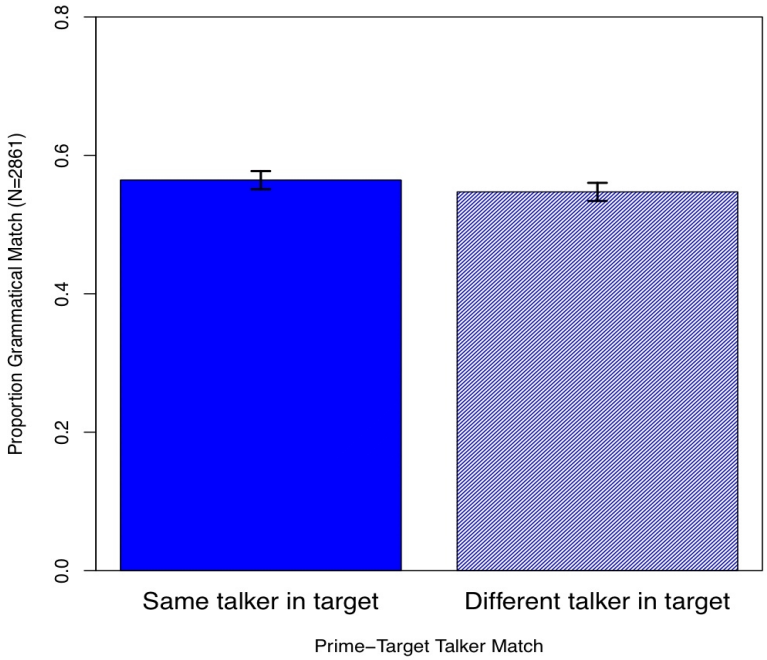


Figure 6.3. Same talker vs. different talker: Proportion grammatical match across talker match conditions, Experiment 6.

While Experiment 6 was designed to test short-term priming within single series of trials (within one item, from prime to target trial), there was also a possibility that over the course of an experimental session, participant behavior changed as a function of exposure to the grammatical patterns or talkers throughout the experiment, with the task leading to more long-term effects. However, block was not a significant predictor of either nonstandard target responses or grammatical priming. Participants do not seem to have learned associations between talkers and grammatical variants over the course of the experiment.

6.1.6 Discussion

Overall, my predictions were not met. There was no difference in priming for the same versus different talker conditions, nor did the identity of target talker alone influence participant responses. Had participants learned the association of subject-verb

patterns with particular individuals, then over the course of the experiment, the identity of the target talker alone might have triggered more nonstandard responses in the nonstandard voice, regardless of prime. But this did not happen either; there was no progressive effect of experimental block on performance. This is surprising, given that participants might be expected to learn, over the course of the experiment, which talker used which structures, and that this association would only become stronger through more exposure. I expected that at least for the nonstandard sentences in *don't* trials, which are overall less likely to be interpreted as nonstandard, talker match might have boosted priming, by providing a social dimension of similarity to increase the expectation for a nonstandard structure when it otherwise seemed unlikely. Anchoring the linguistic variation (the nonstandardness) to a particular person might have made the nonstandardness more plausible, or more readily repeated, but this effect did not occur.

One could interpret the lack of evidence of talker-specific grammatical priming as evidence that structural priming is not modulated by information about individual talkers. This was also suggested by Thothathiri & Snedeker (2008), though they did not manipulate specific talker matches; they did find priming in dative structures *despite* always having a change in talker (and gender) from the prime to the target. It could be that in perception/comprehension, a change in talker voice does not trigger a change in expectation for a type of structure. Conversely, greater talker similarity between prime and target may not enhance the expectation for structural similarity (that is, perhaps the grammatical and the social are not mutually reinforcing cues).

Yet Thothathiri & Snedeker's results were unsurprising when considering that dative structures are not associated with any particular social types (though they could certainly be components of individual styles). We might not expect participants to be expecting a social match to a dative structure--in other words, because the structures aren't themselves socially salient, social information plays no role in their interpretation (and this is something for future experiments to tease apart: just how salient need something be for social cues to be taken as relevant?). However, for subject-verb agreement variation, especially involving NP+*don't*, the difference between forms is noticeable to participants, and the nonstandard form signals not only a grammatical

difference (as evidenced by the sentence norming ratings), but a social one as well (as evidenced by Experiment 5's talker choice results). Further, during the post-experimental debriefing of Experiment 6, several participants anecdotally commented on matters of grammar, grammatical correctness, and talker identity. For instance, several participants noted that they responded with "the right sentence" rather than "what the speaker would say," and several also noted the individual styles of the two talkers, commenting to the effect that they had noticed that one talker used "incorrect grammar."

It thus seems highly improbable that *no* links at all between talker and grammatical form were being processed in Experiment 5. So from the perspective of how participants were dealing with social information, there seem to be two primary explanatory possibilities: either they simply did not use the talker information in interpreting the sentences, or they actively overrode the talker information in favor of non-associated grammatical responses. On the first explanation, participants would have had exemplars activated by grammatical form, but the social information was not incorporated during the processing task. On the second explanation, both grammatical and social information would be involved in the exemplar matching, and the nonstandard variant more likely activated by the nonstandard talker, but that variant was then consciously suppressed or overridden by participants.

A third possibility is that the two talkers were not distinctive enough to the listeners for *individual* social properties to be relevant in processing--perhaps because they were both women, or they were both perceived as belonging to the same social group(s). This may have led to participants choosing grammatical forms that seemed consistent with what the talkers would say because of a group-level property they possessed, rather than as individuals. Unfortunately this experimental design cannot distinguish between these possibilities for the lack of talker-specific effects; a followup set of experiments could compare talker-specific priming when the two talkers also represented different social groups, for instance, to determine if talker-differentiated effects do obtain when the talkers themselves are perceived as distinctive. If it were true that some group-level expectations overrode individual-talker expectations, this would suggest that more general sociolinguistic categories influence listener perception more

readily than specific ones.

Indeed, perhaps individual social information is too specific, and too narrowly applied, to be detected in a short-term priming task. Obviously, there is a difference between perceiving an association and drawing upon the knowledge of that association in resolving some kind of ambiguity (or completing some interpretative task). We have seen that grammatical priming has an effect in all experiments so far. It may be that grammatical exposure is a strong enough cue that it overpowers the cue of individual talker, determining participant reaction. This might especially be the case in a short-term priming paradigm such as that used here, where both exposure to a prime and responses to a target happen extremely rapidly. More general knowledge (such as of grammatical patterns or social group links to grammatical patterns) might be more rapidly applied in processing--because it should be more rapidly activated--than more specific knowledge (such as of individual grammatical constructions or individual talker links to linguistic forms).

The possible inadequacies of a short-term priming paradigm for detecting talker specificity is also bolstered by evidence from speech perception that suggests that processing that happens at longer durations may be more susceptible to talker-specificity effects than processing at shorter durations. For instance, McLennan & Luce (2005) tested the influence of talker match and mismatch on lexical priming, running experiments at two degrees of time delay. They found specificity effects only for a task that involved processing at a slower pace (because the stimuli were more difficult); this is also supported by recent eyetracking work by McGowan (2010) on foreign accent perception. Experiment 6's short-term priming design, with rapid exposure to the prime, rapid response to the target, and fast-paced changeover between prime, target, and filler, may have led to grammatical sensitivity taking precedence over social sensitivity. Perhaps if more time were involved in the processing task, social effects would emerge as social and linguistic information interacted. In an exemplar-theoretic model, this could imply that activation of social categories and linguistic categories occurs serially from one set of exemplars to another (see discussion in Chapter 7). This is suggested as well by the response time data in Experiment 4, where the nonstandard *don't* trials showed

longer response times overall.

There are, of course, a number of other possibilities for why no talker-specificity effect was found in Experiment 6. First, it may be that participants were simply exposed to too much competing information over the course of the experiment for clear effects of talker to emerge. Not only was there little time between trials, but trials were also randomly organized, with no pattern as to in what order standard, nonstandard, *don't,* or *there's* trials occurred. Second, specificity effects have also been shown to be most prominent when the target task and stimuli are identical to the prime task and stimuli. In the design of Experiment 6, the prime sentence and target sentence are not identical, though the verb is; this mimics the successful structural priming in comprehension designs (e.g., Arai et al., 2007). Yet it may be that talker effects are also more detectable when there is even greater linguistic similarity between the prime and target stimuli, so that degrees of variance on other dimensions affect processing. In other words, if the prime and target are already so different linguistically, perhaps linguistic information is the main cue for processing. But if the prime and target are more similar linguistically, then social information will have a chance to be used as a cue to the interpretation. Experiment 7 was designed to explore some of these possibilities as to detecting talker-specificity in alternative structural priming paradigms.

6.2 Experiment 7: Talker identity in long-term priming

Experiment 7 tested for effects of long-term priming rather than short-term priming. This was achieved by presenting prime and target trials as separate blocks, rather than adjacent trial pairs. In this design, participants first underwent a prime block, which consisted of the full, unmasked *target* sentences from the other experiments. The task was simply to choose the photo corresponding to the noun that was *actually* presented. In each prime block, all of the sentences were also the same construction *(don't* or *there's*). Following each prime block came a target block, in which the target sentences occurred with white noise replacing the subject noun. The talker voice in the target block was either the same or different as the voice that spoke the sentence in the prime block. Again, same vs. different prime-target talker was an independent variable.

Figure 6.4 shows a sample prime trial and a sample target trial.

By using near-identical stimuli in the prime and target trials, I hoped to maximize the potential for a change in social information to cue a change in grammatical perception, without interference from changes in other linguistic aspects of the stimuli from prime to target (such as lexical content). In general, Experiment 7 decreases the amount of information that participants are exposed to over the course of the session, by eliminating filler trials, which decreases the total number of sentences, total number of noun photographs, and number of talker photographs (because there are no filler talker photographs). Blocks were also arranged so that only one construction of *there's* or *don't* was presented per block, to achieve focus on one construction at a time.

Finally, Experiment 7 added a talker choice component. In four blocks throughout the experiment, participants were faced with a talker choice task. For each of four trials, participants saw a sentence that was either standard or nonstandard (taken from the prime sentences from the items). They were simultaneously presented with the two talker photographs used throughout the experiment, and were prompted to choose which speaker they thought was more likely to produce the sentence. Figure 6.5 shows an example talker choice trial.

In what follows, I will discuss the "sentence completion" portions and the "talker choice" portions of the experiment separately.

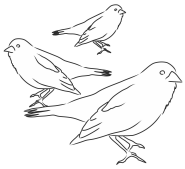
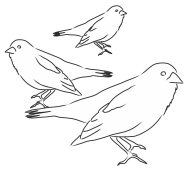
		Stimulus	
Prime Trial in Prime Block	*Sentence + Photo*	"In the yard, the bird don't sit on the feeder." 	
	Response		
Intervening trials			
Target Trial in Target Block	*Sentence + Photo*	"In the yard, the _____ don't sit on the feeder." 	
	Response		

Figure 6.4. Experiment 7 sample experimental sentence completion trials, for an item in the *don't*-nonstandard-different talker condition (standard talker in target).

Prompt	Which speaker do you think is more likely to produce the following sentence?	
Sentence	"At the campsite, the mosquito don't fly into the tent."	
Photos		

Figure 6.5. Experiment 7 talker choice trial example, *don't*-nonstandard condition.

6.2.1 Design

The dependent measures in Experiment 7 are target choice and response time for the sentence completion trials, and talker choice for the talker choice trials. For the sentence completion trials, the independent variables are construction *(there's* v. *don't*), prime agreement form (which is identical to the agreement usage of the prime talker), prime-target talker match (same v. different), and experimental block (1, 2, 3, 4). For the talker choice trials, the independent variables are construction, sentence agreement form, and block. Results were analyzed and are discussed in three different sets.

First, the "prime" data include responses only to the prime block trials, in which the full sentences were audible. The dependent variables were sentence completion accuracy and response time. The independent variables for the prime set were construction, prime agreement, and prime completion accuracy (as a predictor of response time only). The response measures in the prime were assessed as a check on the validity of the expeirmental design, ensuring that prime sentences were being heard correctly and the correct completions were being chosen. The prediction regarding prime data was that nonstandard prime sentences would be responded to less accurately, and more slowly, than standard prime sentences. Additionally, since this subject population is more accepting of *there's*+NP_{PL} than NP_{SG}+*don't*, it was predicted that *there's* prime trials should be responded to more accurately and more quickly than *don't* prime trials.

Second, the "target" data include responses only to the target blocks, in which the same sentences as those in the preceding prime blocks were heard, but with the subject noun masked. The dependent variables were again response time and accuracy of sentence completion. For target trials, accuracy corresponds to whether or not participants chose the agreement of the sentence that they had heard in the preceding prime block. In other words, accuracy is a measure of priming: does the chosen target structure correspond to the primed structure? The independent variables for the target data were prime-target talker match (same v. different talker), construction, and prime agreement. The target trials were the primary trials of interest, with the main prediction being that responses would be faster and more accurate when the talker of the target trial was identical to the talker of the sentence in the prime trial.

Third, the "talker choice" data include only responses to the talker choice blocks (which followed each target block). The dependent variable is participants' assignment of the sentence to either the standard or nonstandard talker, where an accurate response was one that chose the talker who used the corresponding prime form. The independent variables were the standardness of the sentence (standard v. nonstandard), construction, and block (1, 2, 3, 4). The main prediction was that participants' accuracy at matching the sentences to the correct talker would increase over the course of the experiment. Another prediction was that listeners would be better for *don't* trials than *there's* trials, since nonstandard *don't* forms are more marked than *there's* forms (i.e., either talker could use either *there's* form). The results are organized in terms of these three datasets, summarized in Table 6.3

Table 6.3
Summary of Datasets and Variables for Experiment 7 Results

Dataset	**Prime Data**	**Target Data**	**Talker Choice Data**
Independent Variables	Construction Prime agreement Accuracy	Construction Prime agreement Talker match	Construction Sentence agreement Block
Dependent Variables	Accuracy Response time	Accuracy Response time	Accuracy

6.2.2 Materials

In the sentence completion portions of Experiment 7, only sentences used as the target trials in the other experiments were used. The same target trial files from Experiment 6 were used as the target block files in Experiment 7, with the same nonstandard talker and standard talker voices. However, a new set of prime stimuli were created from the target sentences, which consisted simply of the unmanipulated target sentence recordings, spoken by either the same or different talker from the target sentences. These new unmanipulated sentences served as the prime sentences: participants heard an entire prime sentence, with the subject noun unmasked, and thus the entire subject-verb pattern was audible. In target blocks, they heard the same target sentences with the subject noun masked.

For the talker choice portions of Experiment 7, sentences that in other experiments had served as the prime sentences were presented in text on the screen, in either the standard or nonstandard condition. Eight sentences of each construction were randomly selected from the set of prime sentences, to serve as the talker choice task sentence stimuli. The same two talker photographs were used as in Experiment 6, for both the sentence completion portion and the talker choice portion.

6.2.3 Participants

47 participants received 1/2 hour of course credit for their participation. Three participants were removed because their accuracy in completing the prime trial sentences (in which the full sentence was audible) was under 70%. 44 participants are included in the analysis.

6.2.4 Procedure

The experiment had four main blocks, each consisting of two prime sub-blocks, two target sub-blocks, and one talker choice sub-block. Each block contained only one construction, thus there were two full blocks for *don't* and two for *there's*. A participant first heard either two subsequent *there's* prime-target blocks (16 items) or two subsequent *don't* prime-target blocks (16 items), followed by two prime-target series of the other

construction, with this order repeated in the second half of the experiment. The order of presentation was offset by participant, and it was always the case that the order of the two constructions alternated. A block outline is given in Table 6.4. Each construction had two blocks like this; the numbers in parentheses correspond to the number of trials presented in each condition.

Table 6.4
Block Outline for Experiment 7

Construction	**Sub-block Type**	**Agreement/Talker**			
There's	Prime	Standard (4)		Nonstandard (4)	
	Target	Standard (2)	Nonstandard (2)	Standard (2)	Nonstandard (2)
	Prime	Standard (4)		Nonstandard (4)	
	Target	Standard (2)	Nonstandard (2)	Standard (2)	Nonstandard (2)
	Talker Choice	Standard (2)		Nonstandard (2)	

Participants entered their responses using two buttons on a serial response box. In each prime or target trial, the talker photo appeared for 500 ms before the onset of the audio file. After the audio file completed, the talker photo remained on the screen for 750 ms. The noun choice photo then appeared, staying onscreen for a maximum of 4000 ms. After participants logged a response, there was a 1000 ms pause in between trials. To create more time between the prime and target blocks, a 6000-ms pause followed each prime block, followed by a screen asking participants if they were ready to continue. Once they pressed the correct response button to continue, the target block began (with a 1000 ms pause before onset of first target trial).

After each target block, participants were presented with a talker choice task. This task consisted of the presentation of four sentences using the construction participants had just been exposed to in the prior prime and target blocks. In the talker choice blocks, each sentence occurred onscreen for a maximum of 15000 ms, and each trial was followed (once participants logged a response) by a 1000-ms pause. Each talker choice block contained two standard sentences and two nonstandard sentences. In this experiment, photo position on the screen was randomized in all trials. The same was done

for the presentation of the talker photos in the talker choice tasks. Thus, only one list was used.

Participants were given four practice trials: two in which the noun was unmasked, one in which the noun was fully masked, and one in which white noise was overlaid onto the signal during the noun portion. Two were spoken by a male voice, and two spoken by a female voice. Participants could repeat the practice block if they chose.

6.2.5 Results: Prime data

Responses in the prime trials indicate good completion accuracy, better accuracy for *there's* than for *don't* trials, increased accuracy for *don't* trials in the second block compare to the first, and faster responses for accurate completions. Overall accuracy in the prime blocks was 92.58%, indicating that there was generally good correspondence between the intended noun cues and the noun photos chosen by participants. As shown in Table 6.5, in the prime trials, responses were overall more accurate for *there's* trials (.95) than for *don't* trials (.89), but the effect of the prime agreement form did not reach significance at the .05 level. This indicates that participants chose photos in the prime trials based on what they heard presented, not necessarily on their grammatical expectations.

Table 6.5
Prime Completion Accuracy by Construction and Prime Agreement, Experiment 7

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	2.87	0.24	11.93	<.001
Construction	*There's*	0.87	0.24	3.63	<.001
Prime Agreement	Nonstandard	-0.46	0.24	-1.94	<.1

For *don't* trials, participants also got more accurate from the initial block (.86) to the later block (.94), suggesting that they came to expect that nonstandard *don't* might occur, and their completion of these sentences with singular nouns was facilitated by the earlier occurrences (β = .91, SE(β) = .29, z = 3.11, p<.01).

Accurately completed prime sentences were also completed more rapidly than inaccurately completed sentences (Figure 6.6 and Table 6.6), and *there's* trials were also faster.

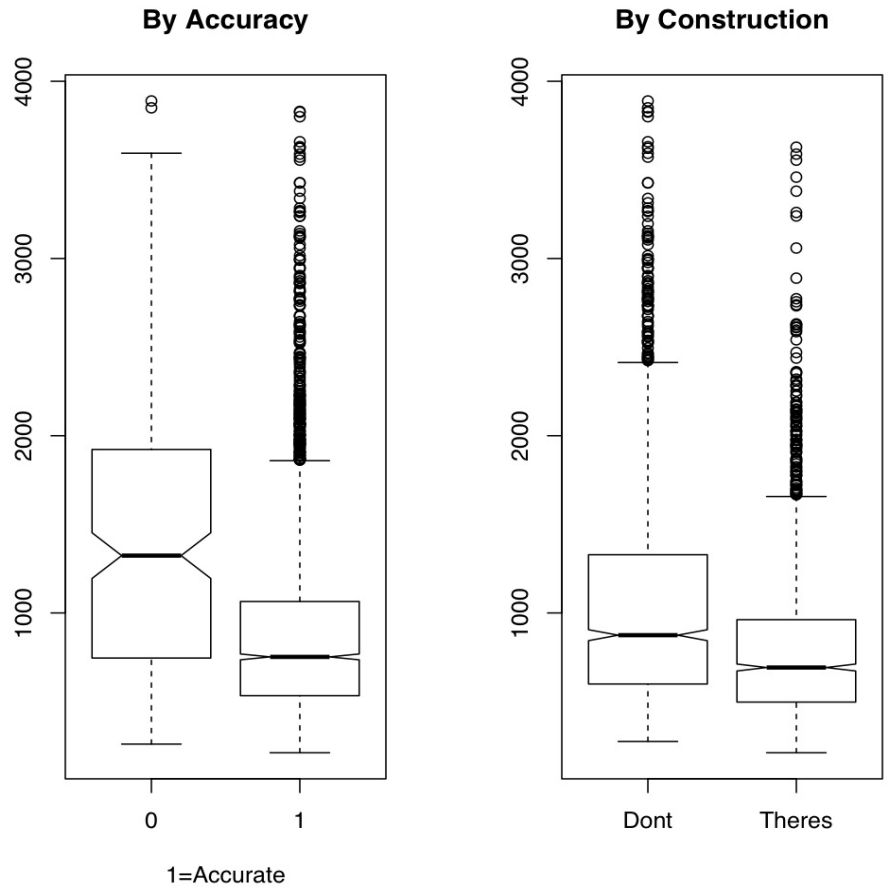


Figure 6.6. Prime trial response time differences by two predictor variables: accuracy and construction, Experiment 7.

Table 6.6
Accuracy Effect on Prime Trial Response Times, Experiment 7

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**t value**	**Significance level**
	(intercept)	1323.19	65.73	20.13	<.001
Construction	*There's*	-237.13	52.14	-4.55	<.001
Accuracy	Accurate	-270.52	35.4	-7.64	<.001

Response time delays suggest that participants experience a competition between forms. The fact that *don't* sentences take longer to complete suggests that listeners may experience dissonance between the expected form and the experienced form in *don't* trials. And, inaccurate responses essentially involve overriding what was heard in order to make the alternate choice; this seems to be reflected as well in the response times.

6.2.6 Results: Target data

Talker-specific effects were found in the target trials, shown by Table 6.7 and Figure 6.7.

Table 6.7
Target Trials Accuracy across Conditions, Experiment 7

Construction	**Prime Agreement**	**Talker Match**	**Proportion Accuracy**
Don't	Standard	same	0.93
		different	0.81
	Nonstandard	same	0.40
		different	0.27
There's	Standard	same	0.61
		different	0.52
	Nonstandard	same	0.71
		different	0.60

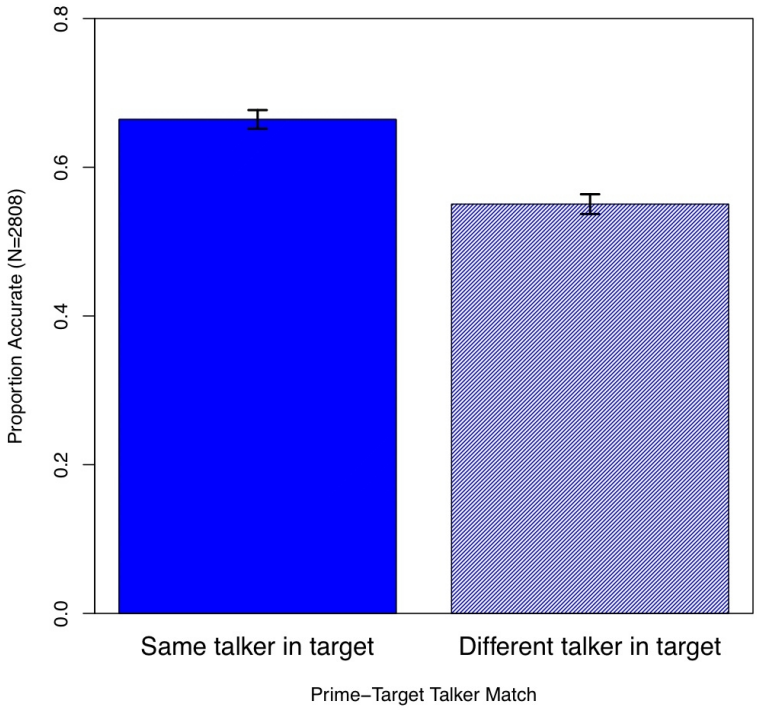


Figure 6.7. Target trial accuracy by talker match condition, Experiment 7.

Same-talker trials were more accurate than different-talker trials. *There's* trials and nonstandard trials were less accurate overall, but nonstandard *there's* trials were more accurate. All of these factors are significant (Table 6.8).

Table 6.8
Effects on Target Trial Accuracy, Experiment 7

Factor	**Factor Level**	**Coef. *β***	**SE (*β*)**	**z value**	**Significance level**
	(intercept)	1.84	0.18	10.43	<.001
Talker Match	Same	0.65	0.11	5.67	<.001
Prime Agreement	Nonstandard	-2.94	0.18	-16.55	<.001
Construction	*There's*	-1.84	0.17	-10.57	<.001
PrimeAgreement: Construction	Nonstandard: *There's*	3.37	0.23	14.42	<.001

Talker-specificity effects were not found on response times. Same-talker trials did not show a difference from different-talker trials in terms of response times, contrary to the expectation that response time would be shorter.

6.2.7 Results: Talker choice data

The talker choice blocks were run to explore grammatical form as a cue to talker identity. An "accurate" response corresponds to choosing the nonstandard talker for the nonstandard sentences, or the standard talker for the standard sentences. Participants were less accurate for nonstandard sentences (standard proportion: .77; nonstandard proportion: .61), and this effect is significant (β = -.83, SE(β) = .28, z = -2.96, p<.01). Agreement did not interact with construction, nor did construction have an overall effect. There was an overall bias towards the standard talker photo.

Additionally, contrary to expectation, participants' accuracy did not improve over the course of the experiment. Thus, this does not support strongly that participants learned an association between the talkers and structures to the extent that they were able to use grammatical form to identify individual talkers, in contrast to the findings from Experiment 5.

6.3 General discussion: Talker specificity in grammatical priming

Experiment 7's results provide evidence of a talker-specificity effect on grammatical priming, aligning with results in speech perception showing that talker specificity effects are more prevalent when processing duration is longer. Recall that participants heard full sentences with either standard or nonstandard subject-verb agreement in each prime block. In the subsequent target block, they heard the same sentences, but without the subject noun. To complete the task of choosing the subject noun, there are a few strategies participants might use: memory of the subject noun from the prime block; memory of the chosen photograph from the prime block; memory of the talker and the sentence they had produced in the prime block. The talker match effect gives evidence for the third strategy. If participants' choices were facilitated predominantly by the memory of either linguistic or visual information, we should have

seen equivalent behavior in the same- and different-talker trials.

Instead, talker specificity effects indicate a listener's reliance on talker-specific cues in order to aid processing--to facilitate interpretation or disambiguation of the stimulus. The completion of all structures was affected by talker consistency, suggesting that more generally, the dimension of social information is one along which similarity matters for sentence processing. That is, these results suggest (as did the results of Experiments 4 and 5) that sentence interpretation, and particularly priming, is sensitive to talker information (contra results from, e.g., Thothathiri and Snedeker, 2008). This contingency was not identified in Experiment 6, when prime and target trials were presented consecutively rather than temporally separate.

Individual talker contingency is one expected way that social influences on perception should manifest if sentence processing is a function of grammatical exemplar matching and activation, and if exemplars are stored with robust socio-indexical information. A grammatical construction that is encountered at once activates similar grammatical constructions stored in memory (exemplar matching), and simultaneously adds to the stored representations that a listener has. The heightened activation of that construction's exemplars increases the likelihood that it will be expected, or accessed, subsequently.

The results here suggest that talker information, whether it be voice, visual attributes, or "identity," is a feature represented with the grammatical construction, such that in a subsequent processing situation, the previously activated construction is less likely to be deployed if there is a change in talker than if the talker remains constant. That is, upon hearing the same talker produce a similar construction as was previously activated, the likelihood of matching to the previously-activated exemplar is high. It is lower if a different talker is heard producing a similar construction, and the matching to exemplars is less clear. This replicates from an experimental standpoint the empirical findings of Szmrecsanyi (2006) that structural persistence is greater within the same speaker than between speakers.

Over the course of just 16 sentences per prime block, or eight repetitions per speaker per block, listeners began to link the spoken forms with the individual talkers

who spoke them in the prime blocks. To schematize this, say that the listener is learning that for variant A, talker X is more likely to use it; while for variant B, talker Y is more likely to use it. When encountering talker X in subsequent trials, there should be a preference for variant A, while encountering talker Y should engender a preference for variant B. This is exactly what participants' responses show by being more accurate in same-talker trials: they are using talker information to estimate the grammatical form of the sentence. Further, in the prime blocks, participants generally chose the accurate sentence completions, regardless of whether the sentence was in standard or nonstandard form. This supports the linking assumption that listeners were fully processing the subject-verb portions of the prime sentences, and then applying them to the target sentences.

While the results were clear in terms of the use of social cues for grammatical interpretation in Experiment 7, this mutuality was not found in the talker choice trials. Since listeners were exposed over the course of the experiment to multiple iterations of the same talkers using the same forms, it was expected that they would use the information about grammatical-social match in order to make judgments about which talker was more likely to produce novel sentences. It was expected that when seeing standard sentences, participants would choose the standard speaker, whereas when seeing nonstandard sentences, they would choose the nonstandard speaker. However, morphosyntactic variant did not appear to be used as a cue to identity. This stands in contrast to the results of Experiment 5, which showed clearly that grammatical form was a cue to social status (a group-level social category).

There are a number of potential reasons regarding the methodology of the experiment that could have led to this null result. First, the talker choice trials were presented after the target trials, not the prime trials. This was done because the goal was to see to what extent participants were retaining information about grammar-talker matches over time, rather than to what extent they could accurately identify grammar-talker matches after having just heard them. If these sentences had been placed after the prime blocks instead, there may have been a higher accuracy in talker choice because of the recency of hearing the full prime sentences spoken by the individual talkers.

Second is the possibility that the written form of the sentences in these trials led to a decrease in the activation of talker information by the structures. Throughout the prime and target blocks of the experiment, participants' experiences with talkers were in two modalities: voice and photograph. However, in the speaker choice trial, no vocal cues were available, and the exposure to grammatical forms (subject-verb constructions) was in written text, rather than spoken. Text was used precisely to avoid cuing individual talker through vocal cues, which would have mitigated the point of asking them to choose between photographs of the talkers. And yet, the lack of any grammatical effect in the speaker choice data may indicate that the way in which grammatical information is encountered matters, in terms of mapping it to talkers: without the vocal component, participants' exemplars are not being sufficiently activated to foster a choice between photos; or, perhaps talker information is mostly stored vocally, rather than visually.

Recall that Experiment 1 also used written text to serve as the grammatical prime and did garner grammatical priming effects; nonstandard prime sentences led to higher rates of nonstandard target completions. However, in that experiment, the primes were meant *only* to signal grammatical information, and precisely were *not* intended to signal social information. The evidence from Experiment 7's talker trials may therefore be interpreted to corroborate the lack of social information signaled by the written text. That is, when asking to identify speakers based on grammatical forms, the vocal cues add something that the text-based cues do not have, especially when considering that the orthographic conventions used for the entire sentences were also standard. This also represents a difference between the talker choice data in Experiment 7 versus that of Experiment 5, however, where Experiment 5 successfully used written target sentences to cue social status. Perhaps the social cue of social status is more readily distinguished on the basis of written linguistic form than individual identity--this would be unsurprising, given the connection between writing, language standardization, and concepts such as social class and race.

Finally, the results from the talker choice data in Experiment 7 show specifically that participants were less accurate at choosing the talker for the nonstandard sentences than for the standard sentences. This means that they were more likely to choose the

"standard" speaker for the nonstandard sentences (*there's*+NP_{PL} and NP_{SG}+*don't).* This is surprising, since we might expect that participants would apply the *there's*+NP_{PL} pattern to the standard speaker (since it is less socially marked), but not the NP_{SG}+*don't* pattern (since it is very socially marked). Perhaps the photo used for the standard speaker was more appealing, or perhaps the standard speaker's use of standard forms led to a higher degree of expectation for that speaker throughout the experiment, by establishing a positive bias toward the speaker regardless of the sentences. Recall that in Experiment 5, the high-status talkers were also overall the preferred talkers chosen as most likely to produce the target sentences. These apparent biases motivate the inclusion of social perceptions, attitudes, and ideologies in models of language, such as the social category levels that I discuss in Chapter 7.

However, the most important finding from the experiments in this chapter comes from looking at them in concert. Experiments 6 and 7 were both designed to test the social dimension of the individual, which might potentially be expected to be connected to sociolinguistic variants. Experiment 6 used a short-term priming paradigm similar to those of the prior experiments, and did not find any significant effects of having a matching talker in the prime and target trials. However, Experiment 7 used a longer-term paradigm, where less grammatical and social information were present, and found that talker identity did affect priming results: same-talker stimulus pairs were more likely to show priming than different-talker stimulus pairs. This was the case for both grammatical constructions (*don't* and *there's*).

The comparison between the two experiments highlights that where there are sociolinguistic effects to be found in sentence processing, they will likely be quite sensitive. While it is clear that grammatical priming effects (which have themselves sometimes been elusive in other work) obtain for sociolinguistic variables, the fact that talker-specific effects were found only in a long-term design suggests that talker properties may indeed be used as only secondary cues in grammatical perception. The apparent long-term perseverance of talker information from the prime to target *blocks* in Experiment 7, but the lack of short-term perseverance from prime to target *trials* in Experiment 6, gives evidence that the particular grammatical variants are processed along

with an understanding of the talker who uses them. But the full integration of these two sources of information either does not happen immediately, or does not lead to immediate use of the social information in producing a grammatical outcome. The response time data for the social status experiments indicate this as well: whenever matching social status led to a boost in grammatical priming, response times were longer. Thus, it seems that while social and linguistic knowledge may be jointly stored and jointly processed, they are not always equally activated or equally used, and their interaction or integration may be reflected in real time. A discussion of the implications of these experimental findings for exemplar-theoretic understandings of sociolinguistic knowledge and processing follows in the final chapter.

CHAPTER 7
GENERAL DISCUSSION AND CONCLUSION

In the first chapter, I outlined three main research questions of this dissertation. First, do speakers retain knowledge of grammatical variation in their mental representations of language? Given that real-world experience should include encounters with variable grammatical patterns, we expect these encounters to be reflected, at some level, in the grammar; one theoretical model that has emerged to incorporate this knowledge is based in exemplar theory. Second, is social information used as a supporting cue in interpreting grammatical form--is grammatical perception influenced by social cues? And third, is the perception of social properties influenced by grammatical cues? Answers to these questions should be affirmative if participants have knowledge wherein linguistic and social information are jointly represented, as in an exemplar model.

The preceding chapters have reported on seven experiments, all of which used priming to explore relations between grammatical form and social information in perception. This chapter synthesizes the overall results by revisiting the three questions from the introduction. I discuss what the results suggest about knowledge of linguistic variation; what they suggest about social influences on linguistic perception; and what they suggest about linguistic influences on social perception. I first present the discussion in terms of empirical contributions--what the results tell us about speakers' behavior. I then discuss implications for exemplar-theoretic models of grammar that incorporate social knowledge with linguistic exemplars. The chapter closes by noting limitations and suggestions for future studies.

7.1 Empirical contributions

7.1.1 Knowledge of grammatical variation

Many have argued that listeners possess as part of their grammars knowledge of linguistic variation, dealing especially with phonetic variation (see especially Hay et al., 2006; Staum Casasanto, 2009). In terms of grammatical variation, Bender (2007) has done experimental work showing that speakers have knowledge of syntactic variation, and that that knowledge includes social knowledge about patterns of variability. Hay and Bresnan (2006) have also argued that an exemplar-theoretic approach to grammar would satisfactorily both explain and predict grammatical variation and its social meaning (i.e., its interpretation as being linked with social properties). To investigate this view empirically, the approach of the dissertation was to take common English morphosyntactic variables and use structural priming experiments to probe the factors influencing the perception of standard and nonstandard variants.

Structural priming effects, both experimentally and in corpus-based research, are taken as evidence of the activation of linguistic representations. This was a linking assumption of the dissertation experiments: if someone believes that what they heard in an ambiguous sentence was a nonstandard subject-verb agreement form, this implies that the nonstandard form is among the linguistic representations that constitute their linguistic competence. When priming effects are found experimentally, it is taken as evidence of these representations' activation (Snider, 2008). Priming is especially useful for investigating the perception of sociolinguistic variables, when it might be difficult to elicit a less-frequent variant from a given speaker without some explicit stimulus to activate that form. The dissertation experiments represent an innovation for both psycholinguistics and sociolinguistics, by using priming to explore the perception of sociolinguistic variables.

The results of all experiments here provide evidence that the speakers in this subject population (native English speakers at a university in the midwestern United States) possess knowledge of both standard and nonstandard subject-verb agreement patterns. In the six experiments testing for grammatical priming, nonstandard sentence

interpretations were found to be more likely following nonstandard prime sentences than following standard prime sentences. Table 7.1 gives a simplified overview of the patterns found in the experiments.

Table 7.1
Simplification of Grammatical Priming Results for NP+*don't* and *there's*+NP

Construction	**Baseline**	**Prime stimulus**	**Linguistic percept**
don't	standard	standard	standard
		nonstandard	standard > nonstandard
there's	nonstandard	standard	nonstandard > standard
		nonstandard	nonstandard

Patterns of grammatical perception were different for the two constructions tested (*don't* and *there's*). The baselines are different for the two forms, and the baseline forms are always the most expected, but the effect of the prime makes it more likely that the alternative variant will be perceived. For *there's*, the "nonstandard" form was the overall preferred form (*there's*+NP_{PL}), while for *don't*, the standard form was the overall preferred form (NP_{PL}+*don't*). This difference was found in all experiments, and in Experiment 3 the differences were even more profound--only the *there's* trials showed a grammatical priming effect at all. This shows that not only do people process grammar variably and in response to context, but that perception is also a function of the typicality or stigmatization of sociolinguistic variants. Three other facts shed light on the differences between the two constructions tested.

First, the documentation and discussion of these constructions' production patterns in prior literature shows two quite different statuses for the grammatically "nonstandard" forms. It is commonly reported that *there's*+NP_{PL} is extremely frequent, even approaching standard (through use in standard spoken contexts and by standard dialect speakers), while NP_{SG}+*don't* is associated with lower-status dialects or lower-class speakers. Variation in *there's* usage is less highly stratified by social properties or speakers, and this study has shown that variability in its perception is also more likely overall, as compared to the *don't* construction. Thus, the degree to which a sociolinguistic

variable and its variants are socially stratified (cf. Labov, 1972) seems to affect the general likelihood of perception reflecting that variability. I return to this issue later in the discussion.

Second, for the *don't* construction, Experiment 3 found that nonstandard responses were more common among Black/African American participants than other groups. This suggests that variable perception is also linked to the experience that an individual has had with a linguistic form. African American English is a variety known to use variable subject-verb agreement patterns, and it is reasonable to believe that the higher perception of this feature is related to a greater amount of participants' experience with a variety that uses it, whether in production or perception. Social group effects exemplify the claims of sociolinguistically-informed exemplar theory: that linguistic perception will reflect the social patterning of linguistic variation.

The third issue concerns the nature of the structural priming design and what results tell us about interactions between social stratification and the recency of exposure to a form, which is the foundational feature of a priming experiment design. It is here that the dissertation departs from the work of, e.g., Bod (2006), Snider (2008, 2009), or Walsh et al. (2010), who seek to build exemplar models that rely strictly on functions of frequency, recency, and linguistic similarity in understanding the parameters of exemplar storage, activation, and use. Looking at sociolinguistic variables forces us to consider that social factors may also affect the likelihood of a form's activation. The effect of priming seems to be modulated by the social stratification of a variable. This modulation suggests that, indeed, social information should be built into models of sentence processing in some way.

7.1.2 Social influences on grammatical perception

Three sets of experiments tested for influences of social information on grammatical perception and priming. If social information is included in the mental representation of exemplars, then similarity or dissimilarity along social dimensions should affect priming. That is, if a sociolinguistic variable is distributed such that group A uses variant X and group B uses variant Y, and if speakers have knowledge of this, then

we would expect that a trial sequence consisting of AX-A__ would foster greater likelihood of producing X than AX-B__. And, BY-B__ would produce a greater likelihood of Y than BY-A__. This is the sense in which I expected social matching to enhance grammatical priming across the experiments that manipulated social information.

For gender, there was a marginal effect of females being associated with standard variants and males with nonstandard. However, since there is not one gender group known to relate to these specific variants in practice, I interpret this association as an indirect one: that nonstandardness in general is associated with males, not necessarily that NP_{SG}+*don't* or *there's*+NP_{PL} is associated with males. The result implies that participants have knowledge of this association, and while it may not be mapped to specific linguistic constructions, it can activate specific constructions through the mediation of another sociolinguistic category. Note that "nonstandard" and "standard" are truly *sociolinguistic* categories, in that they involve both linguistic form and social evaluation or, at least, normativity. They may constitute just the type of sociolinguistic categories that are abstracted from individual exemplars: those that then may mediate the activation of other linguistic forms or social knowledge. Hearing the prime voice as male, even speaking a standard sentence, may activate the potential for nonstandardness which then leads to more nonstandard responses in target trials.

The influence of the social status manipulation on grammatical priming was expected to be strong, since it was thought that participants might have direct experience with these particular variants, especially *don't*, as patterning with social class. Whether the relation was one of indirectness (linking status through the vaiants' standardness) or directness (linking status through the variants), I expected that priming would be made more likely by matching status in the prime and target. This overall effect was not found.

However, isolating only the nonstandard *don't* trials, low-low status combinations were more likely to have nonstandard responses than low-high status combinations. That is, matching social status information between prime and target trials fostered higher rates of grammatical matching. For only the variant that participants had most likely experienced as connected to lower-status talkers (NP_{SG}+*don't*), the presence in the target

sentence of a lower-status talker did increase the frequency of nonstandard responses. This suggests that the linguistic forms themselves are represented cognitively with social information about who is more likely to use them, but it is only when the linguistic variant is socially marked that the associated social information activates specific grammatical forms. Indeed, the results suggest that *there's* may actually not be a clear *socio*linguistic variable at all, in the sense that its perception is not linked to a social category (and nor do subject demographics predict its responses).

Finally, talker-specificity effects were found in an alternative, longer-term priming paradigm. In all conditions, participants were more likely to match the target structure grammatically to the prime structure if the individual voice speaking the target was identical to that in the prime. This suggests that listeners do rapidly begin to associate (unconsciously) linguistic forms with individual talkers, such that talker information helps form expectation of upcoming structures. Though these particular talker-grammar combinations had never been encountered before by participants in the experiment, they seem to have encoded talker voice in memory with the grammatical forms, such that they could retrieve those combinations in later processing--different voices then activated different exemplars.

7.1.3 Grammatical influences on social perception

Numerous studies, from the earliest days of matched guise technique experiments (Lambert et al., 1960) to the recent "third-wave" matched guise studies (Campbell-Kibler, 2006; Staum Casasanto, 2009), have shown that altering even subtle phonetic cues alters people's social perceptions of a speaker. Bender's (2005, 2007) work is, as far as I know, the only study to isolate grammatical form to investigate its perception as linked to social information, and she found that both grammatical constraints and participant native dialect affected social evaluations of copula deletion in AAE. I tested whether nonstandard subject-verb agreement was also a cue for talker, for either social status or individual identity.

The social status talker choice experiment (Experiment 5) showed that when participants read a nonstandard *don't* sentence, they were more likely to choose a low-

status talker than a high-status talker. The distribution of choices for high-status and low-status talkers corresponded first to the agreement of the target sentence, with low-status talkers chosen more often in the nonstandard target sentence trials; and second to the agreement of the prime sentence, with a nonstandard prime sentence enhancing the likelihood of nonstandard target trials being correlated with low-status choices. For *don't*, the low status was preferred even in the nonstandard-standard condition--so having the nonstandard variant in the stimuli at all seems to activate a low-status association, which persists to the target trial. For *there's*, the high-status talker was preferred in all conditions, but most of all in the standard-standard condition.

The results of Experiment 5 show clearly that participants have a mapping between grammatical variants and social status. It seems that the grammatical variant activates social, as well as grammatical, information. This is strong evidence for grammatical forms as carriers of social meaning (Bender, 2007), and also that social properties are embedded with grammatical structures in knowledge of language.

7.2 Theoretical implications

This research aimed to inform current theoretical pursuits of linguistic knowledge and language processing, in particular pursuits that place a premium on the capability of a model of grammar to accommodate facts of sociolinguistic variation in production and perception. The dissertation tested for what I believe are necessary behavioral correlates in order for sociolinguistically-informed exemplar theory to be theoretically viable. That is, the exemplar-theoretic viewpoint predicts a mutual processing relationship between grammatical and social information. Here I discuss what I think are some important implications of the experimental findings for exemplar theory.

7.2.1 Defining effects of an exemplar grammar

I want to begin with what have been considered by exemplar theorists (e.g., Snider, 2008; Walsh et al., 2010) to be three central processing effects in an exemplar-theoretic grammar. These are *frequency*, *similarity*, and *recency*. *Frequency* refers to the degree of experience one has with a linguistic form and the resultant memory traces

stored as exemplars. Differing levels of remembered experiences lead to different "baseline" levels of production and perception, often called the "resting activation level"; higher-frequency items are more readily activated than lower-frequency items. *Similarity* is the basis for linguistic comprehension in an exemplar model, since new input is matched to the most-similar existing exemplars. Without considering social factors, syntactic exemplar-theoretic work has considered similarity on such dimensions as lexical identity and grammatical context. The dissertation experiments examine a social dimension. Finally, *recency* pertains to the potential for a newly-encountered form to activate stored forms and raise the activation level of those forms. The effect of recency is taken as evidence for stored exemplars, and this effect is also contingent on both frequency and similarity: a more-frequent exemplar is more likely to be activated by recent exposure than a less-frequent form, and a more-similar exemplar is more likely to be activated than a less-similar one.

These three features fit into the dissertation's sociolinguistic priming paradigm in the following ways. First and foremost, priming as a methodological technique is a test of recency effects. If recency influences behavior, this is taken as evidence that the recently-encountered forms have activated existing exemplars. Second, frequency and similarity should be reflected in the effects of recency. For frequency, linguistic variants that are experienced more frequently should have exemplars with higher resting activation levels than others, due to greater experience either comprehending or producing them. Accordingly, speakers should be more likely not only to expect a particular variant, but also to expect variability between two variants. Given this, grammatical priming of variants should be more effective for less-stratified sociolinguistic variables (see further discussion below). For similarity, this means that priming should be greater for stimuli that are more similar along property X, if property X is part of the stored exemplars that are activated.

To guide the discussion that follows, I've used the tenets above to formulate the following conditional statements for my research findings. They are discussed in more detail in the following sub-sections. First, if recency of exposure to a form affects use of the form, then the form is mentally represented. In the context of my experiments, a

"form" could be a grammatical variant, a social property, or what I will call a "socio-grammatical unit." Second, if the effect of recency differs across forms, then the forms are represented differentially with regard to frequency. Third, if the effect of recency differs as a function of similarity between prime and target stimulus, then the properties that are similar are also mentally represented. The properties of interest are grammatical or social.

7.2.2 Recency

Grammatical priming effects were found repeatedly throughout the experiments: the target perception of nonstandard variants was more likely following nonstandard prime sentences than following standard prime sentences. This suggests that exposure to these forms activates existing linguistic exemplars. Social priming effects were also found for social status: in Experiment 6, low-status choices were more likely when low-status talkers were presented in either the prime or target trial, than when they were not. Perception of both social status and grammatical variation are sensitive to recency effects.

The results of primed social or grammatical information independently are not surprising; the more innovative goal of the dissertation was to look for *sociolinguistic* priming effects. Were socio-grammatical units sensitive to recency effects? The strongest positive evidence for this came from the results for the *don't* construction in the social status experiments. Participants' perception of the nonstandard variant was increased by exposure to a low-status talker in both the prime and the target trials, just as their perception of a talker as low-status increased with exposure to a nonstandard variant. Weaker evidence came from Experiment 2, which showed that only for standard prime trials, the presence of a male talker in either the prime or target trial increased the likelihood of nonstandard grammatical perception. And in Experiment 7, it seems that participants formed socio-grammatical representations upon initial exposure, such that in the time-delayed following trials, consistent grammatical perception was more likely when the individual was the same than when she was different. Overall, the experimental results support models of language processing that are sensitive to recency, such as an exemplar model, and further that support models where grammar and social information

are tightly linked. Exposure activates stored representations; activated representations may be grammatical, social, or socio-grammatical.

7.2.3 Frequency

Another area of evidence for exemplar-type models is frequency effects--differential recency effects due to the amount of experience one has with a form and the baseline level of activation at which an exemplar is stored. The experiments here found two such differential patterns, and though the experiments are not all directly comparable, some generalizations can be made. In terms of grammatical priming, the differential results for *there's* and *don't* could be explained by frequency: most participants had less strong exemplars of nonstandard *don't* than of the other variants. Hence nonstandard *don't* was less likely to be activated in the first place, so less likely to be accessed in subsequent perception. Additionally, some participants seem to have had stronger exemplars of nonstandard *don't* than others; participants identifying as Black/African American perceived more nonstandard *don't* than other groups.

Though I do not have production data from study participants (or, for that matter, data about their direct experience), these findings fit with what has been documented for the *there's* and *don't* variables in the literature about United States grammatical variation. Both variants of *there's* occur across sociolinguistic contexts and groups, as does standard *don't;* however, the use of nonstandard *don't* is found in lower social class groups and in "nonstandard" varieties (e.g., AAE, Appalachian English, Ozarks English). Beyond the frequency of individual forms, though, we can also think of participants as storing probabilities of the variation between forms--of the *relative* frequencies. While all participants seem to have strong representations of variability between *there's*+NP_{PL} and there's+NP_{SG}, only some participants seem to have representations of variability between NP_{PL}+*don't* and NP_{SG}+*don't*. It could additionally be argued that the talker choice results from Experiment 5 and Experiment 7, where the high-status talkers were always preferred, could be a function of stronger representations of a "high-status" social category than a "low-status" category.

Note that this direction for frequency effects runs in contrast to some findings of

"inverse frequency effects," where structural priming effects are stronger for low-frequency structures than for high-frequency structures (e.g., Jaeger & Snider, 2008; Snider, 2008). This has been explained by Snider (2008) as an outcome of the greater number of similar exemplars to which activation of high-frequency items spreads, in contrast to the relatively lower number of exemplars to which a low-frequency item might spread. In short, "more surprising structures are predicted to prime more strongly ... than less surprising structures" (Jaeger & Snider, 2008:2). For instance, verbs that rarely occur in passive structures will lead to greater passive priming than verbs that frequently occur in passive structures (Snider, 2008).

If this effect also occurred in sociolinguistic priming, we might expect that the nonstandard *don't* variant would show stronger priming effects than the other three variants examined here. This was not found; rather, nonstandard *don't* was categorically more difficult to elicit than any other variant. It seems that exemplars of the nonstandard *don't* construction do not register even enough frequency to be activated by prime stimuli, and so there is no activation to spread. This suggests, unsurprisingly, that for many participants, the variation between standard and nonstandard *don't* is different from that between other types of common alternants, in that NP_{SG}+*don't* is too low-frequency to prime in this paradigm.

The above discussion highlights some complications when considering frequency, and in dealing with sociolinguistic processing, there are a number of potentially confounding factors, including sociolinguistic stereotypes. For instance, we cannot be positive that the lower perception of nonstandard *don't* is an outcome of lower activation (processing), rather than of conscious suppression of activated material (post-processing). If it were an effect of post-processing suppression, though, we would expect longer response times for trials where nonstandard *don't* was heard but standard *don't* was chosen, as the forms competed at a conscious level for viability. The experiments did not find this pattern. An outstanding theoretical issue, then, is whether effects that could be considered a matter of conscious sociolinguistic behavior--such as failing to choose a nonstandard variant--can be reduced to frequency, a product of differential experience.

It is additionally important to note that exemplar formation itself likely depends in

part on social factors, as well as attentional factors; here, it is useful to keep in mind that exemplar representations are memory traces--not direct imprints of experienced stimuli. Both Pierrehumbert (2006) and Johnson (2006) have acknowledged the role that attention and saliency may play in exemplar storage. Pierrehumbert highlights the supposition that exemplars do not represent raw experience directly, but rather represent memories of that experience; tokens of experience are categorized as they are stored, and some details of experience may be lost. Frequency of *experience* therefore cannot tell the whole story, though it may be a necessary starting point (frequency of *storage* or frequency of *categorization* may ultimately be a more adequate concept). For nonstandard *don't*, participants may indeed have had many experiences with the variant but still not have strong exemplars of it, if the instances were not categorized as NP_{SG}+*don't*, or were not categorized as probable (or, as discussed below, were categorized as "nonstandard" or some different category delineating forms of speech). The details of exemplar formation--and the roles and limits of experiential frequency--remain a challenge to exemplar theorists, especially considering the complex interactions between social, linguistic, conscious and unconscious factors in exemplar categorization.

7.2.4 Similarity

There are two basic notions of similarity for an exemplar-theoretic view of perception. For whatever properties are relevant to the storage of exemplars, enhanced similarity between those properties in new input and either *stored* or *activated* exemplars will enhance exemplar matching. That is, an incoming construction will be matched to the most-similar stored exemplar (while also accounting for frequency and recency). This is a key element in, for instance, Walsh et al.'s (2010) exemplar model, where sufficient constructional similarity would lead to activation at the unit level (constructions), but insufficient constructional similarity would lead to activation at the constituent level (words). Building on this model, for the same grammatical construction, accompanying social information that is more similar to the stored exemplars should result in greater activation than social information that does not match stored exemplars. That is, a sociolinguistic unit in the input will activate the most similar sociolinguistic unit in the

grammar. Evidence of sociolinguistic activation is therefore evidence of sociolinguistic storage. Enhanced similarity between new input and activated exemplars will further enhance exemplar matching.

What I have investigated is how different factors may be relevant to the issue of similarity in the process of exemplar activation, namely social factors of talkers. The dissertation experiments did find evidence that social similarity between stimuli is relevant to grammatical perception. But this was only the case for social status and individual identity, not for gender (though there was an effect of gender in just the target trial). To some extent these differences had been expected, since gender shows less empirical correlation with the test constructions than does social status; and since individual identity is seen as always potentially correlated with a particular variant. For individual identity, matching talkers from the prime to a delayed target sentence led to higher rates of accurate completions, across both standard and nonstandard trials for both constructions. This suggests a facilitation effect for exemplar matching from talker similarity. For social status, the *don't* variable showed that matching low-status talkers in prime and target increased nonstandard target responses. Additionally, matching nonstandard sentences in prime and target increased low-status target responses. These similarity effects--in addition to those of recency and frequency--are good support for a model of grammar that includes both grammatical and social information, and that accounts for differential storage of linguistic variants.

7.2.5 Social categories and interactivity: Modifications to current models

With the results of recency, frequency, and similarity being consistent, for the most part, with predictions of an exemplar-based grammar, we can consider implications of the specific findings--especially where social information is concerned--for current exemplar-theoretic models of grammar. What kinds of social information do the results show evidence of being stored with exemplars? What can we suppose about the mechanisms of interaction between social and linguistic categories and stored exemplars?

Presumably, if linguistic categories (such as lexical items, lexical types, or construction types) are abstracted away from individual exemplars, so may be social

categories (Johnson, 2006). The findings here suggest at least three levels of abstraction under which a sociolinguistic exemplar may be categorized. I will call these the *person* level, the *group* level, and the *grammar* level. The person level is the most specific. A person may also be categorized as belonging to a social group. By the grammar level, I mean an abstraction that categorizes grammatical forms relative to other grammatical forms--at a basic level, for monolingual speakers of US English, this might be "standard" and "nonstandard." It could equally be something like "Southern/Northern," or a multiplicitous system rather than a dichotomous one; and, though we might represent them as discrete for the sake of our conceptual models, the mentally represented boundaries of these abstracted categories would most certainly be continuous and emergent.

The existence of these levels is motivated by several of my findings. The talker-specificity results suggest that new exemplars include person-specific information, such that "talker matters." Social status was also clearly related to the tested grammatical variants, suggesting that some group-level categories are relevant to grammatical perception. I also found slight effects of target talker gender in Experiment 3, and this result in particular motivates the *grammar* level of abstraction. Male talkers were interpreted to produce nonstandard variants more than female talkers were. However, there is no reason to believe that participants in these studies had experienced *there's*+NP_{PL} or NP_{SG}+*don't* as more frequent among males than among females. Yet they may have experienced a general correlation between males and nonstandard linguistic features, or cultural values that these features sometimes signal, such as "toughness." It is thus possible that a male voice activates an abstracted notion of "nonstandardness," which then activates the nonstandard construction exemplar(s).

The interpretation of language through indirect social categories, which has been termed *indirect indexicality* within sociolinguistics (Ochs, 1992), could be accommodated with an exemplar model that has multiple levels of abstraction for both linguistic and social categories. This model would bear strong resemblances to the contemporary variationist notion of the *indexical field*: the field of social meanings that a linguistic variant may take on in a given circumstance, independently or through other meanings

(Eckert, 2008). Most variationist sociolinguistic work does not delve into the cognitive materiality of what social meanings are (though see Campbell-Kibler, 2010b), but exemplar theory offers a way to do this at both the phonological and grammatical levels. Variants are stored with rich detail about who spoke them, and that detail is categorized according to abstracted social categories. Importantly, sociolinguistic categories emerge "bottom-up," from experiences with and interpretations of language as produced by individual speakers on occasions of use.

This type of model could also explain why it is that perceptions of speakers may not be true to reality when sociolinguistic stereotypes are involved, as found in the studies by Niedzielski (1999). A grammar-level category activated by a linguistic variant could activate a group-level category that does not actually correspond to any experienced sociolinguistic exemplar. Thus, it seems that to account for sociolinguistic findings, an exemplar grammar would need to be capable of abstracting multiple types of categories, which would form the basis for indexical associations between linguistic and social information. Johnson (2006) has successfully implemented a phonetic simulation with abstract gender categories of this sort.

How do these categories interact in the organization of the grammar? Of key interest here are the response time data from the social status experiments, where different hierarchies between response times for the two social status experiments were found. The nonstandard responses in the low-low status condition had the longest response times, whereas the low-status responses in the nonstandard-nonstandard condition had the shortest response times. In Chapter 5, I interpreted the delay in response times for nonstandard responses in the low-low condition as a signal that social and linguistic information were being integrated in the processing task. I suggested that the opposite effect in the talker choice experiment--where low-status choices in nonstandard-nonstandard trials took the shortest--showed that inferences from the grammatical to the social are more readily made than those from the social to the grammatical. It may not at first seem that this result is predicted from an exemplar model, for if all exemplars contain both social and linguistic information, shouldn't the use of either type of cue inform perception equally?

If abstracted social categories are in place in the cognitive store of linguistic forms in the manner described above, then differential processing times for the two types of perception tasks are actually expected. It may take longer to move from the social to the grammatical precisely because part of participants' knowledge of linguistic variation is probabilistic. If participants' behavior reflects the processes that I am claiming--activation of sociolinguistic units--then part of what is stored in their representations of variant forms is associations with abstracted social types of speakers. But these associations will not be categorical. Individuals are themselves variable in patterns of usage of linguistic variants, as are the social aggregates that they may be said to belong to. In the case of the experiment's specific variables, this knowledge may be encapsulated as saying that low-status talkers may use either standard or nonstandard *don't*, but nonstandard *don't* may rarely be used by anyone but low-status talkers. If participants know this, and they encounter nonstandard *don't,* the matching to a sociolinguistic unit is rapid: it matches to exemplars of nonstandard *don't* which are robustly categorized as spoken by low-status talkers. On the other hand, when they encounter a low-status talker, exemplar matching is slower, because more exemplars might possibly "match" the input--including both standard and nonstandard variants.

Thus, I think this difference can be built into, and is even predicted by, exemplar models. An alternative explanation could be that instead of grammatical and social knowledge all belonging to the same cohesive system of memory traces and abstracted categories, there is a more modular but interactive system, where one component interprets linguistic information, another component interprets nonlinguistic information, and they interact. This is a possibility that would likely be favored by generativists interested in variation, especially in a feature-based approach like that espoused by Adger and Smith (2010), where a "choice function" for linguistic variants may be informed by social experience. It might also be favored by most approaches to sentence processing, such as parallel processing accounts that posit different sets of cues--though none social, so far as I know--that may interact to choose the most heavily weighted parse (e.g., Boston et al., 2011). But unless the grammar is taken *a priori* as an independent, context-free, and asocial module, there seems no reason to posit it as such in light of the present

findings. Further, an underlying premise of most usage-based theories is that there is no need to posit a language-specific module, that the acquisition and use of language can be explained by general processes of memory and analogical reasoning--such as exemplar comparison. And interacting, not just integrated, social and linguistic information is directly and straightforwardly captured by exemplar models that specify multiple sociolinguistic categories.

Johnson (2006) has specified formal characteristics of an exemplar model of speech perception that includes what he calls "resonance"--the interaction between "auditory, visual, and declarative knowledge representations" (491). In Johnson's model, exemplars consist of full representations of the remembered lexical instance, including information about the person who spoke it. When encountering new input, the system first compares auditory information to stored auditory exemplars, ultimately activating the most-similar exemplars. The activation of these exemplars then feeds into both social (in his case, gender) and linguistic (in his case, individual words) categories, activating the categories. These categories then feed back to the stored exemplars, creating an interactive, dynamic process whereby categorization informs exemplar storage and the existing store of exemplars informs categorization.

I have created a modified diagram schematizing this type of model, inspired by that in Johnson (2006:493, figure 5), in Figure 7.1. Once again, it should be understood that this is a vast simplification of what must be present in a grammar. And though the two-dimensional space of the page does not permit visualizing it as such, each set of categories is actually a set of exemplars clouded together because of shared category membership. Because we are dealing with constructions and not just words, I have taken up Walsh et al.'s (2010) *unit* and *constituent* levels of exemplars. The model represents constructional frequency information visually by the relative size of unit exemplar clouds. Johnson's model, as is the model in Figure 7.1, is a "hybrid" exemplar model, because it includes not only rich and detailed exemplars, but also categories that are abstracted from these exemplars that can, once established, operate independently of individual exemplars (see Clark, 2008 for discussion of "pure" versus "hybrid" models; see also Boomershine, 2005 and Clopper, 2004 for similar socially-enhanced exemplar

models of speech perception). The exemplars themselves remain full of experiential details, and those details are organized into social and linguistic categories. Results from the different types of social information found by the dissertation warrant, I think, a hybrid model such as this, where interaction between activated categories is also expected.[8]

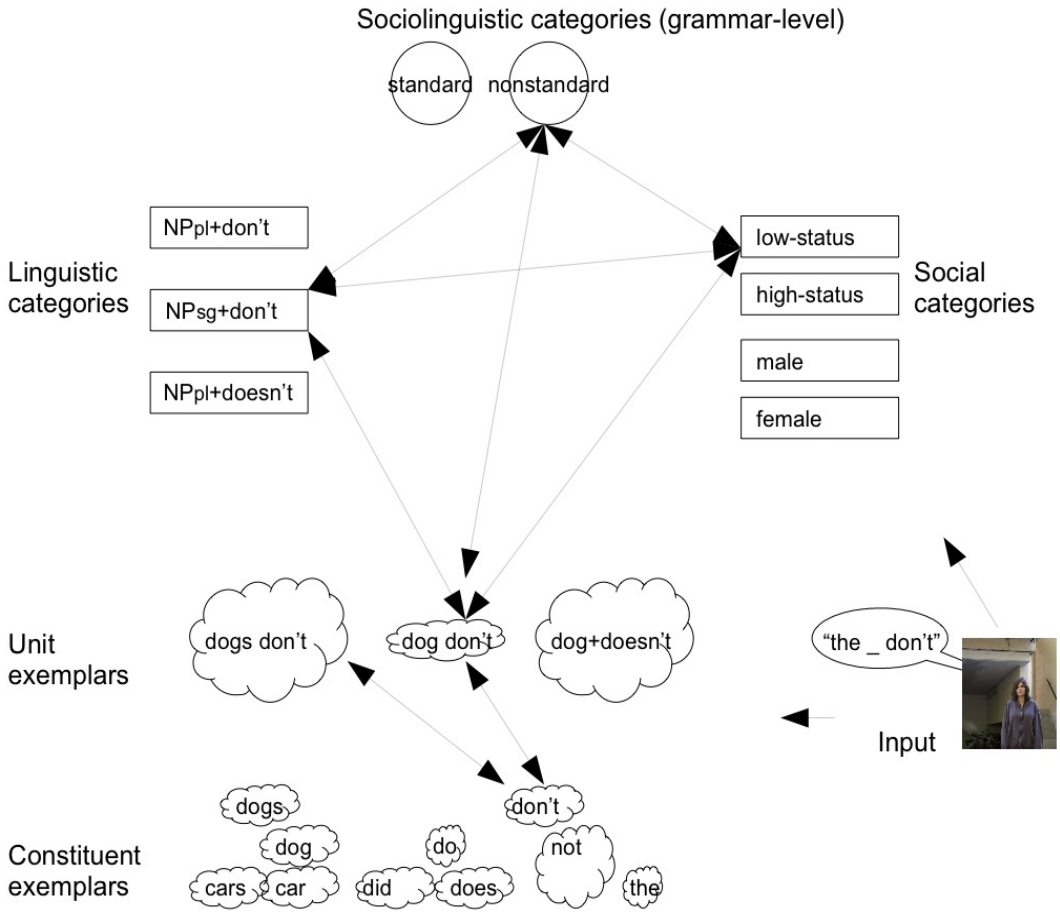


Figure 7.1. Representation of a sociolinguistic exemplar model for grammar, with modified elements of Walsh et al. (2010) and Johnson (2006).

8. I follow Johnson (2006) in schematizing these categories conceptually as independently *social* and *linguistic*, though I don't mean to suggest that categories couldn't be truly *sociolinguistic*, with inseparable elements--but this would be a long way from how we currently theorize and discuss sociolinguistic knowledge.

My response time results from the social status experiments provide empirical evidence of "resonance" across categorial levels, represented by the bidirectionality of the arrows in Figure 7.1. When the immediate input is linguistic, grammatical input is processed and feeds directly to a social category--in this case, social status (it likely activates other categories as well, but my experiment does not address this). In contrast, when the immediate input is social, processing may include richer comparison and matching, and interaction between categories. One, it is possible that the interaction involves more steps of comparison, as the social will be fed to the linguistic, which will then likely be fed back to the social category, then fed back to the linguistic category, then back to the store of exemplars. Two, there are likely social properties other than status (e.g., gender, friendliness, race) immediately perceived from a single photograph of a speaker. Processing thus would involve the activation of all linguistic exemplars potentially mapped to that speaker's social attributes, and interaction between linguistic and social categories to determine which categories are both relevant and the most-frequent. If these processes are reflected in the time-course of unfolding processing, then it is expected that the resolution of linguistic ambiguity would proceed more slowly the greater the effect of the social information. On the other hand, the resolution of social ambiguity would proceed faster with more linguistic information available.

This model attempts to bring some specificity to what might be involved in sociolinguistic categorization (though it may nonetheless seem hopelessly abstract to some), to bring some unified theoretical grounding to findings about the mutual influence of social and linguistic information. I have shown that for sociolinguistically variable grammatical structures, perception is flexible; participants indeed perceive them as variable. The fact of these perceptions, and that these perceptions are also influenced by social factors, suggest a grammar that stores knowledge of what grammatical variants are out there and how they pattern across a social landscape. I have provided empirical evidence that grammatical perception is sensitive to constructional frequency, sociolinguistic stratification, recent exposure, and individual competence. This supports models of grammar that are--at least--probabilistic and replete with both linguistic and social detail. Exemplar theory is not the only possible contender, but it is the model

whose exploration has moved explicitly toward sociolinguistic variation as a central tenet of linguistic competence. The present study has provided an inroad to exploring the perception (not just the production) of grammatical information as a necessary empirical basis for these types of models, but it bears many limitations. The final section discusses some of these, and offers suggestions for future studies.

7.3 Limitations and future studies

7.3.1 The priming paradigm and sociolinguistic factors

My results support views of grammar that are gradient and that reflect properties of variability, frequency, and similarity in processing. However, the experimental results themselves were varied; the main effect that I expected to be consistent across social manipulations--that of social matching enhancing grammatical matching--was not found. It is possible that the short-term priming paradigm is not sufficient to detect effects of social similarity in processing, and that other task designs could more straightforwardly elicit these effects. For instance, we could directly test associations between social variables and linguistic variables through simpler sentence completion tasks where the talker is manipulated and participants' task is to complete ambiguous sentences with a subject noun (essentially presenting just the target-style stimuli from my experiments). Similarly, we could ask people to metalinguistically evaluate different subject-verb agreement patterns on social dimensions, or ask them to choose the most likely talker without priming of a socio-grammatical unit at all, as in a traditional matched guise technique study. But given the nature of sociolinguistic variables, the utility of these methods is unclear, especially when investigating variants that are known to be stigmatized (NP_{SG}+*don't*). My experimental designs responded to the limited likelihood that, without being primed to do so, standard English speakers would produce stigmatized patterns in a sentence completion task. Investigating the perception of sociolinguistic variation will require innovative task designs that might push participants beyond their metalinguistic judgments or own baseline production patterns; the dissertation used priming to activate underlying knowledge that might not necessarily come to bear in

more conscious production tasks.

Additionally, knowing more about participants' sociolinguistic experiences could provide more nuanced understanding of the outcomes of the priming manipulations. The demographic surveys that I used at the end of each experiment did provide valuable information about different participant groups; other social diagnostics could further complement the behavior data. For example, collecting grammaticality judgments before or after the experiments, collecting a speech sample designed to elicit subject-verb patterns, or interviewing participants about their impressions of the speech of males and females (in particular) could shed light on the relation between participants' own speech, their conscious understandings of the social factors being manipulated, and their strategies in undertaking the experimental tasks. However, each of these techniques would likely have influenced behavior during the experiment itself.

As I discussed in each of the experimental sections, modifications to the experimental designs could also improve priming results. In the gender experiments, it is possible that I "overloaded" participants with multimodal information, such that attention was not being paid to talker information. As Pierrehumbert (2006) notes, attention is not equal to all instances of speech, and nor should we think it will be equal to all *aspects* of speech in all instances. It is possible that the task (or task instructions) did not encourage drawing on talker information from the prime trial in the target trial, or that the task did not require drawing on that information because grammatical information was sufficient. I obtained better social matching results for the social status experiment, which included less information throughout the experimental session. Followup experiments could directly explore the effects of different combinations of multimodal information.

It is also possible that prime trials did activate both grammatical and social knowledge, but that activation decayed so rapidly following the trial, that it was no longer highly accessible to use in the target trial. However, because of the findings that talker match *was* a factor in long-term priming, an explanation based on decay over an extremely short amount of time seems unlikely to me. Indeed, it also seems possible that there was too little time from prime to target trial in the short-term trials. Using eyetracking in a lexical disambiguation task, McGowan (2010) found that English-

speaking listeners were more likely to fixate on a word that would be correct if the speech were Chinese-accented, rather than the correct word, when they believed that a speaker was Asian (even though the speech they heard was by a native English speaker). However, critically, these increased fixations to the Chinese-accented word only occurred *after* the time when lexical access had already happened--indicating a late-stage effect of socio-indexical information. If the temporal elements of the task were driving the overall lack of social matching effects on grammatical perception, this could be taken as evidence against exemplar models, since sociolinguistic processing would happen after linguistic processing had already occurred. A set of directly comparable experiments could compare rapid versus longer-term processing across different social manipulations; eyetracking or mousetracking data would also provide even more sensitive time-course evidence.

7.3.2 The variables and stimuli

In addition to the experimental paradigm, there are limitations to the sociolinguistic variables I used and the stimuli I devised. First, I used variables that I thought would be experienced across a generic subject group of US English speakers, rather than isolating a single narrowly-defined dialect group. The constructions I chose had strong documentation in the literature, a common reference as nonstandard features, and interesting differential patterns that provided complementary test cases for the priming paradigm. I also avoided using variables that carried heavy associations with just one narrowly-defined social group, such as speakers of AAE. This likely meant that the effects I was testing for were more difficult to find, but it was an intentional choice to move away from obviously stereotyped variants or groups (such as those used by, e.g., Staum Casasanto, 2009).

One fruitful direction for extending this type of work would be to investigate the perception of variables that are known, at the outset, to carry specific social meanings within a particular group (such as the *was/were* variation studied among high school girls by Moore, 2010). This would enable the experimenter to tap into what is known about the local meaning of the variants to the participants, then use that information to tailor the

social manipulations accordingly. It is important to remember that the model I've outlined above is in no way meant to be a universal model--social and linguistic categories will emerge based on individual experiences, most of which will be local. My work engages macro-level social categories that have been shown to be relevant across many studies of linguistic variation and perception, but I do not mean to imply that these categories are either universal or stable. In fact, a substantial draw of sociolinguists to exemplar-style cognitive models is that they are emergent, dynamic systems. One could argue that such a system must be the basis for a model of language that acknowledges language variation, its social meaning, and a cognitive reality to sociolinguistic meanings (see Clark, 2008 for more discussion). Sociolinguists' rich attention to the details of these meanings makes the field well-positioned to expand the investigation into the cognitive realm (Campbell-Kibler, 2010a), and I hope that the dissertation provides a positive example for how to do that with grammatical variation.

Future studies should also seek to develop more controlled stimuli in terms of both grammatical and sociolinguistic noise. I designed my stimuli to meet methodological needs based on the experimental paradigm, such as matching auditorily similar nouns, using similar sentence patterns, and creating sentences semantically plausible for either singulars or plurals. I did not control for some other factors that may affect the use of either a standard or nonstandard variant, such as the animacy or definiteness of the subject noun, the general probability of the noun serving as a subject in the sentence, or the prosody used by individual speakers who recorded the stimuli. Nor did I manipulate my speakers' speech patterns or control for different vocal characteristics, such as pitch range or speech rate. Finally, I did not target speakers who I knew had nonstandard *don't* as part of their native dialects, because I wanted to isolate the effect of the grammatical manipulation. It is possible that social inferences about particular speakers were made other than those manipulated, though the norming results described in Appendix A give no indication that this was the case; if it was, the inferences were likely subtle and possibly participant-specific. Nonetheless, future work could control more finely for these factors.

7.3.3 Testing the model

In terms of an exemplar model like the one I've outlined it above, a major prediction it makes relates to similarity across category members, and how this should play out in priming designs. If it's correct that similarity is a key feature in all language processing, and if social categories are incorporated into the grammar, then "like should activate like" across categories, not just specific constructions. That is, a construction that activates the "nonstandard" category should make it more likely that subsequent input will be interpreted as nonstandard as well, even if it does not bear linguistic resemblances to the primed exemplars, relative to if the standard category had been activated. Thus, one way to test the model would be to test for the perseverance of category activation across perceptual tasks. For example, after priming participants with a NP_{SG}+*don't* sentence, a target sentence could include a different subject-verb agreement variable (such as NP+*was*). If a nonstandard category was activated, the likelihood of choosing NP_{PL}+*was* (instead of NP_{SG}+*was)* should increase relative to priming with a standard sentence. This should also be the case across relevant social categories; activated categories should make more likely that subsequent input will be matched to category members rather than to non-members. These predictions arise from a fundamental tenet of exemplar models that activation spreads between exemplars and categories (Johnson, 2006; Snider, 2008).

Spreading activation could also be explored in terms of the overlap between grammatical and phonetic knowledge. Hay and Bresnan (2006) have shown evidence that sound changes are affected by grammatical factors, and argue that this is evidence that both constructions (phrases) and social details about lexical items are stored as exemplars. If the store of phrases encompasses the store of words (as in the model in Figure 7.1), and if the store of both words and phrases encompasses fine phonetic detail, then activation of a socially-linked phrase presumably would also activate the related socially-linked lexical items, and phonetic details of those lexical items. It would be possible to use phonetic variation as another resource for probing knowledge of grammatical variation. Where phonetic and grammatical patterns covary, exposure to one could activate exemplars of the other, and this would show up in perception as well.

For instance, both phonetic and syntactic features of African American English

are well-established, as are their perceptual correlates (Bender, 2007; Staum Casasanto, 2008). If a listener is primed with a sentence omitting the copula (a variable feature of AAE), then presented with a lexical ambiguity task for [kol], they might be more likely to perceive a subsequent lexical item as containing an underlying deleted /d/ (as "cold" rather than "coal"). And the presence of social information may play into this in various ways. Manipulations like this--where phonetic, grammatical, and social cues are intertwined--will bring an empirical base to theoretical claims for the non-independence of linguistic components and the linguistic system on whole.

7.4 Conclusion

This dissertation has positioned grammatical, sociolinguistic variation as a factor in linguistic perception, to augment our understandings of the role of variability in linguistic competence and performance. In doing so, it has urged consideration of the idea that what is often considered to be independent linguistic processing may in fact be susceptible to tacit knowledge about relations between language and social properties. These experimental findings support the continued development of models of language and language processing that accommodate multifaceted linguistic representations, perceptual biases, and social and linguistic sensitivities.

Work on the perception of variable syntactic patterns remains scant compared to the work on the perception of variable phonological patterns, even when including the rich literature on structural priming. Work that takes social factors into account in comprehending sentences is even rarer. In bringing these concerns together, I hope to have addressed a general lack of engagement between sociolinguistics and psycholinguistics, which I believe have much to offer one another in tackling common theoretical problems. I hope that this dissertation inspires future studies to innovate new methods for investigating how grammatical variation is perceived, how speakers using variable grammatical patterns are perceived, and what this perception implies about the cognitive organization of language.

APPENDIX A

EXPERIMENTAL ITEMS

Item	Sentences	Photo Pair
1		
Prime	In the den, the screen/screens don't shield the lamp.	lamp/mop
Target	Beside the oven, the plate/plates don't crack easily.	plate/plates
Filler	The metal on the table will crack easily.	table/rake
2		
Prime	In the cafe, the chef/chefs don't slice the cake.	cake/snake
Target	In the city, the car/cars don't drive safely.	car/cars
Filler	The cafe has a basket for tips.	basket/bucket
3		
Prime	The customer/customers don't want the brush at that price.	brush/dress
Target	The rabbit/rabbits don't forage loudly in the daytime.	rabbit/rabbits
Filler	That price for the couch is high.	couch/cake
4		
Prime	At the campsite, the mosquito/mosquitoes don't fly into the tent.	tent/net
Target	In the yard, the bird/birds don't sit on the feeder.	bird/birds
Filler	A spoon is missing at the campsite.	spoon/pan
5		
Prime	In the set, the raft/rafts don't come with the pool.	pool/doll
Target	On the table, the orange/oranges don't roll around.	orange/oranges
Filler	Under the house a screw rolls around.	screw/squirrel
6		
Prime	On the desk, the handle/handles don't stay on tight.	desk/dresser
Target	In the skillet, the egg/eggs don't smell very good.	egg/eggs
Filler	The burning of the iron smells strong.	iron/tire
7		
Prime	On the couch, the stain/stains don't respond to the cleaner.	couch/towel
Target	In the picture, the balloon/balloons don't look flattened.	balloon/balloons
Filler	The assistant is taking the dress to the cleaner.	dress/glass

8		
Prime	Beside the skunk, the leaf/leaves don't form a stack.	skunk/squirrel
Target	For being so long, the book/books don't teach much.	book/books
Filler	The glove is above the stack.	glove/scarf
9		
Prime	On the drum, the crease/creases don't look very long.	drum/thumb
Target	On the cardboard, the pen/pens don't write smoothly.	pen/pens
Filler	On the cardboard the marks are from the foot.	foot/wood
10		
Prime	On the popcorn, the spice/spices don't change the flavor.	popcorn/pumpkin
Target	At the zoo, the monkey/monkeys don't have much space.	monkey/monkeys
Filler	The company should change the shoe.	shoe/shirt
11		
Prime	On the shoe, the lace/laces don't stay knotted.	shoe/tie
Target	After feeding, the duck/ducks don't swim much.	duck/ducks
Filler	After feeding, the bat takes a nap.	bat/bear
12		
Prime	On the pan, the oil/oils don't flavor the fish.	pan/bone
Target	After twisting, the fork/forks don't look curved.	fork/forks
Filler	The borders of the shell look curved.	shell/eye
13		
Prime	Near the tire, the log/logs don't look safe.	tire/fire
Target	After eating, the turtle/turtles don't walk very fast.	turtle/turtles
Filler	The roof keeps the collection safe.	roof/rope
14		
Prime	With little length, the panel/panels don't cover the roof.	roof/wood
Target	Without sugar, the apple/apples don't appeal to the child.	apple/apples
Filler	The sunlight will cover the snail.	snail/skunk
15		
Prime	To the bee, the plant/plants don't seem inviting.	bee/bear
Target	On the tall rack, the hat/hats don't touch the floor.	hat/hats
Filler	Someone threw the rose on the floor.	rose/coat
16		
Prime	In the cage, the eagle/eagles don't nibble the feather.	feather/finger
Target	On the median, the tree/trees don't grow very tall.	tree/trees
Filler	In good soil, the corn will grow well.	corn/worm
17		
Prime	The string/strings don't pull the bucket in the sand.	bucket/racket
Target	The flower/flowers don't keep for a week in the heat.	flower/flowers
Filler	The butter will liquify in the heat.	butter/bottle

18		
Prime	In the dark, the light/lights don't reflect off of the glass.	glass/glove
Target	In the bedroom, the box/boxes don't contain much.	box/boxs
Filler	The lock is too big for the bedroom.	lock/mop
19		
Prime	Over time, the battery/batteries don't power the clock.	clock/block
Target	In that room, the chair/chairs don't match the table.	chair/chairs
Filler	Over time, the nail acquires rust.	nail/pool
20		
Prime	Without sharpening, the needle/needles don't pierce the scarf.	scarf/heart
Target	Around midnight, the dog/dogs don't bark too much.	dog/dogs
Filler	An axe is used to pierce the goat.	goat/pig
21		
Prime	On the stove, the burner/burners don't melt the butter.	butter/button
Target	With water, the lemon/lemons don't taste too sour.	lemon/lemons
Filler	Water makes the hair appear messy.	hair/parrot
22		
Prime	The drink/drinks don't empty the bottle at average volume.	bottle/pitcher
Target	The ball/balls don't bounce as high on the concrete.	ball/balls
Filler	The neighbor's sale has a dresser on the concrete.	dresser/faucet
23		
Prime	On the listing, the sellers don't offer the radio.	radio/rake
Target	On the farm, the frog/frogs don't stay in the dirt.	frog/frogs
Filler	On the farm, a saw is always available.	saw/log
24		
Prime	For the lobster, the chemical/chemicals don't affect the redness.	lobster/lipstick
Target	After drinking, the can/cans don't go in the trash.	can/cans
Filler	After several uses, the comb goes in the trash.	comb/bone
25		
Prime	Per the contract, the worker/workers don't paint the fence.	fence/fan
Target	Near the ground, the kite/kites don't fly quickly.	kite/kites
Filler	It takes an hour to paint the clock.	clock/rock
26		
Prime	The coconut/coconuts don't hide the crab on the beach.	crab/bat
Target	The cat/cats don't hunt very often in the hallway.	cat/cats
Filler	The tent functions well on the beach.	tent/truck
27		
Prime	In the drawer, the dish/dishes don't fit tightly.	drawer/door
Target	On carpet, the broom/brooms don't clean very well.	broom/brooms
Filler	The pear will fit in the jar.	pear/bee

28		
Prime	The bump/bumps don't affect the foot on the top.	foot/hook
Target	The cup/cups don't weigh too much without liquid.	cup/cups
Filler	On the top, the branch has a curve.	branch/bridge
29		
Prime	The chimp/chimps don't climb the rock with the trainer.	rock/rope
Target	The bowl/bowls don't get used often at lunchtime.	bowl/bowls
Filler	The bow is used often in the ceremony.	bow/ring
30		
Prime	Beside the house, the donkey/donkeys don't appear wide.	house/horse
Target	In the fridge, the banana/bananas don't ripen quickly.	banana/bananas
Filler	The fibers of the bread appear thick.	bread/beard
31		
Prime	The visitor/visitors don't seek the map in the museum.	map/mask
Target	The candle/candles don't burn long through the night.	candle/candles
Filler	The exhibit displays the doll at the museum.	doll/owl
32		
Prime	The knife/knives don't cut the onion without the board.	onion/mushroom
Target	The cookie/cookies don't appear crispy on the bottom.	cookie/cookies
Filler	The shovel is jagged at the bottom.	shovel/towel
33		
Prime	There's a cracker/crackers by the parrot in the corner.	parrot/carrot
Target	There's a frog/frogs jumping up and down in the pond.	frog/frogs
Filler	The racket sank in the pond.	racket/helmet
34		
Prime	Under the snail, there's a mark/marks from the rust.	snail/nail
Target	In the window, there's a hat/hats being advertised.	hat/hats
Filler	The camera is cheaper than advertised.	camera/lamp
35		
Prime	There's a creature/creatures watching the moon in the story.	moon/spoon
Target	There's a car/cars parking illegally on the street.	car/cars
Filler	The kid wants the raccoon in the story.	raccoon/popcorn
36		
Prime	In the case, there's an ant/ants inside the bell.	bell/shell
Target	On the table, there's a bowl/bowls for cereal.	bowl/bowls
Filler	In the case, the pillow is small.	pillow/drawer
37		
Prime	On the hand, there's an injury/injuries from the iron.	iron/lion
Target	In the bush, there's a rabbit/rabbits eating grass.	rabbit/rabbits
Filler	The cannon sticks out in the grass.	cannon/carrot

38		
Prime	In the morning, there's a gardener/gardeners fixing the rose.	rose/hose
Target	In the basement, there's a box/boxes for packing.	box/boxs
Filler	In the basement, the drum is rarely used.	drum/desk
39		
Prime	After the flooding, there's a drip/drips from the faucet.	faucet/helmet
Target	In the street, there's a cat/cats playing around.	cat/cats
Filler	The cousins like playing around with the horse.	horse/door
40		
Prime	In the display, there's a sticker/stickers on the pillow.	pillow/window
Target	In the door, there's a lemon/lemons for cooking.	lemon/lemons
Filler	In the display, the lipstick is pink.	lipstick/backpack
41		
Prime	There's a pile/piles awaiting the raccoon in the back.	raccoon/vaccuum
Target	There's an egg/eggs cooking slowly in the pan.	egg/eggs
Filler	The bus is gold on the back.	bus/brush
42		
Prime	In the yard, there's a rake/rakes against the branch.	branch/bench
Target	Near the house, there's a dog/dogs running wildly.	dog/dogs
Filler	The hose is stored in the yard.	hose/boat
43		
Prime	On the ladder, there's a label/labels for the brand.	ladder/letter
Target	In the kitchen, there's a broom/brooms for cleaning.	broom/brooms
Filler	The kitchen has at least one mushroom.	mushroom/vaccuum
44		
Prime	On the pig, there's a wound/wounds from the accident.	pig/leg
Target	Outside the school, there's a tree/trees growing tall.	tree/trees
Filler	Outside the school is a picture of a house.	house/mask
45		
Prime	In the backpack, there's a notebook/notebooks from the class.	backpack/basket
Target	In the fridge, there's an orange/oranges ready to juice.	orange/oranges
Filler	The juice must be kept away from the rug.	rug/bed
46		
Prime	On the stone, there's a moth/moths staring at the bug.	bug/sun
Target	In the creek, there's a turtle/turtles waiting for food.	turtle/turtles
Filler	The patient is waiting for surgery of the heart.	heart/arm
47		
Prime	There's a sign/signs facing the truck on the road.	truck/bus
Target	There's a monkey/monkeys sleeping a lot across the fence.	monkey/monkeys
Filler	The pumpkin was found on the road.	pumpkin/button

48		
Prime	There's a wig/wigs by the comb at the salon.	comb/bow
Target	There's a ball/balls rolling fast on the hill.	ball/balls
Filler	The block will not roll down the hill.	block/hook
49		
Prime	For the project, there's a tool/tools next to the saw.	saw/screw
Target	On the desk, there's a pen/pens for writing.	pen/pens
Filler	For the project, the window was removed.	window/radio
50		
Prime	There's a fly/flies bothering the owl near the barn.	owl/cow
Target	There's a chair/chairs for the summer on the porch.	chair/chairs
Filler	Near the barn, the farmer sees the bag.	bag/bug
51		
Prime	From the rain, there's a drop/drops on the arm.	arm/worm
Target	In the cupboard, there's a plate/plates for the banquet.	plate/plates
Filler	The feather is the wrong color for the banquet.	feather/pitcher
52		
Prime	On the boot, there's a buckle/buckles shining brightly.	boot/belt
Target	In the vase, there's a flower/flowers from the garden.	flower/flowers
Filler	The covering on the lobster is shining.	lobster/ladder
53		
Prime	In the garage, there's a hammer/hammers by the shovel.	table/shovel
Target	On the counter, there's a banana/banana ripening fast.	banana/bananas
Filler	In the garage the net stays folded.	net/tie
54		
Prime	Around the ring, there's a napkin/napkins collecting grease.	ring/corn
Target	On the railing, there's a bird/birds singing loudly.	bird/birds
Filler	The belt is idly collecting grease.	belt/bell
55		
Prime	Beyond the lock, there's a guard/guards at the gate.	lock/smoke
Target	Up in the air, there's a balloon/balloons flying high.	balloon/balloons
Filler	At the gate, the bench is made of wood.	bench/fence
56		
Prime	There's a seed/seeds in the pear in the picture.	pear/hair
Target	There's a cup/cups with insulation in the washer.	cup/cups
Filler	The flag was accidentally in the washer.	flag/map
57		
Prime	In the stall, there's a weed/weeds under the goat.	goat/boat
Target	In the cart, there's a can/cans for recycling.	can/cans
Filler	In the stall, the crab was a surprise.	crab/cow

58		
Prime	Around the eye, there's a scratch/scratches from the hamster.	eye/ear
Target	In the top drawer, there's a fork/forks for the pasta.	fork/forks
Filler	The hamster runs from the fan.	fan/sun
59		
Prime	In the bed, there's a flea/fleas biting the skin.	bed/beard
Target	On the dresser, there's a candle/candles burning slowly.	candle/candles
Filler	Next to the ear, the skin is hot.	ear/fire
60		
Prime	Under the rug, there's a pebble/pebbles from the driveway.	rug/log
Target	At the park, there's a kite/kites floating away.	kite/kites
Filler	A wild lion was found at the park.	lion/onion
61		
Prime	On the shirt, there's a thread/threads hanging off the bottom.	shirt/coat
Target	In the office, there's a book/books from the library.	book/books
Filler	In the office, the sight of the boot is rare.	boot/moon
62		
Prime	On the field, there's a sound/sounds from the camera.	camera/cannon
Target	On top of the tin, there's a cookie/cookies cooling off.	cookie/cookies
Filler	On the field, the player injured his leg.	leg/thumb
63		
Prime	On the flag, there's a line/lines in the pattern.	flag/bag
Target	In the crisper, there's an apple/apples looking fresh.	apple/apples
Filler	The clerk is looking at his letter.	letter/finger
64		
Prime	There's a hole/holes in the bread by design.	bread/bridge
Target	There's a duck/ducks walking away on the grass.	duck/ducks
Filler	The hikers are walking away from the snake.	snake/smoke

APPENDIX B
MATERIALS NORMS COLLECTION

Design

The norming study for the experimental materials consisted of four parts, which all participants completed in single sessions. First, speaker voices were judged on semantic differential scales on five dimensions: Gender, Education, Age, Accentedness, and Formality. This was to see whether any of the 16 voices carried unwanted social cues by voice quality alone. Participants also checked boxes indicating what region they believed the speaker to be from. The dependent variables analyzed for speaker voices were the ratings of each speaker along these five dimensions.

Second was the picture naming section. Participants were shown half of the total 192 photographs used in the experiment, and were to write down the name of the object or objects. The mean accuracy across participants for naming the picture as intended was the measure of interest.

Third, all prime, target, and filler sentences were rated using a 7-point Likert scale from Perfectly Acceptable (1) to Completely Unacceptable (7). These ratings were submitted to ANOVA tests with construction type (*don't* and *there's*), sentence type (prime, target, filler), and agreement form (standard and nonstandard) as independent variables.

Fourth, participants completed a demographic questionnaire that asked for their ethnoracial identification, gender, region of origin, and parents' education levels. The demographic information was collected only in case it was needed to shed light on the other results; I do not include the demographic variables as independent variables in any of the analyses of the norming results.

Participants

50 participants participated for 1 hour of experimental course participation credit. Two lists were used. Sentences and photographs were split between two lists, and all 16 voices were included in both lists. Fifty participants rated all voices, whereas 25 participants gave ratings and namings for each sentence and photograph. One subject was removed from the sentence analysis for failing to complete many of the ratings, and three subjects were removed from the photo naming analysis for having individual accuracy rates under 60%.

Procedure

Participants participated in small groups of between one and five participants, sitting around a small table in a computer classroom. Each subject was given a paper-based experimental packet in which to record their responses in four sections: voice rating, photo naming, sentence ratings, and a demographic questionnaire. Photos were displayed on a projector screen, voices were played over audio speakers, and sentences and the demographic questionnaire were contained in the packet itself.

Subjects first heard the voices altogether as a group, then were shown the pictures, also as a group. For the voice ratings, participants were told to listen to each voice and immediately make their ratings based on their first impressions of the speaker. All 16 speakers' voices were played speaking the same two filler sentences ("The block will not roll down the hill" and "The hikers are walking away from the snake"), and participants were given one practice voice before the 16 critical voices began. After each voice, approximately 30 seconds lapsed for participants to enter their ratings.

For the photo naming, participants were told to write the first word that came to mind that accurately named the object or objects in the photo (shown on the projector screen). They were given instructions on the screen, and a practice picture ("computer") before the 96 critical photos began. Photos were presented using a PowerPoint slideshow with eight seconds of time for each photograph.

After a short break, participants were told to continue to the sentence ratings and complete them at their own pace, followed by the demographic questionnaire. For the

sentences, participants were instructed to focus on the grammatical form in determining acceptability, not the meaning. Once a participant completed the final two portions, they left the room and the experimenter gave them a debriefing form. Altogether, the session took most subjects around 45 minutes.

Results: Voices

As a whole, male speakers were rated close to the scale end of "definitely male," whereas female speakers were rated close to "definitely female." An ANOVA test confirms that the difference in means is significant by gender ($F(1,14) = 4082.7$, $p < .001$). This confirmed that these voices would be appropriate to use to vocally introduce gender as social information into the experimental paradigm (as was done in Experiments 2 and 3, discussed in Chapter 4). Male speakers overall were also rated older than females ($F(1,14) = 9.28$, $p < .01$). Table B.1 gives the means for gender and youth ratings for all speakers (F corresponds to female speakers; M to male). Neither education, formality, nor accentedness were significantly different by gender. While ratings on nearly all measures significantly varied by speaker, no single speaker had extreme ratings in terms of social markedness.

Table B.1
Speaker Means for Gender Ratings (1 = "definitely female"; 6 = "definitely male") and Youth Ratings (1 = "young"; 6 = "old")

Speaker	Gender Mean	Youth Mean
F1	1.54	2.60
F2	1.04	1.80
F3	1.28	2.56
F4	1.28	1.98
F5	1.09	2.10
F6	1.18	2.04
F7	1.30	2.60
F8	1.18	2.38
M1	5.96	3.38
M2	5.90	2.76
M3	5.62	2.00
M4	5.88	2.56
M5	5.88	2.88
M6	5.90	3.00
M7	5.94	3.24
M8	5.66	2.81

Results: Noun photo naming

The goal of norming the photos was to get a sense of how readily named each of the photos was for the noun it was chosen to represent, and especially to see whether singular and plural versions of the photos corresponded to participants naming them with singular and plural nouns. The main concerns were that a) target photos saliently represented a singular versus plural noun, and to a lesser extent that b) target photos saliently represented the intended object noun. The first is more of a concern for the experimental design, since it relies on people's choice between a singular and plural-representing photo as representing a choice between a singular and plural noun.

To code the non-target (filler and prime) photos, participants' responses were given a "1" when their response matched the target noun represented by the photograph. Because of the primary concern of number marking, for plural target photos, any plural

response was coded as accurate (most times, an alternative plural response also bore semantic closeness to the intended noun, such as *bluebirds* for *birds*; *broomsticks* for *brooms*). The percentage of accurate responses was then calculated for each photo. Figure B.1 shows the distribution of proportional accuracy for non-target photos, singular target photos, and plural target photos. As can be seen, plural target photos have the lowest overall accuracy rates. The mean accuracy rate for non-target photos is .91 (SD=.12), singular target photos is .93 (SD=.12), and plural target photos is .81 (SD=.15).

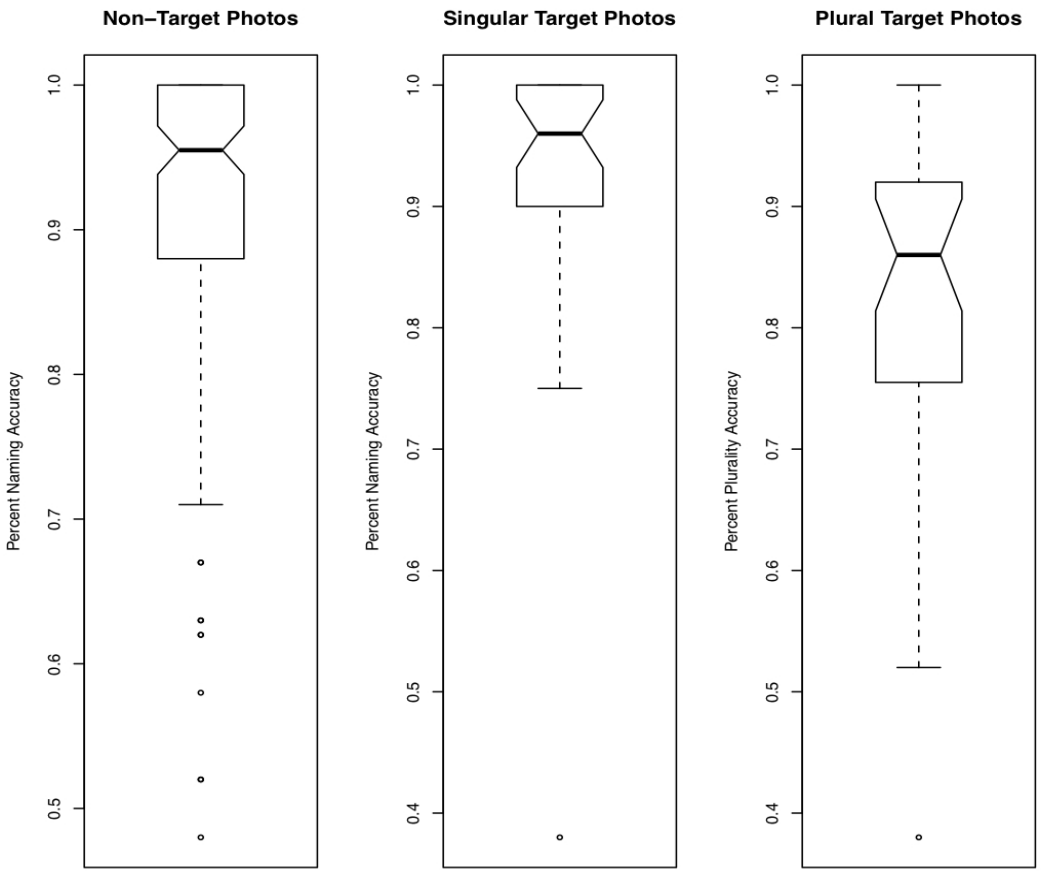


Figure B.1. Proportion naming accuracy across photographs (notched lines represent the median across items; boxes represent the interquartile range; dotted lines extend to 1.5 the interquartile range).

In looking at individual subjects' photo naming, it is clear that several subjects frequently did not use plural nouns when naming the plural photos at all. Thus, there seems to have been some conceptual barrier to writing plural nouns--perhaps because subjects misunderstood the instructions to be simply "the first word that comes to mind" rather than the first word that names the object(s). I would suggest that this has more to do with either instructions (though the instructions to participants were standardized across subjects), or more likely with subject eccentricity, than with the photos being poor representatives of plurals. Overall, the photographs did seem to be good representations of the intended nouns, though because of the issue with plurals for some subjects (who were all in the same testing session), the ratings appear somewhat imbalanced for target nouns.

Results: Sentence ratings

Nonstandard sentences were rated overall as unacceptable, while standard sentences were more rated overall as acceptable, as shown in the histograms in Figure B.2. Repeated measures ANOVAs reveal that the difference between standard and nonstandard structures is significant for the prime and target sentences as a group ($F1(1,48) = 178.89$, $p < .001$; $F2(1,127) = 1986$), $p < .001$). The histograms in Figure B.3 show that overall, the nonstandard versions of the prime and target sentences were rated as less acceptable than the standard versions, and the fillers were rated as predominantly acceptable. Additionally, nonstandard sentences including *don't* were more frequently rated as unacceptable than nonstandard sentences with *there's* ($F1(1,48) = 75.25$, $p<.001$; $F2(1,62) = 282.76$, $p<.001$). This is shown in the histograms of Figure B.3.

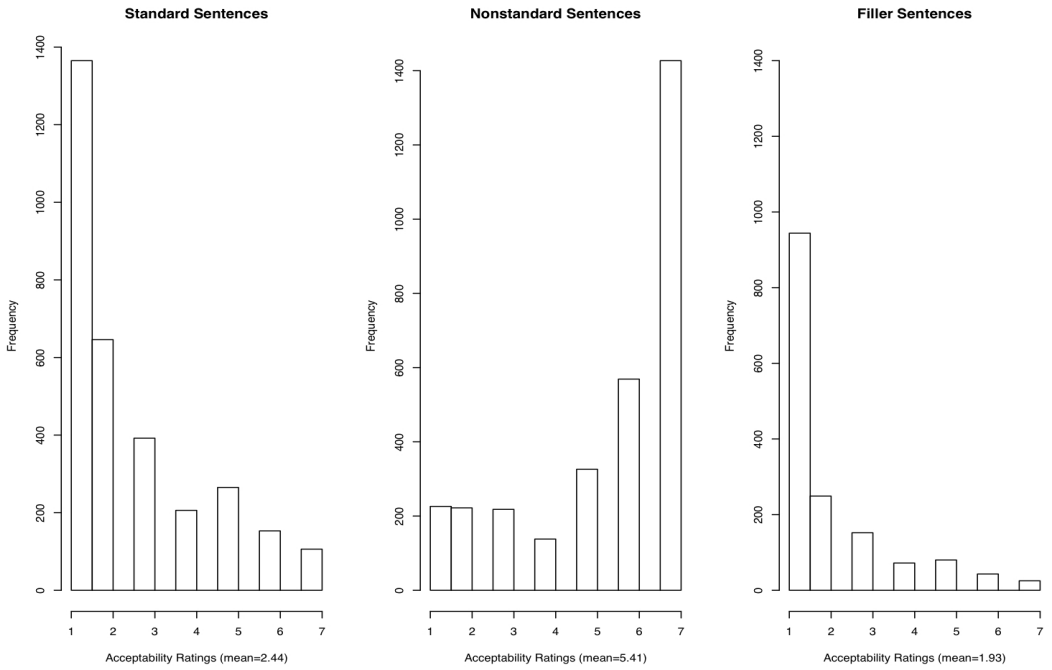


Figure B.2. Histograms of sentence ratings for standard, nonstandard, and filler sentences (1 = "perfectly acceptable"; 7 = "completely unacceptable").

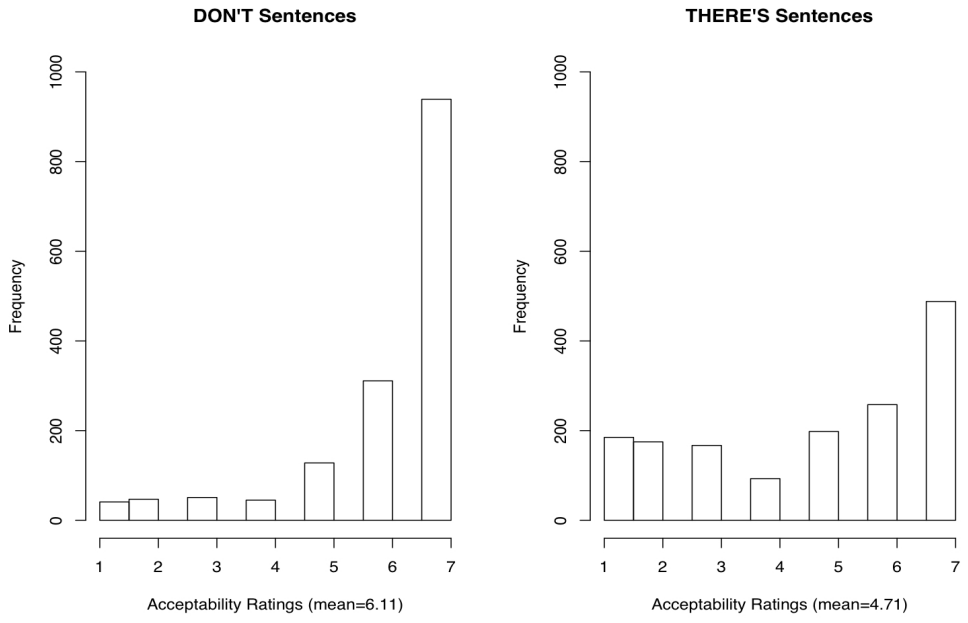


Figure B.3. Histograms of sentence ratings for nonstandard sentences only, divided by construction.

There are two important notes from the sentence norming results. First, nonstandard sentences are rated as less acceptable than standard sentences, indicating that the manipulation of agreement form on its own alters acceptability of these sentences, and that these sentences successfully introduce the intended perception of a difference between standard and nonstandard constructions. Further, standard sentences are rated within the range of acceptability (mean = 2.44, with "1" being the most acceptable rating), while nonstandard sentences are rated within the range of unacceptable (mean = 5.41, with "7" being the least acceptable rating). Second, for nonstandard sentences, *there's* sentences are rated as much more acceptable than *don't* sentences. Nonstandard *there's* is considered more acceptable than *don't* by the subject population; this is consistent with nonstandard *don't* as a variant of higher social stigma than nonstandard *there's,* as reported in the literature (discussed in Chapter 2).

APPENDIX C
SOCIAL STATUS STIMULI NORMS COLLECTION

Before proceeding with Experiments 5 and 6, visual stimuli signaling status difference were created and norms of these photos were collected, in order to facilitate stimuli choice and understand how they might affect participants' perceptions of the talkers in the experiment. Ratings of the people represented in the photos were collected from the subject population, whose impressions were gathered on six dimensions.

Design

Participants rated each photograph on the six dimensions on a five-point Likert scale. The low and high ends of the scale corresponded to different valences for different dimensions, so that "5" was not always the positive end of the scale, and "1" was not always the negative end of the scale. By-subjects and by-items ANOVA analyses were run on each dimension, with the numerical rating as the dependent variable and intended social status as the independent variable. That is, pictures were already divided into high- and low-status groups, so this binary factor was used as the independent variable in testing for the effect of the manipulation.

The concern for norming these photos was whether the photos would be sufficient to introduce status differences into the experimental context. Thus, I tested for the overall ratings of the high v. low status photographs. I also tested for whether some dimensions were more strongly indicated by the photos than others. I predicted that class, success, education, cleanliness, and speech would show strong differences between conditions, with high-status guises signaling higher class, success, and education, higher cleanliness ratings, and higher ratings for being well-spoken. The one element that I had an alternate prediction for was that on the dimension of friendliness, the low-status guise might be

rated more friendly than the high-status guise.

Materials

A set of visual photographic stimuli were created to signal class or status differences among talkers, building off of the work of Hay et al. (2006). Nine female models were each photographed in two different guises, one high-status and one low-status. Models were compensated for their time, and a semi-professional photographer shot and edited the photos.

For the high-status guise, the models wore button-up collared blouses and/or a blazer or sport jacket, and most were photographed in front of large houses in one of Ann Arbor's many upper-middle or upper-class neighborhoods. For the low-status guise, the models wore plain t-shirts, henley work shirts, or sweatshirts, and were photographed in settings such as apartment complexes mobile homes, trailers, or garages, also around Ann Arbor. One model was photographed in front of commercial spaces: an upscale clothing boutique in downtown Ann Arbor for the high-status guise, and a dollar store for the low-status guise. Each photograph was taken so that the model's torso was visible (to show her shirt/jacket), and behind her was the status-indicating context. One photograph was chosen from each guise for each of the nine models, creating a set of 18 status photos.

Procedure

Ratings were collected using E-prime 2.0. The 18 photographs were presented in two blocks (randomly ordered), each block consisting of either the high- or low-status guise of each model (so that each model was only seen once in each block). Within blocks, the photographs were randomly presented by the software. Each photograph first appeared in the center of the screen. Then, the photograph reduced in size and moved to the left side of the screen, and a series of six ratings questions appeared on the right side of the screen. Each rating question was on a likert scale from 1 to 5, and participants used the computer keyboard to enter their responses. The ratings questions were presented in a random order following each photograph; however, the same scales were used for all photographs and all participants.

After completing a consent form, participants were led to a testing room, where they were seated in front of the computer. The session lasted between 8 and 12 minutes for most participants.

Participants

28 undergraduates participated for course credit.

Results

Before analysis all dimensions were converted to the same valence, so that "1" corresponds to the expected values for the high-status photos, while "5" corresponds to the expected values for the low-status photos.

Participant ratings confirm the validity of perceived differences in status between the two guises, on all dimensions except for friendliness. The mean ratings for these dimensions are presented below, along with the subjects (F1) and items (F2) F-values and p-values from the ANOVA analyses. All dimensions show significant differences by status, with the exception of friendliness. Table C.1 shows these means.

Table C.1
High-status and Low-status Means on Status Dimensions

Dimension	**High-status mean**	**Low-status mean**	**F1**	**F2**
Class	2.13	3.75	(1,27) = 192.58***	(1,8) = 72.332***
Education	2.2	3.25	(1,27) = 50.63***	(1,8) = 49.91***
Success	2.28	3.59	(1,27) = 89.40***	(1,8) = 68.92***
Friendliness	2.9	2.96	(1,27) = 96.59***	(1,8) = 86.14***
Cleanliness	1.78	2.93	(1,27) = .42	(1,8) = .23
Speech	2.06	3.08	(1,27) = 67.13***	(1,8) = 122.77***

Discussion

The manipulation of guise for high-status and low-status was successful, especially since there is a correlation with speech. Participants perceived the low-status

guises as less educated, belonging to a lower social class, less successful, less clean, and less well-spoken than the low-status counterparts. Thus, the photographs created are sufficient indicators of social status.

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