Chapter 5

Previous theoretical approaches to non-categorical constraints

5.1 Introduction

The purpose of this chapter is to review and critique previous approaches to accounting for non-categorical grammatical constraints on variation. Three such approaches will be considered: The variable rule approach of Labov and others (§5.2), the Optimality Theoretic approaches of Reynolds and Nagy (1994), Anttila (1997) and Boersma and Hayes (1999) (§5.3), and the functionalist approach of Kiparsky (1972, 1988) (§5.4). This first section provides some background for the discussion, in three parts: §5.1.1 discusses the problems that sociolinguistic variation raises for theories of grammar, from Weinreich et al.'s (1968) challenge to the idea of grammar as a homogeneous system to the problem of non-categorical grammatical constraints, and finally the association of social value with variation. This last issue is taken up in more detail in §5.1.2. §5.1.3 outlines the data to be accounted for by any analysis of socially meaningful, grammatically constrained variation against which the three previous accounts considered will be judged.

5.1.1 Variation and grammar

According to Weinreich et al. (1968), the field of linguistics, from the work of Hermann Paul in the late 1800s through the generative phonology of the 1960s, had been mistakenly searching for homogeneity in language, on the basis of the misguided assumption that only homogeneous systems can be structured. They argue that this misconception was behind Saussure's paradox: how do slow gradual changes in language use create (new) homogeneous language systems? If language systems are not homogeneous, but rather variable, the paradox dissipates. Another example of the effect that the assumption of homogeneity had on linguistic theory is Bloch's now infamous definition of *idiolect*:

> The totality of the possible utterances of one speaker at one time in using a language to interact with one other speaker is an *idiolect*. ... The phrase 'with one other speaker' is intended to exclude the possibility that an idiolect might embrace more than one STYLE of speaking: it is at least unlikely that a given speaker will use two or more different styles in addressing a single person. (Bloch 1948:7, §1.7)

In trying to define variation out of the purview of linguistics, Bloch arrived at an object of study that was too narrow—precluding, for example, a theory of how idiolects relate to each other, within or across speakers—and, at the same time, not narrow enough, for individual speakers can style-shift even while talking to an individual hearer.

Fries and Pike (1949) take the first step away from the assumption of homogeneity, stating that "Socially pertinent differences of style cannot safely be ignored; they must be handled in some way in our phonemic assumptions and procedures" (p. 29). Fries and Pike's proposal is to allow for coexistent phonemic systems when some phenomenon doesn't fit the general phonological pattern abstracted from a language. The case they explore in most detail is the problem of new phonemes or contrasts brought into a language by loanwords. However, they also suggest that the same method would do in the case of stylistic differences in the speech of one speaker and in the case of "a conflict in the system of sounds of a single speaker" during a time of change in the phonemic system of a language.

However, the postulation of coexistent phonemic systems can also be seen as a last-ditch effort to preserve the homogeneity of linguistic systems in the face of variable data that Fries and Pike realized require honest treatment. Weinreich et al. (1968) propose instead to abandon the assumption that structure is only to be found in homogeneity, and argue that a realistic description of any synchronic stage of a language as well as an empirical theory of language change are only possible if we recognize that language can be (and is) both heterogeneous and structured.

Weinreich et al. establish that phonological variation is structured in two respects: at the level of the linguistic system and at the level of the speech community. Phonological variation is structured at the level of the linguistic system in that variation in one part of the grammar is associated with variation in another. For example, Weinreich et al. find that the (variable) raising and backing of (ah) in *father* and raising of (oh) in *coffee* in New York are related: the more a speaker or group of speakers does one, the more they do the other. This fact has a structural explanation: if (ah) were raised and backed while (oh) stayed in place, the distribution of the phonemes would overlap and distinctions would potentially be lost.[1]

Phonological variation is structured at the level of the speech community because the hierarchical organization of speech styles parallels the (hierarchical) socioeconomic organization of the community. This too is true in two respects: First, in Labov's (1966) study of a number of variables in New York City, he found that the higher a speaker's socio-economic status, the lower their use of stigmatized variants. Second, in the same study, Labov also found that speakers used more stigmatized variants in more casual speech and fewer stigmatized variants in more formal, or careful, speech, reproducing the community's hierarchy of speech styles within their own repertoire, albeit on a smaller scale. Although this interpretation of the relationship between variation, the social structure of a community, and style has been challenged (see §5.1.2), Weinreich et al.'s (1968) main point still stands: variation

[1]Bender (1998) provides a syntactic example: Avoiding the use of the epicene pronoun *he* when the gender of the referent is unknown leads to a reduced use of singular definite generic NPs with human reference (e.g., *the poet* in *The poet chooses his words with care.*) in the texts studied. Here the explanation concerns linguistic structure in a somewhat different sense: singular definite generic NPs introduce precisely the kind of referent that requires an epicene pronoun.

is not merely random fluctuations to be assumed away, but instead indicative of the interface between language and social structure.

The other important point established by Weinreich et al. is that variation cannot be eliminated by narrowing the object of study down to one style of one speaker, etc. Variation is inherent to the language of communities and to the language of individuals. What differentiates styles (within or across speakers) is not the presence or absence of given variants, but the relative frequency of occurrence.

The preceding arguments all concern phonology, but what of syntax? The first question is whether sociolinguistic variation exists at the level of syntax in the same way that it exists in phonology. This, in turn, breaks down into two questions: Is there such a thing as a syntactic variable? And, if so, do syntactic variables interact with social structure in the same way phonological variables do?

A variable, standardly, is a choice-point in the linguistic system that allows for two (or more) ways of saying the same thing. The variable (ah) mentioned above groups together multiple pronunciations of the first vowel in *father*. The choice of which variant is pronounced has no (denotational) semantic effect. As Lavandera (1978) points out, this cannot be straightforwardly extended to syntax, where typically a choice-point in syntax involves a choice between different morphemes. Since morphemes, unlike phones, are typically meaningful, many choice-points in syntax do not provide multiple ways of saying the same thing. Rather, one is faced with multiple utterance-types that do not mean exactly the same thing, although they may be semantically related.

However, not all morphemes necessarily carry referential meaning. Function words and inflectional affixes are standardly analyzed as semantically vacuous formal elements. So variation concerning such elements should in fact amount to multiple ways of saying the same thing. Examples include variable negative concord (1), variable subject-verb agreement (2),[2] and, to some extent, variable copula absence. (I hedge there because the copula does carry tense information, although, as discussed in Chapter 3, the alternative construction may carry the same tense information.)

[2]From Guy 1996:238.

(1) a. I didn't see anything.
b. I didn't see nothing.

(2) Popular Brazilian Portuguese:

a. Eles	fizeram	uma	bagunça
They	made.pl	a	mess
b. Eles	fez	uma	bagunça
They	made.sg	a	mess

Likewise, variables having to do with the order of constituents are potentially analyzable as different ways of saying the same thing. One example is the order of the particle and the complement in English verb-particle constructions:

(3) a. I took the garbage out.
b. I took out the garbage.

Alongside such variables are other choice-points that cannot be analyzed as different ways of saying the same thing. For instance, an agentless passive sentence differs from its active counterpart in leaving the agent unexpressed (4).

(4) a. Eight talkers were recruited to record the sentences.
b. I recruited eight talkers to record the sentences.

Although it is often clear from context who the agent is, there remains a clear semantic difference.[3] Sentences such as (4a) are characteristic of English scientific discourse (e.g., in descriptions of experiments). One possible explanation for this is that, by backgrounding the agent, they make it sound like the experiment was carried out perfectly, with no human agent to potentially do things wrong. As reproduceability of results is central to modern scientific practice, backgrounding the agent makes writing sound scientific.

[3]Weiner and Labov (1983), in their variationist study of the passive, contrast agentless passives with active sentences with subjects like generic *they* that give little or no information on the identity of the agent. In this case, the active and the agentless passive are closer to being two different ways of saying the same thing. However, the fact remains that the choice between active and passive is available even when they are patently not two different ways of saying the same thing.

Lavandera (1978) argues that sociolinguistic variables were originally restricted to alternate ways of saying the same thing, not for any sound theoretical reason, but out of fear that finding that different groups of people say different things would provide evidence that could be used to support prejudices against one or more of the groups studied. She suggests that while the intentions behind this fear are good ones, the overall social purpose would be better served by practicing more theoretically sound science and remaining vigilant for any abuses of the results. On her view, the notion of sociolinguistic variable should be applied to any set of linguistic forms provided that (a) the forms share some kind of functional equivalence,[4] and (b) the relative frequencies of the forms (and not just the forms themselves) carry some social import.

The question of whether the social value of a variable is in the individual instances or in the pattern will be taken up again in Section 5.1.3 below. For now, I would like to ask if any syntactic variables vary with social factors in the same way that phonological variables do. Although syntactic variables have not been as well studied as phonological variables, some have been shown to correlate with social factors. Cedergren and Sankoff (1974) found that *que*-deletion in Montreal French correlates with social class. Eckert (2000) found that rates of negative concord among the Detroit adolescents in her study correlated with various socioeconomic facts about the speakers' parents (most notably, the mother's level of education) and with social categories within the high school. In fact, Chambers (1995:51) claims that "[g]rammatical variables tend to mark social stratification more sharply [than phonological variables]."

However, despite claims to the contrary by Mufwene (1992), the mere fact of variation does not pose the same problems for modern theories of syntax as it did for structuralist phonology. Mufwene (1992:234) argues that there is in syntactic theory a "mistaken working assumption that grammars are monolithic institutions with rules that are consistent with each other," citing AAVE copula absence as one example. He proposes that copulaless sentences should be analyzed in terms of an alternative rewrite rule for the category S:

(5) S $\longrightarrow$ NP PredP

[4] Lavandera leaves the precise definition of this notion of functional equivalence to later work.

As shown in Chapter 3, a sign-based view of grammar does not require that there be only one way to build an S.[5] In fact, the existence of multiple rewrite rules for the same category is fundamental to a construction-based approach. Even in GB, where there appears to be general assumption that the phrase-structural backbone is the same across languages, or in Minimalist syntax where different derivations compete with each other for grammaticality, variation in syntax can be accommodated by deriving the different variants from underlying forms with different (possibly phonologically null) lexical items. The one exception to this kind of compatibility with intraspeaker variation is OT syntax, to the extent that it posits semantic structures as underlying (or input) forms. However, as discussed in §5.3, the classical OT model has been extended in various ways to accommodate variation in phonology, and all of these extension can be applied to OT syntax.

However, while optionality does not pose any problem, probabilistic or frequentistic application of rules does. Variable rules (see §5.2 below) were proposed by Labov (1969) and Cedergren and Sankoff (1974) as an extension of generative grammar. In particular, variable rules were presented as a more precise version of optional rules. Optional rules applied some of the time, while variable rules applied some specific percentage of the time. Generative grammarians (including Butters 1972 and Kay and McDaniel 1979) responded by pointing out that this was a misinterpretation of generative grammar: a generative grammar produces sentence TYPES, and an optional rule adds a sentence type to the set of sentences types generated by the grammar. Frequency of occurence is a matter of TOKENS. To adorn generative rules with probabilities to produce such frequencies of occurrence is to misconstrue them as rules of performance—i.e., rules that people apply when producing a sentence to say. Thus the general treatment by generative grammarians of frequentistic data is to rule such effects as outside the grammar proper, i.e., not a matter of competence but of performance.

While some frequencies are strictly epiphenomenal, (cf. Chomsky's observation about the relative frequencies of *I live in New York* and *I live in Dayton, Ohio*[6])

[5] Although this does not turn out to be the best analysis of copula absence in AAVE.

[6] From a lecture to the 1964 LSA summer institute, cited in Halliday 1991:30.

this is not so clearly the case for the frequentistic effects in sociolinguistic variation. In particular, there is the problem of non-categorical grammatical constraints on variation.[7] As discussed in the previous chapter, the rate of copula absence in AAVE is sensitive to the part of speech of the predicate. While it is possible that these effects are a matter of (universal, functional) performance factors (see §5.4), the results of the experiment reported in Chapter 4 indicate that they are also a matter of linguistic knowledge. I will suggest in Chapter 6 that they may also be a matter of linguistic competence. Here what is relevant is that if any frequentistic or probabilistic effects are found to be a part of linguistic competence, such a result would be incompatible with mainstream generative grammar.

The final problem that sociolinguistic variation raises for mainstream, modern theories of syntax is its intimate connection with social meaning. In mainstream theories (and here I mean GB and Minimalism), linguistic competence is supposed to be relegated to a separate module of the mind, and syntax to a separate module within linguistic competence. If syntactic variation can carry social meaning, then there must be some way for grammar and social meaning to interface. Further, the results of the experiment reported in Chapter 4 show that social meaning is not simply a property of individual variants, but is also intertwined with the syntactic context of the variants. This renders any theory in which social meaning is 'read off' the syntax outside the grammar less plausible, as such a theory would have to reproduce non-trivial syntactic structure outside the grammar. Section 5.1.3 outlines the data a theory of non-categorical constraints must account for (whether it's a theory of competence or a theory of performance). First, however, the next subsection discusses social meaning and the social value of linguistic variation.

[7] Cf. Cedergren and Sankoff 1974, 333:

> The notion of optionality [of rules of grammar–EB] fails to capture the nature of the systematic variation which exists even on the level of the grammar of a single individual. It does not permit the incorporation of relativity or covariation between the presence of certain features in the linguistic environment of a rule and the frequency of operation of the rule.

5.1.2 Social meaning

Weinreich et al. (1968) find the connection between diachronic and synchronic perspectives on language in a model of language that is heterogeneous and intimately connected with the structure of society. They write:

> [The empirical studies reviewed] have confirmed the model of an orderly heterogeneous system in which the choice between linguistic alternants carries out social and stylistic functions, a system which changes with accompanying changes in social structure. (1968:162)

Labov (1963) fleshes this out with a particular example: centralization of the nucleus of the diphthongs (ay) and (aw) on Martha's Vineyard. In that community at that time, high rates of centralization of the nuclei (traditional Vineyard pronunciation) were associated with resistance to the change to a tourism-based economy. Low rates of centralization (i.e., approximation to the mainland standard) were associated with enthusiasm for the economic changes. Further,

> Centralized speech forms are then a part of the dramatized island character which the Chilmarker assumes, in which he imitates a similar but weaker tendency in the older generation.

Labov speaks of this in terms of younger speakers identifying with some older speakers as a reference group and then hypercorrecting their speech in an attempt to be like the reference group. In current terms (e.g., those of Eckert and McConnell-Ginet 1992), centralization of the nucleus of (ay) and (aw) is one symbolic resource used in the on-going construction of the "dramatized island character", that is, the old Yankee fisherman to whom (according to one local ideology) Martha's Vineyard "rightly" belongs.

As variationist studies expanded to include larger samples of larger speech communities, the treatment of social factors was simplified to seeing them as simply a matter of social "address": the use of certain variants or certain patterns of use are markers of certain pre-established and global groups (such as "women", "lower middle class", "African-American").[8] On this view, a change travels through the social

[8] Compare the old Yankee fisherman character. Not only was this particular social category local to Martha's Vineyard, it also was constituted by a range of particular activities, attitudes and ways

structure and is reflected in the speech of people from different social categories according to whether the change has reached them. When they are not paying much attention, people speak their vernacular: the system they learned growing up, the one appropriate to their social address. When paying attention, they may move away from that vernacular, typically correcting their speech towards some prestige variety. This notion of vernacular is implicit in Labov's repeated claim that the vernacular is the most systematic speech style.

The social-address view of variation has been challenged on many dimensions. Most important here are the following: The view of social categories as pre-existing (nearly "natural") categories and the view of language as merely reflecting the social categories a person belongs to. The proposed alternative is a view of social categories as socially constructed and language as one tool used in that process of construction. Eckert and McConnell-Ginet put it succinctly:

> It is the mutual engagement of human agents in a wide range of activities that creates, sustains, challenges, and sometimes changes society and its institutions, including gender and language. (1992:462)

Crucial to this view is the notion that institutions or social categories such as gender are highly textured, or contentful. It is often said that gender differentiation is the social elaboration of a rather simple biological differentiation.[9] What this means is that social categories such as "male" (or "masculine") and "female" (or "feminine") are reifications of a set of properties, practices, or stances.[10] Ochs (1992) gives the example of two sentence-final particles in Japanese. The particle *ze* expresses coarse intensity and the particle *wa* expresses delicate intensity. The properties coarse and delicate are partially constitutive of the categories masculine and feminine, respectively. One thing about women, according to Japanese ideology, is that they are delicate, even when expressing intensity. One thing about men, according to the same ideology, is that they are (or can be) coarse about things such as expressing

of being.

[9] Although the widely held assumption that the biological differentiation at least is clear-cut has also been challenged. See, for example, Epstein 1990.

[10] This applies equally to local social categories such as the old Yankee fisherman on Martha's Vineyard or "jocks" and "burnouts" among the students of Belten High studied by Eckert 2000.

intensity. To use the particle *ze* is to be coarse, or in Ochs's terms to directly index coarse intensity. The use of the particle thus indirectly indexes gender: used by a man, it indexes masculinity. Used by a woman (against expectations) it probably indexes something more like anti-femininity. By the act of speaking one of these particles, the speaker has performed an instance of coarse or delicate intensity, which is part of being masculine, feminine, anti-masculine or anti-feminine, depending on what was said, by whom.[11]

Thus social categories such as gender are textured and contentful. They are also crucially continually reproduced/reenacted. Taking for the moment the perspective of a child being socialized, it is clear that the only way to learn a category and the practices that make it up is to experience it in some way—through watching, interacting with, or perceiving the expectations of others. Social categories only exist because they have a history, and only persist from generation to generation because they are reproduced in everyday acts. For adults (socialized members of society) reified notions such as femininity in all of its details might persist for some time even if their performance was stopped. Nonetheless, they are still reproduced by any act that depends on the reification for interpretation, and can be subtly changed by acts that challenge the existing notions.

To take a concrete example, Subaru currently has a commercial out in which three female athletes (tennis player Martina Navratilova, golfer Juli Inkster, and skier Diann Roffe-Steinrotter) are all shown saying "What do I know about power/control/grip?" Then they each get into one of the Subaru SUVs and say something like "What horsepower!" The commercial ends with Martina Navratilova getting out of her car and saying, "But what do we know? We're just girls." This commercial is openly highlighting and disputing certain aspects of the gender system in the US, for example, that only men appreciate those aspects of cars. At the same time, it is constitutive of another piece of the gender system, in particular, what it means to be a female athlete. According to this commercial, athletic prowess goes along with being knowledgeable about cars and, more generally, taking on "male" characteristics.

[11] This whole picture is complicated, of course, by the possibility of alternative femininities and masculinities. See, for example, Connell 1995.

The next question is, how does language fit into this process? The answer is: ubiquitously. As noted with Ochs's example of Japanese sentence-final particles above, particular linguistic forms can index social stances that are in turn constitutive of social categories. In every use and interpretation of such forms, that aspect of the linguistic system, the stance, and the social category are reproduced. But the interpretation of socially significant linguistic forms is not capricious, but rather mediated by ideology. Irvine and Gal (2000) argue that the relationship between form and social meaning is cemented by a process of iconization:

> *Iconization* involves a transformation of the sign relationship between linguistic features (or varieties) and the social images with which they are linked. Linguistic features that index social groups or activities appear to be iconic representations of them, as if a linguistic feature somehow depicted or displayed a social group's inherent nature or essence. This process entails the attribution of cause and immediate necessity to a connection (between linguistic features and social groups) that may be only historical, contingent, or conventional. (2000:37)

From this point of view, the connection between the particles *ze* and *wa* to coarse/gentle intensity and to masculinity/femininity is non-arbitrary to speakers of Japanese. *Ze* IS coarse and *wa* IS gentle, so of course men (who are coarse) say *ze* and women (who are gentle) say *wa*.

One effect of the process of iconization is that we are often unaware of the fact that we are getting social information from language. Ochs writes:

> Competent members of every community have been socialized to interpret these meanings and can without conscious control orchestrate messages to convey social meanings. (1992:338)

That is, because of the apparent iconic relationship between form and social value, we plan to be polite rather than planning to be polite by phrasing a command as a request. Likewise, a native speaker of Japanese need only intend to express gentle intensity, not intend to express gentle intensity by using *wa*.[12] This is no different

[12]As a non-native speaker of Japanese, the experience is entirely different: In my own experience with Japanese, I've often found myself having to intentionally plan on using politeness markers and other aspects of feminine speech when I wanted the effect of those forms.

from the way in which we plan to talk about cats as opposed to planning to talk about cats by using the word *cat*.

Neither the process of iconization nor the reification of social categories implies that social meanings are fixed. California Style Collective (1993), Eckert (2000), Irvine (in press) and Coupland (in press) paint a picture of the social world as a landscape inhabited by salient people with salient characteristics. Individual speakers attempt to make their place in that landscape through a process of 'bricolage' (California Style Collective 1993): the piecing together of a personal style out of symbolic resources made meaningful by their association with other people and groups in the social landscape, ideologies about those people, and the speaker's own attitudes. According to Coupland (in press), this process of identity building is as much for the speaker's own sense of self as it is a display or performance for others. Further, identity building is not once-and-for-all, but rather highly relational. Irvine (in press) provides an example from the Wolof opposition of noble and griot[13] castes. Each caste is associated with a supposedly distinct style of speech. In practice, Irvine found a continuum of speech styles whose endpoints represented public speech by each caste. The middle is used relationally:

> Two persons who belong to one and the same caste will differentiate their speech along the same stylistic axis that differentiates castes from each other, in order to represent subtler differences of rank (such as lineage seniority), or to define an activity, such as petitioning, that is reminiscent of intercaste relations. (in press)

Note also that the social construction of identity is not necessarily entirely voluntary/in the control of the speaker. The role of the listener is important, too: if listeners do not acknowledge or do not understand the speaker, they can frustrate a speaker's efforts to build and project a particular social identity. Eckert and McConnell-Ginet discuss the concept of "symbolic privilege" or the privilege to "assume [one's] own positions to be norms toward which everyone else orients" and to "judge other positions while supposing [one's] own to be invulnerable to less privileged assessment" (1992:483).

[13] A low-ranking caste "whose specializations are public speech making, praise singing, music and the rhetorical and communicative arts in general." (Irvine 1990:132)

Summary In Searle's (1995) study of *The Construction of Social Reality*, he proposes that all social facts basically consist of people mutually agreeing to assign a certain status to a certain entity. At the basic level, statuses are assigned to physical phenomena, for example, a smooth, heavy piece of glass with patterns inside can be assigned the status of a paperweight. Statuses can be assigned recursively, so that that same heavy piece of glass *qua* paperweight can be assigned the status of belonging to someone. As a possession, it can be assigned the status of a gift, and of belonging now to someone else. Searle schematizes this status-assignment as "X counts as Y (in context C)". This concept might be useful for reviewing the relationship between language, social categories and identities explored in this section.[14]

What we have is a recursive system of status-assignment. For Japanese speakers, saying *ze* counts as expressing coarse intensity, and expressing coarse intensity (along with a variety of other acts) counts as being normatively masculine. For Eckert's (2000) Belten High speakers, using negative concord counts as (one aspect of) orienting one's style in the social landscape towards Detroit and urban culture. Orienting towards Detroit and urban culture counts as (one aspect of) being a burnout. When a linguistic form counts as something in the social landscape, we say that it has social meaning.

There is an important aspect of social meaning (and indeed other aspects of language and other social institutions) obscured by the phrases 'counts as' and 'mutual agreement' in the preceding paragraphs: the assignment of social meaning is not a process in which all speakers participate on an equal footing. Speakers may believe they agree with others on the social value of a variant, say, while the other parties in fact have another idea. Further, people in positions of power often have the privilege to assume that others share their 'mutual' understanding, since they essentially have the power to assign the blame for any misunderstanding to a less powerful interlocutor. This gives powerful people more meaning-making rights (e.g., Eckert and McConnell-Ginet 1992). This isn't unique to social meaning, but pervades language use. Mainstream English speakers do not usually attempt to learn AAVE, but rather

[14]Note, however, that where Searle speaks of mutual agreement, Ochs speaks of socialization and Irvine and Gal of iconization.

expect AAVE speakers to accommodate their (more standard) variety.

5.1.3 Data to be accounted for

Labov (1966) and Weinreich et al. (1968) find social meaning (such as it was for them) in the differing frequencies of each variant across different social groups. The discussion of social meaning in the construction of social categories and the social landscape above focussed on individual forms. Where does social meaning reside? Given a sociolinguistic variable, there is both a pattern of variation and individual instances of each variant. Eckert and McConnell-Ginet write:

> Individual agents plan and interpret situated actions and activities, but their planning and interpretation rely on a social history of negotiating coordinated interpretations and normative expectations (and in turn feed into that history). (1992:474)

Similarly, Bakhtin (1986) writes, referring to an arbitrary speaker:

> He is not, after all, the first speaker, the one who disturbs the eternal silence of the universe. And he presupposes not only the existence of the language system he is using, but also the existence of preceding utterances—his own or others'—with which his given utterance enters into one kind of relation or another (builds on them, polemicizes with them, or simply presumes that they are already known to the listener). (p. 69, translation by Vern W. McGee)

This is reminiscent of Halliday's (1991) description of the interrelation between grammar and text with reference to the relationship between climate and weather:

> To the 'instance' observer, the *system* is the potential, with its set of probabilities attached; each instance by itself is unpredictable, but the system appears constant through time. To the 'system' observer, each *instance* redefines the system, however infinitesimally, maintaining its present state or shifting its probabilities in one direction or the other (as each moment's weather at every point on the globe redefines the global climate). (1991:34)

Taking this view of system and instance, there are two parallel hierarchies of systems being built up. They are represented schematically in Figure 5.1. By saying something, a speaker (abbreviated S in the figure) produces an instance of linguistic form and an instance of verbal behavior (a speech act). As an instance of linguistic form, the utterance contributes to the system of how that speaker talks in situations like the current one. Going up the hierarchy, it also contributes to the system of how that speaker talks in general, how people like the speaker talk and to the language of the speaker's whole community. As an instance of verbal behavior, the utterance contributes to the definition of the speaker's behavior in situations like the current one. As a situated action in the world, the utterance is also part of the practice that is the speaker's identity and the fabric of the social category or categories that the speaker belongs to. Finally, the social landscape of the community is populated with such categories.[15]

language of S's community	$\leftrightarrow$	social structure of S's community
language of S's social category	$\leftrightarrow$	social content of S's social category
language of S in general	$\leftrightarrow$	S's identity
language of S in this kind of situation	$\leftrightarrow$	behavior of S in this kind of situation
linguistic form	$\leftrightarrow$	speech act

Figure 5.1: Parallel hierarchies of systems

Each level of linguistic patterning (the instance, the pattern of the speaker's speech in this type of situation, etc.) corresponds to a level of social patterning and is thus potentially meaningful. To illustrate this, let's take a particular example and examine it from the point of view of interpretation. Suppose that a middle manager named Kim gets upset and swears in a business meeting. The impact that swearing will have on Sandy, another employee present, will depend on Sandy's knowledge of how Kim usually behaves in business meetings. If Sandy has often heard Kim swear in that situation, then Sandy might know that Kim is only somewhat upset. If Kim almost

[15]The separation of the linguistic and social hierarchies in this discussion is somewhat artificial. For an utterance to count as part of the system of how people like the speaker talk, it has to be interpreted by that speaker and others against the existing ideologized social background and the speaker's position in it. Eckert (2000) suggests that iconic speakers and iconic speech acts can have more weight in the definition of such styles. Conversely, this implies that many speech acts or speakers can be deemed unimportant and therefore have little effect on the system.

never swears in that situation, to Sandy's knowledge, then Sandy might deduce that Kim is extremely upset. Further, business meetings are not the only situation in which Kim speaks to Sandy. If Sandy knows that Kim swears a lot, but not at business meetings, then the import of that instance of swearing (for Sandy) is different than if Sandy almost never hears Kim swear.

Moving up the hierarchy, Kim is busy constituting the social category middle manager for Sandy, Kim, and the others present. Thus Sandy will also interpret Kim's swearing in the context of the behavior of other middle managers and other employees of the company. Finally, the taboo nature of the swear words is constituted in part by the combined practice of all members of the speech community, and Kim, in swearing, is making use of (and perhaps loosening) this taboo. Note that it's not just the act of swearing that has all of these interpretations. Suppose Kim has a particular favorite swear word (and Sandy knows this), but chose a different one on this occasion. The 'bite' or shock-effect that Sandy perceives in Kim's swearing will depend on that choice, but also on the general level of taboo associated with the particular word at all of the successively larger parts of the speech community.[16]

The preceding paragraph talked about patterns of behavior, including patterns of behavior of entire communities. These patterns can only be meaningful to the extent that they are known by speakers (and therefore available to be interpreted and to use in the interpretation of new utterances). Of course, no speaker will have perfect knowledge of the speech patterns of the rest of his/her community, or indeed, even of his/her own speech patterns. What counts are the patterns that the speaker believes to exist. Such beliefs are based on the actual interactions that the speaker has had, but certainly extend beyond as the speaker extrapolates for his/her experience. As mentioned above, there is considerable potential for misunderstanding between speakers with different experience, who may or may not assume their position to be shared. Further, it is usually the prerogative of those in power to assume that their understanding of the patterns is indeed shared. With these caveats, I believe the

[16]For ease of exposition, this example has taken the notion of a 'business meeting' as a social situation to be invariant background, which of course it isn't. To the extent that Kim is a prominent or powerful individual, Kim's behavior also contributes to what a business meeting is in that company, and in general, for the people present.

model of parallel hierarchies of social structure and linguistic structure provides a basis for describing the relationship between instances of variants, patterns of variation, and social value.

Most variationist work focuses on the social value of the patterns, and not of the instance. In fact, Lavandera (1978) writes:

> [F]or cases of inherent variation it is reported that there are no speakers who never use a variant nor are there any who always use it. It is not therefore which form is chosen in any particular occurrence but the frequency with which one form is chosen over another alternative form which, when correlated with some other linguistic or extralinguistic element, takes on significance. (1978:174)

Lavandera contrasts this with cases of syntactic or lexical variation where each variant is marked as e.g., 'informal' or 'formal', and argues that the pattern of variants in formal or informal styles does not carry any meaning, but is rather an epiphenomenon derived from the fact that the forms are meaningful.

On the other hand, Coupland (in press) argues that in the study of style it's not aggregate patterns but individual situated acts that are most revealing.

> The basic problematic of style ... is inherently established at a local level which makes aggregation inappropriate, just as it would be inappropriate, say, to interpret musical performance through an aggregation of pitch or amplitude levels across performers and instances. (in press)

I would like to argue that both the pattern and the instance can be meaningful at the same time. I hope that it is clear from the business meeting example that patterns built up out of meaningful acts are not left uninterpreted but are called upon as the background against which new acts are interpreted. Further, mixing up formal and informal forms can create an intermediate level of formality—a pattern whose meaning is not identified with that of any of the forms that build it. Thus meaningful instances can combine to produce meaningful patterns. To extend Coupland's musical analogy, it is not possible to tell from only one note what key a piece of music is in. Likewise, in cases where the meaning was previously held to be primarily in the pattern, one can find evidence that instances are treated meaningfully as well. In the experiment reported in Chapter 4, the listeners attributed social value to individual occurrences of copula absence/presence.

Further, the experiment showed that the meaning of an instance of a variable can be modulated by the syntactic context of that variable. A speaker using copula presence in an unmarked environment (before NP) was judged (by the AAVE speakers) to be somewhat reliable/likeable/well educated, but not as much so as a speaker using copula presence in the marked environment (before V+*ing*). To use the terminology introduced in this section, using copula presence appears to count as evidence that a person is reliable/likeable/well educated for these speakers, or index these properties. But it counts as better or stronger evidence (or indexes the properties more emphatically) in precisely those contexts where it is unusual. Therefore, the experimental results indicate that non-categorical grammatical constraints, so far ignored in this discussion of social meaning, are not a separate issue from social meaning but rather intertwined with it.

To summarize, then, variation is (potentially) socially meaningful both at the level of the social import attached to individual variants, and to the social import of patterns of those variants. Further, non-categorical grammatical constraints can interact with the social meaning of a variant. In the remaining three sections of this chapter, I will discuss three existing approaches to modeling non-categorical grammatical constraints, asking how they can model these three aspects of the social meaning of variation.

5.2 Variable rules

The first attempt to model non-categorical constraints on variation was Weinreich et al.'s (1968) proposal of variable rules, extended and refined in Labov (1969), Labov (1972, Ch. 3), Cedergren and Sankoff (1974), and elsewhere. In Weinreich et al.'s original proposal, variable rules were rules in a community grammar, that is, descriptions of the linguistic behavior of a community. Labov (1969, 1972, Ch. 3) and Cedergren and Sankoff (1974), on the other hand, explicitly view variable rules as a part of competence grammar.

5.2.1 Variable rules as a part of linguistic competence

Section 3.3.1 of Chapter 3 gave two examples of variable rules from Labov (1972, Ch. 3). The second rule (deletion) is repeated here as Figure 5.2.

$$\begin{bmatrix}\text{+cons}\end{bmatrix} \longrightarrow \langle\phi\rangle \ / \left\langle\begin{matrix}\text{*strid}\\ \text{+cons}\\ \text{+Pro}\end{matrix}\right\rangle \#\# \begin{bmatrix}\underline{\qquad}\\ -\text{nas}\\ +\text{cont}\end{bmatrix} \#\# \left\langle\begin{matrix}\text{+Vb}\\ \text{+Fut}\\ -\text{NP}\end{matrix}\right\rangle$$

Figure 5.2: Labov's variable rule of copula deletion

This rule is encoded in an extension of the formalism of Chomsky and Halle 1968 (SPE). It has an input (a consonant) that is rewritten as ϕ in a specific context. It differs from standard SPE rules in that it applies with some probability.[17] The specifications in angle brackets in the context indicate those features of the environment that favor the application of the rule. These features are given, from top to bottom, in order of how strongly they favor the rule. The '*' before the feature 'strid' indicates that the rule applies categorically after stridents. The specification +cons indicates that a preceding consonant (as opposed to a preceding vowel) strongly favors deletion. Below that, the specification +Pro indicates that a preceding pronoun (as opposed to a full NP) favors deletion somewhat. The specifications in the following environment are +Vb (verbs, including *gon/gonna*), +Fut (the additional effect of *gon/gonna* over other verbs), and −NP (predicate adjectives and locatives).[18] Rules like the one in Figure 5.2 are said to have a basic probability of applying (the 'input probability') which is either enhanced or muted by the specific features present in the environment.

Variable rules that are rules of community grammar include various social factors (i.e., a specification of the social groups a speaker might belong to) as additional probabilistic constraints on rule application. For example, the speaker's being a teenager rather than adult would increase the probability of application of the deletion rule in Figure 5.2. However, when such rules are viewed as rules of individual linguistic

[17] This is indicated in the notation by the angle brackets around the output of the rule.

[18] The possibility of following predicate nominals is not explicitly mentioned. The notational convention seems to be to leave out the least favorable environment, and to specify only those that have a relatively favoring effect.

competence, differences in rates of application across speakers are represented by giving different speakers different input probabilities for the rule.

The variable rules of contraction and deletion are part of a system of rules, some categorical and some variable, that Labov proposes as a partial model of AAVE phonology. In view of the interrelation between the two types of rules in his grammar, Labov writes:

> [T]he variable rules themselves require at so many points the recognition of grammatical categories, of distinctions between grammatical boundaries, and are so closely interwoven with basic categorical rules, that it is hard to see what would be gained by extracting a grain of performance from this complex system. It is evident that [both the categorical and the variable rules proposed] are a part of the speaker's knowledge of language ... (1972:125)

Cedergren and Sankoff argue instead from the systematicity of the effects modeled by variable rules:

> [T]he notion of competence must be strengthened to include representations of systematic covariation between elements of language, even when this covariation cannot be described in categorical [...] terms. (1974:352)

Unlike much work in computational linguistics and psycholinguistics that makes use of probabilistic models and methods, Cedergren and Sankoff (1974), at least, appear to intend variable rules as a model of competence with a "random or non-deterministic component." While models such as those of Jurafsky (1996) or Bod (1998) incorporate probabilities to choose the most probable structure out of some candidate set, Cedergren and Sankoff see the probabilities as a random element in the system, positing a relationship between competence and performance that is "analogous to that between a probability distribution and a sample" (1974:353). Preston describes a similar model, using the analogy of a coin toss to describe the relationship between the underlying probabilities and the output:

> Variable items are unfair coins made so by appropriate weightings which derive from such characteristics of identity as age, sex, and social class[,] and by such features of the environment as formality, solidarity with other speakers, and power and status relations among interlocutors. (1989:20)

This point will be relevant to the discussion of the kinds of social meaning that variable rules can model in Section 5.2.2 below.

The proposed change to linguistic competence involves making it more concretely related to performance. Earlier conceptions of linguistic competence (as well as the current mainstream conception) view competence grammar as merely generating a set of well-formed sentence types (and their associated structures and semantic representations)—never mind how this knowledge actually interacts with the systems behind actual language use. The probabilistic view of competence, on the other hand, is couched as a system that gets used every time a sentence is produced. The underlying competence contains some weighted coins and the performance system must include a means of (metaphorically, of course) flipping those coins and incorporating the choices they make.

There have been two main challenges to this idea. The first is that probabilities are an improbable thing for people to know. This was put most emphatically by Bickerton:

> [I]n order that the average for his group should remain constant, the variation of the individual must be confined within a relatively narrow range. What keeps his percentages within those limits? And how can it keep within them unless something, somewhere is COUNTING ENVIRONMENTS and keeping a running score of percentages? ... [S]peaker B must continually be saying to himself things like : 'Good Lord! A's percentage of contractions in the environment +V__ +__ NP has fallen to 77! I'll have to step up mine to – let's see: ... what? About 86%!' (1971:460–461)

As has been pointed out many times, this argument is a non-starter. Bickerton has confused frequencies with probabilities. That is, what is in the grammar are probabilities, which don't need any history to operate properly. Coins don't remember how they've been tossed, and yet they manage to keep to about 50/50 heads/tails.

Still, one might wonder whether probabilities are something people can know, and how they might be learned. In fact, there is ample evidence that people do learn frequencies. For example, Grant et al. (1951) set up a task in which participants were asked to guess whether a light would flash in each trial. For different groups of participants, the light flashed none of the time, 25% of the time, 50% of the time, or

100% of the time. The participants ended up guessing at the same rate as the light actually did flash. For example, the participants in the 75% condition guessed that it would flash about 75% of the time, despite the fact that they would have been correct more often had they guessed it would flash every time. Haser and Chromiak (1977) provide evidence that 'frequency counting' as they term it is an automatic skill. In their study, participants were shown a list of words, including some repeats, and then asked to judge how many times each word appeared. They included 2nd, 4th and 6th grade students as well as college students in their study. They found that the 2nd graders did as well as the college students. Further, neither being told before seeing the list that they would be asked about frequencies nor practice and feedback on their performance improved the participants' accuracy. In all of these properties, frequency counting differs from other memory skills. Haser and Chromiak conclude from this that frequency counting is largely an automatic process, and suggest that it "is something that the organism engages in as an essential component of his processing of the world" (1977:182). Finally, learning mechanisms that convert frequencies in a training corpus to probabilities in a grammar are not hard to come by (e.g., Boersma and Hayes 1999). The question is not whether people can learn probabilities as part of their linguistic competence, but whether they do.

The other challenge to Labov and Cedergren and Sankoff's proposed revision to the notion of linguistic competence is that variable rules as they were originally formulated don't fit well with syntactic theories (as opposed to SPE phonology). In his essay "The quiet demise of variable rules" Fasold (1996)[19] points out that the formal mechanism of variable rules makes certain assumptions that are incompatible with syntax (including transformational syntax) and non-rule-based phonology:

> Unlike phonological variable rules, the syntactic transformations of [the Standard Theory and the Extended Standard Theory] did not convert a possible structure into another structure that was also possible in the language. Rather, they re-arranged an underlying structure so that it became more nearly sayable. . . .
>
> There is a problem with trying to analyze [syntactic] variables as the consequence of a syntactic variable rule in the traditional sense of *syntactic*

[19] Originally published as Fasold 1991. Page numbers cited here refer to the 1996 publication.

> *rule*. There seems to be little reason to suppose that most of these variants are related by the application or nonapplication of an actual variable rule of syntax. (1996:88–89)

and later:

> Analysis of variation in syntactic structure, even when VARBRUL is used, is nonetheless not about "rules" at all, at least not in the ordinary sense. Rather, it seems to be about the social and discourse consequences of making certain choices within language ...
>
> In many cases, especially in syntax, but also in phonology, there is no motivation for tying variation to the rules of grammar—at least not to any rules of grammar that have been proposed so far. (1996:90–91)

As noted in §5.1.1 above, one of the difficulties in studying variation in syntax is the problem of analyzing the myriad choices that speakers make into discrete bundles of variants called variables. However, variation is tied to grammar (if not to the rules of grammar) by the very fact that grammatical factors have robust favoring or disfavoring effects on the distribution of variants in the variables that have been isolated and studied. Unless these effects can be given an explanation outside the grammar (see §5.4 below), some way must be found to formulate rules of grammar so that they are able to interface with this information.

In fact, that goal is not so elusive as it might seem. Probabilistic context free grammars attach a probability to each way of rewriting each non-terminal symbol (see, e.g., Charniak 1996). Other approaches extend this by allowing rewrite rules that cover more than one level in the tree (e.g., Bod 1998), by conditioning the probabilities for each way of rewriting the current node on how the tree had been built so far (e.g., Black et al. 1993), or by attaching probabilities to grammatical dependencies between words in the sentence (see e.g., Collins 1996). Probabilistic parsers of this sort can be used for disambiguation in automatic parsing, for speeding up parsing, and for predicting which string was actually said in voice recognition systems where the input is uncertain. (For an overview, see Manning and Schütze 1999, chapters 11 and 12.) Chapter 6 discusses how a sign based grammar can include information about the effect of the surrounding grammatical environment on variation.

To summarize so far, the variable rules proposal is essentially a proposal that the grammar include probabilistically applied rules constrained again probabilistically by features of the linguistic context. The next section considers how well this model can handle the various aspects of the social value of variation.

5.2.2 Variable rules and social value

The first aspect of the social value of variation is social meaning associated with styles, or patterns of frequencies of variants. This is the aspect that variable rules can handle most elegantly. Labov (1966) found a parallelism between social and stylistic variation in the variables he studied in New York City. When speakers from any socio-economic class are speaking carefully (as in a formal situation) they tend to adjust their rates of prestige variants towards that of speakers from higher socio-economic classes. Thus the stylistic range of any individual reproduces on a smaller scale the range of variation of the community. This is the 'attention paid to speech' model of variation, on which speakers have a natural vernacular that they use un-self-consciously and the ability to produce more prestigious styles when they pay close attention to how they're speaking. When this model is taken together with the idea of an input probability for variable rules, the obvious way to model stylistic variation with variable rules is to posit that speakers adjust their input probabilities according to the situation.

As discussed in Section 5.1.2 above, Labov's view of the relationship of style to social structure has been shown to be too simple in many ways. However, the variable rules model is not completely tied to the 'attention paid to speech' model of variation. First of all, speakers could be deliberately adjusting their input probabilities in either direction. Further, different variables could be associated with different dimensions of style, and their input frequencies adjusted independently of one another. Finally, speakers need not have one most natural input frequency, but could always be moving around within some range that they control.

	Interview III	Interview IV
Input probability	.49	.20
Following grammatical environment		
Gonna	[100%]	.79
V+*ing*	.59	.66
Locative	.87	.52
Adjective	.39	.29
Noun phrase	.24	.32
Miscellaneous	.34	.40

Table 5.1: Rickford and McNair-Knox's Varbrul input probabilities and factor weights for two interviews

As far as I know, this particular application of variable rules theory has not been explored extensively. However, it makes an interesting prediction: If stylistic variation is a matter of adjusting the input probability, then the constraining effects of features of the linguistic environment should remain the same across styles. Rickford and McNair-Knox 1994 is the only study I know of that reports the results of separate Varbrul[20] runs for different styles. The samples came from two different interviews with the same AAVE speaker, which represent different styles of speech primarily because in one case (Interview III) the interviewer was African-American and well known to the interviewee while in the other interviewer was white and not well known to the interviewee. The factor weights for the following grammatical environment are shown in Table 5.1, adapted from Rickford and McNair-Knox's (1994) Table 10.4, page 253. With the exception of locative in Interview III and adjective in interview IV, the relative orderings of the environments are the same across the two interviews, despite the overall higher rate of copula absence in Interview III. This is only one study of only one speaker, but it does suggest that the constraining effect of features of the linguistic environment is relatively stable across different styles or events.

The second aspect of the social meaning of variation is social meaning associated with individual instances. Here, variable rules do not fare so well. This was noted by

[20]As discussed briefly in Chapter 4, Varbrul is a computer program that implements the technique of stepwise multiple regression to isolate the effects of different factors on a linguistic variable. Varbrul is widely used without any presupposition of the theoretical notion of variable rules.

Dittmar (1996), who writes:

> Variable rules ... cannot account for different productive and interpretive communicative strategies because intention, underlying meaning, and pragmatic aims of communication are not considered in the analysis. (1996:134–135)

In other words, variable rules describe random, probabilistic behavior. If speakers produce one variant or the other probabilistically, then hearer must not attribute any significance to the choice between variants for any given instance.[21] Note that, if variable rules were just a model of performance—a statistical model of what people in a community do—that model wouldn't face this problem. But Labov and Cedergren and Sankoff insist that variable rules are intended as a model of probabilistic competence with a random component.

It might seem from the discussion of iconization above that hearers don't attribute any intentionality to speakers in their choice of linguistic variants. To return to the Japanese example, to use *wa* is to speak gently, and so women (who are supposed to be gentle) use *wa* as a matter of course. However, this is confusing ideologized social categories with actual people. Individual speakers are constantly navigating and negotiating their place in the social landscape, by actions such as choosing to speak like a woman (or like a certain kind of woman) or not in any given instance. Hearers must, at some level, recognize those choices on the part of their interlocutors.

Finally, for the third aspect of the social value of variation: the modulating effect of the linguistic environment on the social meaning of a variant. Variable rules cannot account for the effect shown in Chapter 4 because a theory that cannot attribute social meaning to individual instances has nothing to say about factors that affect the meaning of individual instances.

[21] This only applies to cases of inherent variation, that is, cases where speakers are known to actually use both variants, even in informal styles. In cases (should any exist) where each variant is strictly associated with one and only one style, one instance would be enough to determine the style in question. In that case, the social value of the style would be the social value of the instance.

5.2.3 Summary

The most important contribution of work done under the rubric of variable rules theory is the discovery of non-categorical grammatical constraints on variation. As a systematic aspect of language, non-categorical constraints require some explanation. The idea that non-categorical constraints could be a matter of probabilistic effects in a grammar is interesting and will be explored further in Chapter 6. However, the particular way in which the probabilities are incorporated in the model of competence/performance in variable rules theory appears to preclude an adequate treatment of the social value of variation. This, like the out-dated style of the phonological rules used, can safely be abandoned.

Before leaving this discussion of variable rules, I would like to consider one final criticism of them. Both Gazdar (1976) and Fasold (1996) point out that variable rules do not constitute explanations for the patterns they summarize. Further, as Fasold puts it, "nor does [a variable rule] do much to distinguish spurious patterns from significant ones" (p. 93).

Thus additional evidence that is independent of the production data is necessary in order to establish that information about frequency of co-occurrence is actually a part of speakers' internalized grammars. The experiment described in Chapter 4 was designed as a means of doing just this. As for the point that variable rules do not constitute explanations, no formal rules ever constitute explanations. A formal rule, as a part of a grammar, is a model, or description, of a language. In this sense, formal rules and formal grammars can account for patterns in language, but provide no information as to why they are that way. If we think of grammars as models of what people know (linguistic competence), then we can say that grammars go some way towards accounting for people's linguistic behavior. They do not constitute explanations of why a language is the way it is. Even in GB/Minimalism, where there is a emphasis on 'rich deductive structure' so that a small number of abstract properties of the grammar account for a wide range of linguist facts, these formal accounts only become explanations in connection with the theory of Universal Grammar *qua* Language Acquisition Device.

The next two subsections consider two different approaches to accounting for non-categorical constraints without adding them to the grammar. Section 5.4, in particular, addresses the possibility that non-categorical constraints can be explained by functional pressures on language use, and hence don't need to be represented in the grammar. But this assumes that grammars should only encode that which has no explanation. This assumption probably enjoys the wide acceptance that it does in part because of the relationship that does obtain between arbitrariness and grammar: if we speak according to arbitrary rules, we must know those rules. It does not follow from this that we don't also know or can't be shown to know (in the sense of represent as part of our grammars) other facts about language. This topic will be picked up again in Chapter 6. Variable rules (or some similar device) could be shown to correspond to something in actual speakers' knowledge of language without precluding the existence of some explanation for how the language that those speakers learned got to be that way.

5.3 Optimality Theory

Optimality Theory (OT) (Prince and Smolensky 1993) is a metatheory of grammar. The basic principles are simple and elegant. All grammars consist of the same violable constraints. Grammars differ in how they rank those constraints. The constraints chose grammatical forms from among a competing set of candidates. Between any two candidates, the winner is the one that does not violate (or violates fewer times) the highest ranked constraint on which they differ. For example, in the schematic tableau in Figure 5.3, candidate 1 is the winner.[22]

Within OT, a theory of grammar is a set of constraints, all of which are posited to be universal. The constraints define a 'factorial typology'—a set of rankings of the constraints which gives all possible languages based on those constraints.[23] The grammar of a particular language, in classical OT, is a complete ranking of all of the constraints. A complete ranking of constraints should choose only one optimal

[22] An '!' indicates the fatal violation, the one which causes an ungrammatical candidate to lose to the optimal candidate.

[23] And some definition of GEN, the function that gives the initial candidate set.

	CONS1	CONS2	CONS3
Cand 1	*		*
Cand 2	*	*!	

Figure 5.3: Example OT tableau

candidate out of any candidate set. There are two ways to get variation within a language in this system: either the variants correspond to different underlying forms so that the multiple optimal candidates do not ever compete, or the constraints are not able to distinguish the candidates. The first option is not very appealing for phonological variation, which is seen as differing realizations of the same underlying phonological form. The situation is not all that different for syntactic variables that do not correspond to semantic differences. The second option is also not appealing: in some cases of variation (i.e., changes in progress), one would expect to find speakers for whom one or another variant is completely unavailable. If some of the forms are to be ruled out for some speakers, then the constraints must be able to distinguish the candidates.

Crosslinguistic variation in OT is a matter of reranking the same universal constraints. Reynolds and Nagy (1994), Anttila (1997) and Boersma and Hayes (1999) have extended this idea to intraspeaker variation, by allowing speakers to have a range of possible rankings. The next three subsections describe their approaches.

5.3.1 Partially unranked constraints

Anttila (1997) provides perhaps the simplest extension to classical OT. In his framework, intraspeaker variation is a matter of speakers having partially unranked constraints in their grammars. Each full ranking of the grammar will still pick out only one candidate as optimal. The probability of occurrence of a given candidate is the proportion of full rankings that select it.

The particular phenomenon that Anttila investigates in this paper is the alternation between 'strong' and 'weak' variants of the genitive plural morpheme in Finnish.

Shorter words categorically take one or the other based on the weight of the final syllable of the stem.

(6)	a.	/puu/	'tree'	pu**i.den**	strong	
	b.	/kala/	'fish'	ka.lo.**jen**	weak	(Anttila 1997:37)

Words that are at least three syllables long and end in a light syllable, however, can take either the strong or the weak form. Further, this variation is subject to non-categorical constraints: (1) Stem-final high vowels favor the strong variant, while low vowels in this position favor the weak variant. (2) A heavy antepenultimate syllable (penult of the stem) favors the weak variant, while a light syllable in that position favors the strong variant. These results are based on native-speaker intuitions and a study of 1.3 million word corpus, and the results of both agree.

From a partial ranking of a set of plausibly universal constraints relating sonority, stress, and syllable weight, Anttila derives the categorical behavior of one and two syllable stems (and stems with heavy final syllables), and the possibility of variation in other stems. (This is possible because stress placement is more restricted in the shorter stems, there being less room to spread stressed syllables out.) The partial rankings are of a particular form: they divide the grammar into sets such that the sets are ranked with respect to each other, but the constraints within a set (when there are more than one) are mutually unranked.[24]

The probability of occurrence of each variant for the variable stems is determined by the number of mutually unranked constraints that each variant violates. (This is because the number of full rankings that select each candidate is directly related to the number of constraints violated.) In this sense, the non-categorical constraints are seen as reflecting the universal markedness of each form. In classical OT, the constraints are universal and all penalize some kind of markedness. Each language decides which dimensions of markedness it cares about more than others. This is the ranking of the constraints. In the case of unranked constraints, all of the constraints

[24]This is not quite true. Anttila's (1997) final grammar for Finnish includes a bottom set of constraints, some of which are mutually ranked because they are mutually ranked universally. It appears, however, that these constraints are ranked low enough as to play no role in the phenomena he considers.

count equally, and so there is a kind of additive markedness driving the distribution of the variants.

It is thus a prediction of this model that non-categorical constraints on variation reflect universal tendencies and thus should be the same whenever the 'same' variable arises (cf. the discussion in §5.4.2 below of the Kiparsky/Guy debate on this point).

One final property of this model that is worth mentioning is that the grain of the statistical predictions is limited by the number of unranked constraints participating in the system. If there are 6 constraints, then the smallest probability of occurrence possible for one variant (other than 0) is 1/6. Anttila notes this and suggests that a more complete grammar (one that considers more phenomena and thus has more constraints) should provide an even better fit for his data.

5.3.2 Floating constraints

Reynolds and Nagy (1994) also extend the OT treatment of crosslinguistic variation (different rankings of constraints) to sociolinguistic variation (in particular, to the variable deletion of segments and syllables after the main stress in a class of words in a Romance language called Faetar). Their approach differs from Anttila's in two important respects. First, at a formal level, instead of positing sets of mutually unranked constraints as Anttila does (7), they posit floating constraints that can move within some range (8).

(7) $$\left\{\begin{matrix}\textsc{cons1}\\ \textsc{cons2}\\ \textsc{cons3}\end{matrix}\right\} \gg \left\{\begin{matrix}\textsc{cons4}\\ \textsc{cons5}\end{matrix}\right\} \gg \left\{\textsc{cons6}\right\}$$

(8) $$\textsc{cons1} \gg \left\{\begin{matrix}\ldots\ \ldots\ \ldots\ \textsc{cons2}\ \ldots\ \ldots\ \ldots\\ \textsc{cons3} \gg \textsc{cons4} \gg \textsc{cons5}\end{matrix}\right\} \gg \textsc{cons6}$$

If more than one constraint is allowed to float at a time, Reynolds and Nagy's system is a generalization of Anttila's, allowing for somewhat more fine-grained analyses.

The second respect in which Reynolds and Nagy's approach differs from Anttila's is in the data they attempt to account for:

> ... not only do the various rankings of the constraints account for each of the forms that surface and prohibit those forms that never surface, but the relative number of speakers who produce each surface form is correlated to the number of rankings which would produce each form. (1994:277)

That is, Reynolds and Nagy are not accounting for frequencies in some corpus of text, but for frequencies among a population of speakers. Their grammar is, in effect, a community grammar.[25]

5.3.3 Probabilistic OT

A third approach positing the possibility of multiple rankings within the same grammar is Boersma and Hayes's (1999) probabilistic ranking of constraints. On this approach, rather than strictly ranking the universal constraints, a grammar assigns each constraint to a point on a ranking scale. This point, called the ranking value, is the mean of a normal distribution of actual rankings of the constraint. That is, at evaluation time, each constraint is ranked somewhere near its ranking point, with the probability of any given point being determined by the normal distribution. All of the normal distributions are assumed to have the same standard deviation (width).

If two constraints A and B have exactly the same ranking point, then the chances of B outranking A in a given evaluation run are 1/2. If A is placed far above B on the ranking scale, then the chance of B outranking A in a given evaluation run can be made arbitrarily small.[26] Thus this system can simulate both the mutually unranked sets and the strict rankings of Anttila 1997. However, it can also allow for partial overlap of constraints, as fine-grained as necessary. While on Anttila's system, a distribution in which one variant occurred 1% of the time and the other 99% would require 100 constraints, Boersma and Hayes can model this with two constraints that overlap just a little bit, so that one outranks the other 99% of the time.[27]

[25]Nonetheless, they end up positing a slightly different partial ranking as the grammar of one particular minority dialect in the population they studied.

[26]According to Boersma and Hayes, if the ranking point of A is 5 standard deviations above the ranking point of B, the chances of B outranking A are 1 in 5,000

[27]Boersma and Hayes state that the 1:99 ratio could also be modeled in Anttila's system with only 5 constraints which interacted in such a way that only 1 of the 120 possible orders selected

This approach could be generalized to allow floating constraints, i.e., constraints that range over some series of other, strictly ranked constraints. In this case, some constraints would have larger ranges in which they vary (larger standard deviations). Boersma and Hayes opt for the more restrictive theory in which all constraints have the same range of variation, in the absence of evidence requiring floating constraints. (They note that they can account for Reynolds's (1994) and Reynolds and Nagy's (1994) data in their system, although not with the same constraints.)

5.3.4 Stylistic variation in OT

This section considers how the OT accounts could address the problem of stylistic variation—the fact that the distribution of variants can change in different styles, e.g., cases where the more prestigious variant is relatively more common in more formal or careful styles. One first pass at this problem, given the general framework of OT, would be to create different grammars (i.e., different (partial) rankings) for each style. Taking this as a reasonable strategy for now, how would it work in Anttila's (1997) system, the simplest of the three discussed here?

To be fair, Anttila (1997) states explicitly that he is trying to see how far a grammatical explanation can go towards accounting for all of the variability in his data:

> It is entirely possible that there exists variation which is not sensitive to styles, addressee, gender, age or socioeconomic class, but is completely grammar-driven. To what extent extragrammatical factors are needed in deriving accurate statistics remains an empirical question.

Therefore the exercise of extending Anttila's system to see how it would account for stylistic variation amounts to trying to make it do something it wasn't intended to do.

the uncommon candidate. This is inconsistent with Anttila's method of calculating the proportion of rankings that select each candidate. On Anttila's method, the proportion of rankings that select a candidate (and thus the predicted corpus frequency of a candidate) is directly related to the number of constraints that candidate violates (and that its competitors don't). If there are only five constraints, then the closet ratio to 1:99 possible is 1:4. This happens if one candidate violates only one constraint and the other violates only the other four. Perhaps this inconsistency has to do with the fact that Anttila's constraints don't interact in whatever way Boersma and Hayes have in mind.

The final partial grammar for Finnish that Anttila settles on is as in Figure 5.4. For the class of trisyllabic stems with light final syllables, the constraints in the first two sets are unable to choose between the strong and weak forms of the genitive plural. The competition gets passed off to the third and fourth sets of constraints. Within the class of trisyllabic stems, Anttila distinguishes 6 subclasses (3 vowel heights x 2 weights of the penultimate syllable of the stem). In three of these subclasses, the constraints in the third set are decisive—that is, all of the constraints that apply pick the same candidate (strong or weak form). In the remaining three classes, either the constraints in the third set disagree on which form they select, or the constraints in the third set do not apply and the constraints in the fourth set disagree on which form they select.

SET 1	SET 2	SET 3	SET 4	SET 5
*X́.X́	*Ĺ	*H/I	*H/O	*H/A
	*H	*Í	*Ó	*Á
		*L.L	*L/A	*L/O ≫ *L/I
			*H.H	*A ≫ *O ≫ *I
			*H́	*L
			*X.X	

Key:	X.X	two successive syllables
	X	an unstressed syllable
	X́	a stressed syllable
	H	a heavy syllable
	L	a light syllable
	A	a syllable with a low vowel
	O	a syllable with a mid vowel
	I	a syllable with a high vowel

Figure 5.4: Anttila's final partial grammar for Finnish

For ease of exposition I will abstract away from the content of the constraints, and rename the constraints in sets 3 and 4 as in Figure 5.5.

The first variable class of stems are those in which the penultimate syllable is light and the vowel in the final syllable of the stem is high. When combined with these

SET 3	SET 4
A	D
B	E
C	F
	G
	H
	I

Figure 5.5: Renamed constraints, sets 3 and 4

stems, the strong variant violates two constraints (A and B) and the weak variant violates only one (C) (cf. Table 5.2). There are six ways of ranking these three constraints, and in four of those rankings, one of A or B will be on top. This means that in 2/3 of the possible rankings of these constraints, the strong form will violate the highest-ranking constraint and the weak form won't. In the other two rankings, constraint C is on top, and strong form will be selected as optimal. Therefore, 2/3 of the possible rankings select the weak form for these stems. On Anttila's system, this predicts that 2/3 of the tokens of this kind of stem should appear with the weak form of the suffix.

form	constraints violated
strong	A, B
weak	C

Table 5.2: Constraints violated: light/high V stems

In the next set of stems, the penultimate syllable is heavy, and the vowel in the final syllable is low. These forms all satisfy the constraints in set 3 (since those constraints concern light penultimate syllables and/or high vowels), and the competition is passed off to set 4. The pattern of violation of the set 4 constraints for the strong and weak forms attached to these stem is as in Table 5.3: each form violates two of the four constraints in the set. By a similar calculation as above, this grammar predicts that each form should occur 50% of the time.

The final set of trisyllabic stems that give rise to variation have heavy penultimate

form	constraints violated
strong	G, H
weak	F, I

Table 5.3: Constraints violated: heavy/low V stems

syllables and a mid vowel in their final syllables. Again, the competition is passed off to set 4. The violations of the strong and weak forms for these stems are given in Table 5.4. Note that even within set 4 the constraints in play here are not the same as for the previous set of stems (Table 5.3). In particular, neither form in Table 5.4 violates constraint F and neither form in Table 5.3 violates constraints D or E. This is again due to the fact that the constraints concern properties not relevant to certain stems. For this class of stems, the strong form is predicted to appear only 20% of the time.

form	constraints violated
strong	D, E, G, H
weak	I

Table 5.4: Constraints violated: heavy/mid V stems

These predictions fit the corpus frequencies that Anttila found remarkably well (see Table 5.5). Anttila's (1997) statistics come from a study of a corpus of written standard Finnish. While this particular phenomenon may indeed be insensitive to stylistic factors, it is also possible that other registers of Finnish see a change in the distribution of the strong and weak forms of the genitive plural of the variable stems. Could this system model a hypothetical style in which the usage of the strong forms is increased across the board? Given the general framework, the difference between that system and the grammar in Figure 5.4 would have to be in the ranking of the constraints. The existing rankings are either presumed to be universal rankings or motivated by the categorical facts of Finnish morphophonology. Therefore, assuming that the hypothetical style we're trying to model is still consistent with UG and still maintains the categorical distinctions found in the style studied by Anttila, the only

Stem class	genitive pl form	predicted %	observed %
light/high V	strong	33	37.2
	weak	67	62.8
heavy/low V	strong	50	50.5
	weak	50	49.5
heavy/mid V	strong	20	18.2
	weak	80	81.8

Table 5.5: Predicted and observed frequencies of strong and weak forms

possible changes are further rankings of the as yet unranked constraints.

Note first that the constraints determining the frequency of occurrence of each form in the first stem class (light/high V) are distinct from those affecting the other two stem classes (compare Table 5.2 to Tables 5.3 and 5.4). This means that reranking the constraints could change the distribution of the forms in one stem class without affecting the other two. For example, adding the information that constraint B is dominated by constraint C would even up the distribution of strong and weak forms in the first class to 50/50, but change nothing else.

For the strong form to appear more than 20% of the time in the third class of stems (heavy/mid V) the single constraint violated by the weak form (I) would have to outrank some of the constraints violated by the strong form (D, E, G, H). Table 5.6 gives a sample of partial rankings and how they affect the distribution of strong and weak forms in the two stem classes affected by these constraints. The predicted distributions are deduced, as before, from the set of constraints each candidate violates. That information remains the same as in Tables 5.3 and 5.4. Demoting a constraint to a lower set keeps it from affecting the outcome for these candidates, so long as there remain relevant constraints in a higher set. The number of constraints in the higher set violated by each candidate determines the distributions.

Ranking 1 is the original ranking. Rankings 2 and 3 change the distribution of forms for one stem set but not the other. Ranking 4 increases the frequency of the strong forms in both stem class, but unevenly: from 20% to 33% in one and from 50% to 100% in the other. In general, it is not always possible to manipulate the frequency of the strong forms in each stem class independently, as the stem classes are sensitive

	ranking	strong/weak	
		heavy/mid V	heavy/low V
1	{ D, E, F, G, H, I }	20/80	50/50
2	{ F, G, H, I } $\gg$ { D, E }	33/67	50/50
3	{ D, E, G, H, I } $\gg$ F	20/80	33/67
4	{ D, E, F, I } $\gg$ { G, H }	33/67	100/0
5	{ D, E, F, G, I } $\gg$ H	25/75	67/33

Table 5.6: Partial rankings and predicted frequencies

to some of the same constraints. (In particular, given this system of constraints, it is not possible to increase the frequency of strong forms in the heavy/low V class without also affecting the heavy/mid V class.)

If the ranking in Figure 5.4 is indeed the grammar of one register of Finnish, and other styles/registers are a matter of ranking a few more constraints, then we predict a bunch of styles in which the frequency of the strong forms is changed for one stem class but not another, or changed in multiple stem classes but unevenly. Whether Finnish genitive plurals are used in stylistic variation at all, and, if they are, what patterns of frequencies occur are, of course, empirical questions.

Will the greater flexibility of Boersma and Hayes's (1999) system help? It turns out that the predictions regarding stylistic variation of Anttila's (1997) approach are partly due to the framework and partly due to the constraint set. Since the light/high V class does not violate any of the same constraints as the two heavy classes, this constraint inventory will always predict styles in which the proportion of strong forms is changed in the light/high V class and not the others, or vice versa.

To see what happens in a different kind of constraint set, I will posit some constraints for copula absence in AAVE.[28] In order to get the variation, there must be some constraint(s) pushing for copula presence and some pushing for copula absence.

[28]This is not necessarily the best OT analysis of copula absence in AAVE, and is at any rate simplified in its assumptions about the underlying form and the candidate set. Further, it is not designed to capture all of the categorical constraints on copula absence discussed in Chapter 3. It is only put forth for the sake of the argument.

Suppose that the relevant input forms are quasi-semantic forms giving the predicate-argument relations and the part of speech of the word that contributes the semantic predicate. Suppose further that present tense is not specified in the input (i.e., unmarked), while other tense/aspect forms are specified in the input. In this case, the constraint against copula presence (in present tense sentences) can be seen as a kind of a faithfulness constraint: putting *is* in the surface structure adds a feature (present tense) that wasn't there in the input.

(9) FILL(TENSE): Don't express more information (about tense) than is in the input.

We want the constraints against copula presence to treat the different following grammatical environments differently, so that they can be distinguished. A first pass would be the constraints in (10).

(10)	*NP-PRED	the predicate of a sentence must not be an NP.
	*AP-PRED	the predicate of a sentence must not be an AP.
	*VPROG-PRED	the predicate of a sentence must not be a progressive VP.

Using Anttila's (1997) system, if all four of these constraints are unranked, one would predict 50% copula absence regardless of environment, as shown in Table 5.7. For past tense forms, the input would include tense information (e.g., doctor$_{NP}$(Kim), past). Therefore, the presence of *was* in the output would incur no violation of FILL(TENSE), and the system would get categorical copula presence, if the input specifies past tense.[29]

input	copula absence violates	copula presence violates
doctor$_{NP}$(Kim)	*NP-PRED	FILL(TENSE)
happy$_{AP}$(Kim)	*AP-PRED	FILL(TENSE)
laughin$_{Vprog}$(Kim)	*VPROG-PRED	FILL(TENSE)

Table 5.7: Constraints violated: copula absence/presence

[29] Copulaless forms would remain underspecified for tense and thus could appear in both present and past tense contexts.

Using Boersma and Hayes's (1999) system, it would be possible to capture the observed difference in the frequency of copula absence in these environments. All one would need is a probabilistic ranking as in Figure 5.6.

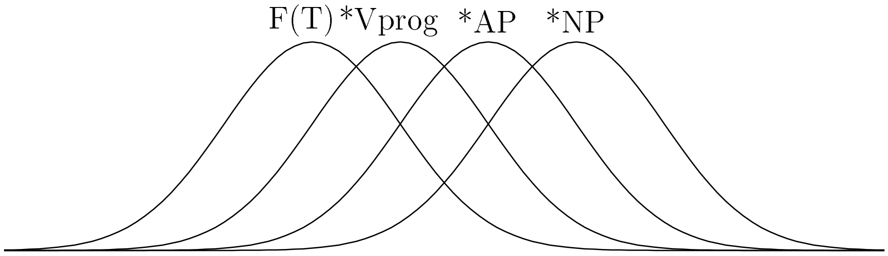

Figure 5.6: Constraints with overlapping distributions

The grammar represented in Figure 5.6 predicts copula absence less than 50% of the time in any environment, as FILL(TENSE) is ranked lower on the scale than any of the other constraints. However, the distributions for FILL(TENSE) overlaps with *VPROG-PRED more than *NP-PRED. This means that it will more often be the case that FILL(TENSE) outranks *VPROG-PRED than that it outranks *NP-PRED. This, in turn, means that copula absence will be more common before V+*ing* than before NP. Note that the overlap of the three *X-PRED constraints is not relevant, as those constraints won't ever apply to the same candidate set. Stylistic variation can be handled in this system simply by moving FILL(TENSE) higher or lower on the scale.

There is the further issue of what these constraints predict in terms of possible languages. Among the possibilities are those given in Table 5.8.[30] This probably not the best possible set of predictions. System 4, in particular, looks like a very unlikely language. Suppose that the crosslinguistic patterns of copula absence follows

[30]The constraint *VPPROG-PRED is somewhat problematic, as the copula is not always involved in the progressive crosslinguistically, even when there is a syntactically marked progressive and it is a compound tense. The constraint could be generalized to barring non-finite predicates. In any case, this issue is orthogonal to the immediate point of this section.

	Ranking	Property
1	FILL(TENSE) $\gg \ldots$	categorical copula absence (present tense)
2	*NP-PRED $\gg$ FILL(TENSE) $\gg \ldots$	copula presence before NP, absence otherwise
3	*AP-PRED $\gg$ FILL(TENSE) $\gg \ldots$	copula presence before AP, absence otherwise
4	*VPROG-PRED $\gg$ FILL(TENSE) $\gg \ldots$	copula presence before V+ing, absence otherwise

Table 5.8: Predicted languages

the general ranking of constraints found in AAVE, as in (11).[31,32]

(11) ϕ V+ing $\succ$ ϕ AP $\succ$ ϕ NP

This is an implicational scale: a language with copula absence before NP will have copula absence in all other environments, etc. This state of affairs can be modeled by postulating a universal ranking of the constraints in (10), in particular, the ranking in (12).

(12) *NP-PRED $\gg$ *AP-PRED $\gg$ *VPROG-PRED

The fourth constraint (FILL(TENSE)) is ranked differently with respect to these other three in different languages, giving the range of systems described in (11). This is an example of Prince's (2000) 'element hierarchies', which contrast with 'inclusion hierarchies' as ways of modeling universal markedness. Prince is concerned with strictly ranked hierarchies, and doesn't consider the possibility of probabilistic rankings. It's possible that one might recast universal rankings such as (12) in terms of ranking points: it's okay for the constraints to be close together on the ranking scale, as long as their ranking points (midpoints) conform to the order given in (12).

For completeness, I will also discuss what happens if we posit a set of constraints that form an inclusion hierarchy. In an inclusion hierarchy, the more general constraints subsume the more specific ones (Prince 2000). In the case of (AAVE) copula absence, one might posit the following constraints:

[31] In fact, it probably doesn't. See §5.4.3 below.

[32] $\succ$ is OT for 'is better than' (of elements), and contrasts with $\gg$, which is OT for 'outranks' (of constraints).

(13) *NONFIN-PRED the predicate of a sentence must be finite.
*NONVERB-PRED the predicate of a sentence must be a verb.
*NP-PRED the predicate of a sentence must not be an NP.

*NONFIN-PRED is violated by any sentence in which the predicate is not a finite VP and *NONVERB-PRED by any sentence in which the predicate is not verbal. Any candidate that violates *NP-PRED also violates the other two, and any candidate that violates *NONVERB-PRED also violates *NONFIN-PRED. No implications go in the other direction. Therefore, this inclusion hierarchy describes the implicational scale given in (11) no matter how it is ranked. In particular, if we add FILL(TENSE) to the mix (still unranked), under Anttila's (1997) system, we get the predicted probabilities of copula absence shown in Table 5.9.

input	copula absence violates	copula presence violates	% absence
doctor_{NP}(Kim)	*NONFIN-PRED, *NONVERB-PRED *NP-PRED	FILL(TENSE)	25
happy_{AP}(Kim)	*NONFIN-PRED *NONVERB-PRED	FILL(TENSE)	33
laughin_{Vprog}(Kim)	*NONFIN-PRED	FILL(TENSE)	50

Table 5.9: Constraint violations and predicted frequencies

This looks more like the observed frequencies than did the predictions from the other constraints. Table 5.10 gives the predicted frequencies of copula absence by following grammatical environment for the possible partial rankings of these constraints on Anttila's (1997) system.[33]

Since the constraints *NONFIN-PRED, *NONVERB-PRED, and *NP-PRED form an inclusion hierarchy, they can only be crucially ranked with respect to each other

[33] The constraints are abbreviated in the table as follows:

F(T)	FILL(TENSE)
*NFP	*NONFIN-PRED
*NVP	*NONVERB-PRED
*NPP	*NP-PRED

	ranking	% copula absence		
		__ V+ing	__ Adj	__ NP
1	{F(T), *NFP, *NVP, *NPP}	50	33	25
2	F(T) ≫ {*NFP, *NVP, *NPP}	100	100	100
3	{*NFP, *NVP, *NPP} ≫ F(T)	0	0	0
4	*NPP ≫ {F(T), *NFP, *NVP}	50	33	0
5	*NVP ≫ {F(T), *NFP, *NPP}	50	0	0
6	*NFP ≫ {F(T), *NVP, *NPP}	0	0	0
7	{*NFP, *NVP, F(T)} ≫ *NPP	50	33	33
8	{*NFP, *NPP, F(T)} ≫ *NVP	50	50	33
9	{*NVP, *NPP, F(T)} ≫ *NFP	100	50	33
10	{*NFP, F(T)} ≫ {*NVP, *NPP}	50	50	50
11	{*NVP, F(T)} ≫ {*NFP, *NPP}	100	50	50
12	{*NPP, F(T)} ≫ {*NVP, *NFP}	100	100	50
13	{*NVP, *NFP} ≫ {*NPP, F(T)}	0	0	0
14	{*NFP, *NPP} ≫ {*NVP, F(T)}	0	0	0
15	{*NVP, *NPP} ≫ {*NFP, F(T)}	50	0	0

Table 5.10: Possible rerankings of inclusion hierarchy

if something else intervenes (Prince 2000).[34] As such, the only relevant rankings to consider are the rankings of Fill(Tense) with respect to the other constraints. Table 5.10 gives an exhaustive listing of such rankings. In the first one, none of the four constraints are ranked with respect to each other. This is the baseline. In the second and third rankings Fill(Tense) either dominates or is dominated by all of the constraints and copula absence or presence is categorical across all environments.

In the second set of rankings (4-6), one constraint is ranked above Fill(Tense) while the others can vary around it. This has the effect of decreasing copula absence, although not evenly across the board (except when they all go to 0). This kind of ranking can set copula absence to zero in one or more environments, according to the implicational scale encoded in the inclusion hierarchy.

The third set of rankings (7-9) are the mirror image of the second set. In this case, one constraint is ranked below Fill(Tense) and the rest. This has the effect of increasing copula absence, and ranking 9 comes the closest to an even, across-the-board increase in copula absence. Rankings 7 and 8 just change the values for one or two environments, respectively.

The final two sets of rankings (10-12 and 13-15) divide the constraints into two sets of two. Since Fill(Tense) is only ever unranked with respect to one other constraint in these rankings, there are only three possibilities: categorical copula presence, categorical copula absence, and 50/50 variation.

In general, these constraints have the following properties: Since they form an inclusion hierachy, under any ranking of the constraints, copula absence before V+ing will be at least as common as copula absence before Adj or NP, and copula absence before Adj will be at least as common as copula absence before NP. They define or predict three 'styles' with the strict ranking of environments shown in (11) (rankings 1, 4, and 9) and six (rankings 7, 8, 10-12 and 15) in which neither copula absence nor copula presence is categorical, but at least two environments are undifferentiated.

It seems that, as a theory of stylistic variation, this both predicts implausible styles and fails to predict enough styles. If speakers stylistically adjust their pattern

[34]If multiple constraints are relevant, they will always give the same result for any given candidate. For example, *nonfin-pred and *nonverb-pred will always treat candidates with adjectival predicates in the same way.

of variation according to the situation, one would expect more than three styles. Further, it seems unlikely that there should be a style of AAVE in which copula absence is possible and equally common across environments (ranking 10). However, Anttila's (1997) framework was not designed as a model of stylistic variation.

The addition of floating constraints (following Reynolds and Nagy 1994) doesn't change the predictions of the grammar significantly. The partial ranking in (14) is consistent with the four complete rankings in (15).

(14) $\left\{ \begin{array}{l} \ldots\ \ldots\ \ldots\ \textsc{f(t)}\ \ldots\ \ldots\ \ldots \\ {*}\textsc{npp} \gg {*}\textsc{nvp} \gg {*}\textsc{nfp} \end{array} \right\}$

(15) a. $*\textsc{npp} \gg *\textsc{nvp} \gg *\textsc{nfp} \gg \textsc{f(t)}$
b. $*\textsc{npp} \gg *\textsc{nvp} \gg \textsc{f(t)} \gg *\textsc{nfp}$
c. $*\textsc{npp} \gg \textsc{f(t)} \gg *\textsc{nvp} \gg *\textsc{nfp}$
d. $\textsc{f(t)} \gg *\textsc{npp} \gg *\textsc{nvp} \gg *\textsc{nfp}$

Table 5.11 gives the grammaticality status assigned to copula absence in each of the following environments by each of the rankings in (15). Each ranking is assumed to be equally likely given the partial ranking in (14). The percentage of occurence of copula absence in each environment predicted by (14) is given in the last column of Table 5.11.

Environment	Ranking				% copula absence
	a	b	c	d	
__ V+ing	*	√	√	√	75
__ Adj	*	*	√	√	50
__ NP	*	*	*	√	25

Table 5.11: Predicted frequencies with floating constraints I

Even though the three ranked constraints are not in conflict, different partial rankings give different results. Table 5.12 gives all of the possible grammars with just one of these four constraints floating. Although there are more possible grammars and the details aren't quite the same, the range of possible values is similar to that found under Anttila's (1997) system. Again, because these constraints form an inclusion

Ranking		% Copula absence		
Floating	Ranked	__ V+ing	__ Adj	__ NP
*NPP	F(T) ≫ *NFP ≫ *NVP	100	100	75
*NPP	F(T) ≫ *NVP ≫ *NFP	100	100	75
*NVP	F(T) ≫ *NFP ≫ *NPP	100	75	75
*NVP	F(T) ≫ *NPP ≫ *NFP	100	75	75
*NVP	*NPP ≫ F(T) ≫ *NFP	100	50	0
*NPP	*NVP ≫ F(T) ≫ *NFP	100	0	0
*NFP	F(T) ≫ *NVP ≫ *NPP	75	75	75
*NFP	F(T) ≫ *NPP ≫ *NVP	75	75	75
F(T)	*NPP ≫ *NVP ≫ *NFP	75	50	25
F(T)	*NVP ≫ *NPP ≫ *NFP	75	25	25
F(T)	*NPP ≫ *NFP ≫ *NVP	50	50	25
*NFP	*NPP ≫ F(T) ≫ *NVP	50	50	0
F(T)	*NVP ≫ *NFP ≫ *NPP	50	25	25
*NFP	*NVP ≫ F(T) ≫ *NPP	50	0	0
F(T)	*NFP ≫ *NVP ≫ *NPP	25	25	25
F(T)	*NFP ≫ *NPP ≫ *NVP	25	25	25
*NFP	*NVP ≫ *NPP ≫ F(T)	25	0	0
*NFP	*NPP ≫ *NVP ≫ F(T)	25	0	0
*NVP	*NFP ≫ *NPP ≫ F(T)	0	0	0
*NVP	*NPP ≫ *NFP ≫ F(T)	0	0	0
*NPP	*NFP ≫ *NVP ≫ F(T)	0	0	0
*NPP	*NVP ≫ *NFP ≫ F(T)	0	0	0
*NPP	*NFP ≫ F(T) ≫ *NVP	0	0	0
*NVP	*NFP ≫ F(T) ≫ *NPP	0	0	0

Table 5.12: Predicted frequencies with floating contraints (all)

hierarchy, copula absence before V+ing is always at least as frequent as copula absence before an adjective, and copula absence before an adjective is always at least as frequent as copula absence before an NP. In addition to some rankings that give the strict ordering of environments, there are many others in which copula absence is equally frequent in two or even all three environments. Further, the stylistic range is again quantized. Since floating one constraint gives four possible rankings, copula absence (in any given environment) can only be predicted to happen at 0%, 25%, 50%, 75%, or 100%. Allowing up to three constraints to float would only allow for a few more levels of copula absence. There is no room for a style with slightly less copula absence, etc.

In Boersma and Hayes's (1999) system (which doesn't allow floating constraints), one could achieve a series of smoothly changing styles with grammars such as those in Figures 5.7 and 5.8. In these grammars, the constraints *NONFIN-PRED, *NONVERB-PRED and *NP-PRED have completely overlapping distributions (represented as one distribution labeled 'others' in the figures). The ranking point for the constraint FILL(TENSE) (F(T) in the figures) is moved depending on the style.

If FILL(TENSE) has exactly the same ranking point as the other constraints, then the grammar is the same as ranking 1 of Table 5.10, and has the same predicted frequencies of copula absence: __ V+ing 50%, __ Adj 33%, and __ NP 25%. If the ranking point for FILL(TENSE) is moved lower than the others, as in Figure 5.7, then the chance that FILL(TENSE) is ranked below the other constraints increases, and the frequency of copula absence decreases evenly across the board. If it is moved far enough away so as to approximate a strict ranking (ranking 3 of Table 5.10), we get categorical copula presence.

Conversely, if the ranking point for FILL(TENSE) is moved higher than the others, as in Figure 5.8, then the frequency of copula absence increases evenly across the board. If it is moved far enough away so as to approximate a strict ranking (ranking 2 of Table 5.10), we get categorical copula absence.

However, certain problems remain. The first is the range of grammars/styles predicted. These are partly defined by the constraints, so the grammars/styles predicted by these constraints when they are probabilistically ranked still include the odd styles

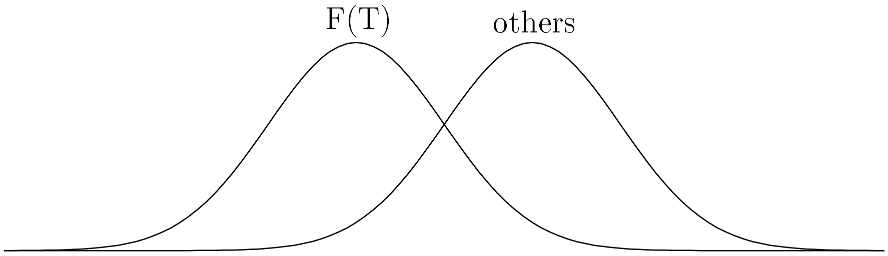

Figure 5.7: Style with less frequent copula absence

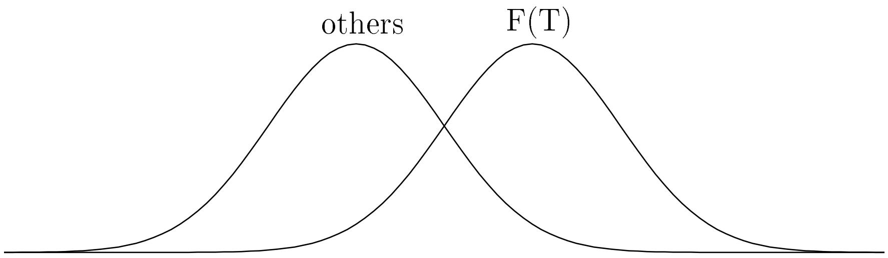

Figure 5.8: Style with more frequent copula absence

enumerated in Table 5.10. Second, perhaps the most interesting feature of Anttila's (1997) analysis of the Finnish data is that it derives the frequencies in the text from an underlying grammar that does not specify any frequencies. The analysis of stylistic variation in OT sketched here boils down to adjusting the position of one constraint along a continuous scale. It ends up looking fairly similar to a Variable Rules analysis: The ranking of environments inherent in the inclusion hierarchy corresponds to the non-categorical constraints on the Variable Rule, while stylistically adjusting the position of FILL(TENSE) corresponds to stylistically adjusting the input value.[35]

In fact, Boersma and Hayes's (1999) model is not only a model of grammar, but also the output of their Gradual Learning Algorithm. The Gradual Learning Algorithm is capable of abstracting a grammar (ranking constraints) from input including free variation, and of matching the frequency of each form in the input. This raises the question of whether the system sketched above for modeling stylistic variation is also learnable, and from what kind of input.

5.3.5 Variation and social value in OT

In this subsection I will argue that OT grammars such as those described above allow, to some extent, for an association of social value with a pattern of variation (a system), but not with individual forms used in individual utterances (an instance). The specific examples treated in this section will make reference to the grammars based on the inclusion hierarchy constraints (13), but all of the conclusions should apply equally to grammars based on the other set of constraints.

These OT models are based on the same kind of random application of probabilities as variable rules. For example, on Boersma and Hayes's system the exact ranking of constraints is determined for each evaluation by randomly selecting a point near each constraint's ranking point. Similarly, on Anttila's or Reynolds and Nagy's

[35]The correspondence would be less striking if *NFP, *NVP and *NPP didn't lead to grammars in other rankings in which copula absence is equally prevelant across all environments. Perhaps a better set of constraints could be found. On this note, one big contrast between the constraints I've been playing with for copula absence and Anttila's constraints is that Anttila's constraints were based on both plausible universals and categorical facts in the same language. Perhaps an OT analysis of categorical effects in AAVE syntax would provide some better constraints to play with.

system, the unranked constraints are randomly ranked for each evaluation run. If such a system is meant as a direct model of linguistic competence, it will have the same problem as the variable rules model did in terms of associating social value with particular instances: Since the choice of rankings and therefore of variants is random (according to specific probabilities), hearers can't attribute any intentionality to speaker's "choice" of variants. Without such intentionality, it's hard to see how there could be meaning.

Note also that it wouldn't do to associate social value with forms in the underlying representation. If any constraints sensitive to that social value are ranked highly enough, they will override the intricate interactions which provide the model of the non-categorical grammatical constraints. If there are no constraints sensitive to the social value information, or if such constraints are ranked low in the hierarchy, then the choice of forms will again be handled by the (randomly ranked) grammatical constraints. This means that even if a speaker picked an underlying representation with some social value, this choice could get overriden by the higher ranked constraints, producing some other variant. A hearer using the same system would have not way to know which variant the speaker actually intended.

Associating social value with a particular pattern of variation, on the other hand, is simply a matter of associating social value with a particular ranking of constraints. That is, speakers would have different grammars (rankings) for different styles. Now, it turns out that in some cases, associating social value with a grammar (i.e., a ranking) may be sufficient to associate social value with a particular form. For example, take a model where there are only a few discrete style-grammars, such as the rankings in Table 5.13, taken from Table 5.10. If these are the only rankings available, and a listener hears a speaker use copula absence before an NP, then the listener can deduce that the speaker must have been using ranking 1 and associate whatever social value goes with ranking 1 with the speaker's use of that one form. If the speaker uses copula absence before an adjective, then the listener can attribute a social value indeterminate between the values for rankings 1 and 4 with the speaker's use of that form, etc. But this won't apply if the range of style-grammars includes some that are not differentiated (like those in Table 5.13) in which forms they allow, but only

	ranking	% copula absence		
		__ V+ing	__ Adj	__ NP
1	{F(T), *NFP, *NVP, *NPP}	50	33	25
4	*NPP ≫ {F(T), *NFP, *NVP}	50	33	0
5	*NVP ≫ {F(T), *NFP, *NPP}	50	0	0
6	*NFP ≫ {F(T), *NVP, *NPP}	0	0	0

Table 5.13: A few discrete styles

in the probabilities with which they produce those forms.

What should a listener do when confronted with an overt copula? Since overt forms of the copula are consistent with all of the rankings in Table 5.13, nothing can be deduced about the grammar behind it. This means that speakers can't meaningfully use the overt copula at the instance level on this model. Such instances only contribute to the overall style.

There is at least one other way in which this system won't scale up: if two variables in a grammar are associated with independent social values. For example, suppose a language has variables associated with formality and different variables (subject to different OT constraints) associated with sounding confident. Certainly these dimensions are independent: one might want to sound more or less confident in both formal and informal speech. To model this under the system sketched here, one would need four rankings of constraints: the confident formal grammar, the confident informal grammar, the unconfident formal grammar, and the unconfident informal grammar. The number of style-specific grammars increases exponentially with the number of (differently socially valued) variables accounted for. Even if each variable only had two patterns of use (high and low use of one variant), two orthogonal variables require four grammars, three require eight, etc. The number of different levels of use within each variable gives the exponent of the exponential progression. In the limiting case of ranking on a continuum (as with the Boersma and Hayes (1999) model), the number of grammars is potentially infinite: for every different nuance of style someone could care to express, there is a different grammar.

The alternative is to associate the social value not with entire grammars (rankings) but with the relative rankings of small sets of constraints within the grammar. This isn't any different from associating social value with each variable directly.

5.3.6 Summary

In this section we have seen that the OT model can be generalized to account for variation and for non-categorical constraints on variation. However, the OT model is not well suited to handling socially meaningful variation. The most flexible version (Boersma and Hayes's (1999) probabilistic OT), can handle continuous stylistic variation. However, all OT accounts share with variable rules the view of variation as probabilistic, which entails that they do not allow any association of social value with individual instances of variants. Further, OT accounts still stipulate the ranking of environments: either by stipulating the universal hierarchies of constraints or by encoding the ranking of environments into an inclusion hierarchy. The most interesting feature of these OT models is that they connect the non-categorical constraints on variation to the analysis of categorical phenomena in the same language.

5.4 Functionalist accounts

The Variable Rules model holds that the constraining effect of different environments of a variable should be encoded directly in the grammar, as factors affecting the probability of application of a rule. The OT models encode categorical and non-categorical constraints in the same way: as violable, ranked constraints. Given the OT framework, allowing for variation (leaving constraints unranked) automatically makes some predictions about the frequency of each variant across environments. Functionalist accounts differ from both VR and OT in that the constraining effect of different environments is not stipulated in the grammar at all. The grammar provides free variation or optional rules, and functional effects in performance are behind the distribution of the variants across environments.[36] Kiparsky (1972) writes:

[36]This is not a pure functionalist model in that it assumes some formal grammar whose output is then subject to functionalist constraints.

> Labov (1969) has claimed that these frequencies are part of linguistic competence, and has developed a formalism for expressing them in grammatical rules. The alternative hypothesis would be that they are the result of general functional conditions impinging on speech performance. (1972:223)

As such, a functionalist account would be preferable to the other two in two respects: it leads to a simpler grammar and it actually provides an explanation for the ordering of environments. It is important to note that these two benefits of a functionalist account are independent. It is possible to give a functionalist explanation for constraints that are nonetheless part of the grammar. Indeed, in that same article, Kiparsky also states:

> Functional conditions, then, enter the linguistic system in a grammaticalized form. At that point they begin to interact and conflict not only with each other, but with formal generality in the usual generative phonological sense. (1972:224)

Further, his functionalist account of variation can be seen as the precursor to the OT accounts discussed above (Paul Kiparsky, p.c.). OT constraints are (ideally) functional, and the mechanism of OT is one way of formalizing and making precise their interaction. In particular, it provides a means of making explicit quantitative predictions.

Of course, OT is not the only possible model of the interaction between functional (and other) constraints. The remainder of this subsection will consider Kiparsky's (1972, 1988) functionalist proposal without the mechanism of OT. The comparison of this account with the variable rules model (and to some extent, with the OT model) can be seen as two questions: Are all of the non-categorical constraints on variation functional? Are any non-categorical constraints on variation encoded in the grammar? If some constraint on variation could be shown to be non-functional (or counter-functional), i.e., if the answer to the first question is 'no', then such a constraint would have to be encoded in the grammar. There would be no other basis for the observed effect in language production. However, even if all of the constraints on variation are functional, or can be understood as functional, this doesn't bar their being encoded in the grammar. It merely shifts the burden of proof to those who maintain that they are.

5.4.1 Social value on a functionalist account

One consequence of considering functonalist accounts as separate from their possible instantiation in an OT model is that they are not necessarily subject to the same shortcomings with respect to modeling the social value of variation.

First, there is nothing blocking the association of social value with individual forms in a functionalist account, since it need not assume that the choice between forms is (entirely) probabilistic. Since styles don't correspond to particular grammars, they can be as fine-grained as necessary, simply built up out of a speaker's linguistic choices over some stretch of time.

Further, if listeners can assume that speakers used one form or the other on purpose, it is possible to account for an interaction between non-categorical constraints and social value. If a speaker uses a variant in a disfavoring environment, then a hearer can deduce, via Gricean reasoning, that the speaker probably really wanted to convey the social value associated with that variant. Consider final t/d deletion, the example that Kiparsky focussed on. Deletion of t/d is inhibited when the /t/ or /d/ is the sole reflex of a morpheme, as in regular past tense. Assuming that this variable is associated with some social value, deleting the final /t/ or /d/ of a regular past tense verb must mean that conveying the social value was important enough to risk the possibility of the listener mistaking the past tense verb for a present tense form. Similarly, t/d deletion is sensitive to the sonority of the following segment (i.e., the first segment of the following word). Retaining t/d even when the following segment has low sonority would mean that the speaker went to extra articulatory trouble to be sure to pronounce the final /t/ or /d/. Again, a listener could interpret this to mean that the speaker especially cared to convey the social value associated with retaining t/d.

Note that this explanation for the effect of context on social value is dependent on the listener having and exploiting either knowledge of the functional constraint in question, or knowledge of distribution of variants across contexts. That is, while the production data alone may be consistent with a functionalist explanation that requires no direct representation of non-categorical constraints, the perception data show that speakers must know the constraints, in one form or another.

5.4.2 Empirical tests

The importance of Kiparsky's (1972, 1988) work is that he goes beyond an appeal for functional explanation and presents a concrete proposal. He proposes that variation is subject to a functional constraint called the distinctness condition: the application of phonological rules is inhibited in environments where their application would erase morphological distinctions. This constraint predicts the basic facts of t/d deletion: it is most common in monomorphemes like *most/mos*, less common in irregular pasts likes *kept/kep* and still less common in regular pasts like *steeped/steep*. (Some frequencies are given in Table 5.14, from Guy 1996:227.) Guy points out that while the distinctness condition directly predicts the contrast between monomorphemes and regular past forms, it can only predict the intermediate status of irregular past forms if it is interpreted as a scalar constraint: "the higher the functional load on a class of targets, the more resistance they exhibit to a process that would eliminate them." (1996:228)

	N	% Deleted	Factor weight
Monomorphemes (e.g., *mist, bold*)	658	38.1	.64
Irregular Past (e.g., *lost, told*)	56	33.9	.55
Regular Past (e.g., *missed, tolled*)	181	16.0	.23

Table 5.14: Guy's English coronal stop deletion by morphological class

Because Kiparsky attempts an explain the facts, and not just account for them, his proposal is subject to a stringent test. If a functionalist account is to be a true explanation of a phenomenon, then the same functionalist pressures must be active in every language. This is where OT accounts using functionalist constraints differ from the performance-based functionalist account considered here. In OT, all constraints are active in all languages, but in different languages different constraints can be more important. This is possible because the constraints are in the grammar, and their ranking is something that speakers learn.

Guy (1980) took up Kiparsky's (1972) challenge to a variable rule account of t/d deletion.[37] Guy argued that if the same grammatical factor could have differing effects on a variable in different varieties, this would show that speakers must learn such non-categorical constraints and that they are therefore a part of the grammar. Indeed, Guy found just such a situation by comparing the constraints on t/d deletion among white speakers in New York and Philadelphia. As shown in Table 5.15,[38] while the effect of a following consonant or vowel was similar in both varieties, the effect of a following pause was radically different.

Environment	__ #C	__ #V	__ ##
New Yorkers	100%	56%	83%
Philadelphians	100%	38%	12%

Table 5.15: Coronal stop deletion by following segment

Kiparsky (1988) replied by pointing out that the difference in the treatment of a following pause in the two varieties might follow from some other difference. He illustrates this with a hypothetical example: Suppose that t/d deletion were to only apply to unreleased stops, and that word-final stops were obligatorily unreleased in word final position before a pause (and elsewhere) for New Yorkers while they were only optionally unreleased for Philadelphians before a pause.[39] Since this difference affects the input to the t/d deletion rule, it would account for the different ordering of the following environments for that rule. With this argument, Kiparsky showed that, without controlling for other, potentially relevant differences in the dialects, Guy

[37] In particular, to Labov et al.'s (1968) account of t/d deletion.

[38] From Kiparsky 1988:387.

[39] Kiparsky seems to assume that the hypothetical difference in the environments for unreleased stops is somehow different from Guy's difference in the environments for t/d deletion. For the unreleased stops, it's a difference between a rule applying categorically (New York) and applying optionally (Philadelphia) in the environment in question, as opposed to applying optionally, but at different rates in the different varieties. However, categorical application can be seen as the limiting case of frequent, optional application.

(1980) had not in fact provided a counterexample to the functionalist explanation of this phenomenon.

Guy (1996) presents two more arguments against Kiparsky's (1972) functional proposal. In order to discuss these, it is necessary to first introduce one more aspect of the original proposal. Based on a survey of historical changes in which phonology did or did not affect morphological categories, Kiparsky (1972) develops the following typology of morphological categories:

(16)

Weak	Strong
verb agreement	verb agreement
(languages without pro-drop)	(languages with pro-drop)
case	number
	tense
	gender

The strong categories are those that bear more functional load, the weak categories those that bear less. The systems of grammatical case that Kiparsky studied and verb agreement in languages without pro-drop carry only recoverable information.[40] Gender is the odd one out here, behaving diachronically as a strong category although the grammatical gender of a noun should always be recoverable from the lexical entry for the noun.[41]

Guy's (1996) first argument has to do with past participles in English. For regular verbs, the past participle has exactly the same form as the past tense. In the past participle, however, the suffix bears only redundant information, according to Guy.[42] Nonetheless, past participles are deleted infrequently, just like regular pasts, as shown in Table 5.16, from Guy 1996:231.[43]

Guy argues that the distinctness condition should not prevent t/d deletion in past participles: if the distinctness condition can take into consideration the larger context,

[40] One would not expect case to be a weak category in the Australian languages studied by Nordlinger (1998).

[41] The exception is homophones with different gender assignments, such as *die Stadt* 'the city' and *der Staat* 'the state' in German (Thomas Wasow, p.c.).

[42] Actually, given that the participle can appear without *have*, perfective aspect is better analyzed as being expressed by the participle. Guy does not differentiate the data he presents according to the syntactic context of the participle.

[43] The results for the three categories also shown in Table 5.14 are not exactly the same here, as these results come from a different corpus.

	N	% Deleted	Factor weight
Monomorphemes	739	38.6	.64
Irregular Past	74	35.1	.60
Regular Past (e.g., *talked*)	157	19.1	.41
Past Participles (e.g., *have talked*)	74	17.6	.35

Table 5.16: Guy's Cornonal stop deletion in 4 morphological classes

the information is redundant, and even if it can't, "'participle' is not one of the strong categories that resist erosion." (1996:230) This last argument is less than convincing, however, since the participle is part of the tense/aspect system of English, so it might be expected to fall under the 'tense' category in Kiparsky's typology. A better interpretation might be that the distinctness condition predicts deletion in participles to be intermediate, as it is for irregular past tense verbs. In both cases, the final t/d does (arguably) represent a morpheme, although one that bears only redundant information. One might object that there is a difference in that for the irregular pasts the final t/d is redundant within the word, while in the participles it's only redundant within the sentence. However, note that Kiparsky's basis for classifying case as a weak morphological category was that it supplies information already contributed by something else in the sentence, such as word order or a preposition. Under this interpretation, the participles do constitute a counterexample to Kiparsky's proposal.

Guy's (1996) second argument has to do with denasalization in Popular Brazilian Portuguese (PBP). The morphological category threatened in this case is number agreement within 3rd person verb forms. For regular verbs, the only difference is nasalization of the final vowel:[44]

(17)

3rd sg	3rd pl	gloss
fala	falam	'speak'
sobe	sobem	'go up'

Guy's results for denasalization by morphological class are given in Table 5.17.

At first glance, this looks wildly counterfunctional: regular plural verbs are denasalized more than monomorphemes. However, the picture is somewhat complicated

[44]Rendered orthographically with a ˜ over the vowel, or with a following *m*.

	% Denasalized	N
Noninflectional nasality (e.g., /õmĩ/ 'man')	66	1258
'Irregular' plural verbs (redundant marker) (e.g., /fizerũ/, cf. sg /fez/)	67	1446
Regular plural verbs (unique marker) (e.g., /sobĩ/, cf. sg /sobi/)	85	3783

Table 5.17: Guy's Denasalization in PBP

by the fact that, in addition to the phonological rule in question, the syntax of PBP makes subject-verb agreement optional in the first place. Guy estimates the rate of underlying agreement by considering forms that are not subject to denasalization (forms with final stress, which blocks the rule), and finds that syntactically, verbs agree 63% of the time. Assuming that syntactic agreement occurs at the same rate in all verbs, the rate of denasalization given for regular plural verbs in Table 5.17 would only fall to 76%, still higher than the rate for monomorphemes.

This argument is based on the premise that 'number' is a strong category. However, the data Guy actually examines fall under the 'agreement' category, which is strong or weak depending on whether the language has pro-drop. Guy does not indicate if PBP has pro-drop or not. I interviewed three speakers from Rio, and found that their variety at least does have pro-drop:

(18) a. Já comi
Already eat-1sg.past
'I already ate.'

b. Já comeu
Already eat-3/2sg.past
'She/he/you already ate.'

Interestingly, there is some syncretism in the person/number inflection, such that (18b) is actually ambiguous between third and second person. This suggests that pro-drop in Brazilian Portuguese might bear some similarity to Japanese/Chinese pro-drop, which is not supported by any person/number inflections on the verb. If this is true, then this casts some doubt on the treatment of agreement as a strong category in Brazilian Portuguese.

However, even a knock-down argument against a given functional explanation of some non-categorical constraint would only be an argument against that one functional explanation. Likewise, a solid demonstration of different orderings of environments in different varieties would only show that that variable was not constrained functionally. These would be interesting results, as they would show that grammars can include this kind of information. However, just as functional explanations don't rule out grammaticization, the fact that some non-categorical constraints are grammaticized wouldn't rule out the possibility that others are actually purely functional. So what is known that might bear on the issue of whether the effect of the following grammatical environment on AAVE copula absence is functional? Two kinds of evidence are available in the literature: studies of variable copula absence in AAVE and other Englishes/creole varieties, and information about the copula in other languages. Both kinds of data are relevant, as any functional constraint posited to account for the data in AAVE should be potentially apparent cross-linguistically.

5.4.3 A functional explanation for copula absence?

Rickford (1998) provides a summary of copula absence by following grammatical environment in a number of varieties bearing different relationships to AAVE. His table 6.16 (1998:190) is reproduced here as Table 5.18.[45] The historical attestations are studies of "ex-slave recordings," early recordings of African Americans born in the mid to late 1800s. The diaspora recordings are modern recordings of speakers descended from African Americans who left the US to settle in Nova Scotia, Liberia, and the Dominican Republic. The varieties spoken by these speakers are thought to be sister varieties to modern day AAVE, and have been relatively isolated so that they bear little influence from other languages. The creole varieties studied are all English-based creoles, mostly with African substrates. The white American English varieties are all from the South, where one would expect mutual influence with AAVE.

[45] In this table, percents are marked with %. All other figures are Varbrul weights.

	NP	Adj	Loc	V+ing	gon
Historical attestations					
Ex-slaves (Bailey 1987)	12%	29%	15%	71%	100%
Ex-slaves (Poplack and Tagliamonte 1991)	.39	.27	.67	.72	.78
Diaspora recordings					
Samaná (Poplack and Sankoff 1987)	.41	.19	.23	.46	.59
Samaná (Hannah 1996)	.12	.44	.42	.89	.93
ANSE[a] (Poplack and Tagliamonte 1991)	.31	.46	.49	.69	.73
LSE[b] (Singler 1991) Carolina	43%	93%	100%	97%	100%
LSE[b] (Singler 1991) Albert	32%	65%	94%	85%	100%
LSE[b] (Singler 1991) Slim	36%	43%	91%	79%	100%
Creole varieties					
Hawaiian Creole (Day 1973)	63%	72%	62%	94%	No data
JC[c] 1960 (Rickford 1996a)	28%	81%	18%	86%	100%
JC[c] 1991 (Rickford 1996b)	4%	59%	28%	58%	93%
Bajan 1980s (Rickford and Blake 1990)	.08	.42	.54	.65	.77
Bajan 1991 (Rickford 1992)	.07	.71	.52	.89	1.00
NSLE[d] (Singler 1991) basilect	20%	92%	23%		
NSLE[d] (Singler 1991) mesolect	93%	100%	100%		
NSLE[d] (Singler 1991) acrolect	5%	13%	0%		
Trinidadian groups (Winford 1992)	1%	79%	90%	94%	97%
Trinidadian individuals (Winford 1992)	1%	30%	53%	70%	50%
White American English					
White Mississippi *are* (Wolfram 1974)	31%	49%(Adj/Loc)		66%	86%
White Mississippi *is* (Wolfram 1974)	8%	16%(Adj/Loc)		18%	18%
White East-Texas (Bailey and Maynor 1985)	2%	10%	8%	34%	54%
African-American Vernacular English					
is, NYC Thunderbirds (Labov 1969)	.2	.48	.36	.66	.88
is, NYC Jets (Labov 1969)	.32	.36	.52	.74	.93
is, NYC Cobras (Baugh 1979)	.14	.72	.31	.59	.78
is+*are*, Detroit WC (Wolfram 1969)	37%	47%	44%	50%	79%
is, Los Angeles (Baugh 1979)	.32	.56	.29	.66	.69
are, Los Angeles (Baugh 1979)	.25	.35	.69	.62	.64
is+*are*, Texas kids (Bailey and Maynor 1987)	.12	.25	.19	.41	.89
is+*are*, Texas adults (Bailey and Maynor 1987)	.09	.14	.15	.73	.68
is+*are* East Palo Alto (Rickford et al. 1991)	.29	.47	.42	.66	.77

[a]African Nova Scotian English, [b]Liberian Settler English, [c]Jamaican Creole,
[d]Non-Settler Liberian English

Table 5.18: Rickford's Summary of copula absence rates

The last part of the table gives the results of several different studies of AAVE around the US. Thus the varieties represented in Table 5.18 are not unrelated to each other.[46] Their very relatedness should work with any functional pressure towards a uniform ordering of the following grammatical environment.

It is clear from this table that there is general agreement as to the ordering of environments. However, the agreement is not perfect. Most prominently, there is a striking lack of agreement on the ordering of the Adj and Loc environments. Among the datasets listed in this table, 15 have more copula absence before Adj than before Loc, while 12 have more copula absence before Loc than before Adj. One might attribute this to some functional constraint (cf. *NONVERB-PRED in the OT analysis above) which doesn't distinguish between these two. The variation in their ranking across the datasets would be the result of statistical noise. Such an explanation would be stretched, however to account for the large differences between Adj and Loc for Liberian Settler English (Albert and Slim) (65%/94% and 43%/91%), Jamaican Creole (1960) (81%/18%), Non-Settler Liberian English basilect (92%/23%), and the NYC Cobras *is* (.72/.31).

Other outliers include the high rate of copula absence before NP for ex-slaves in Poplack and Tagliamonte's (1991) study, Samaná speakers in Poplack and Sankoff's (1987) study, and for *is* for Los Angeles speakers in Baugh's (1979) study; the high rate of *are* absence before adjectives in Baugh's (1979) study; and the relatively low rate of copula absence before V+ing for Liberian Settler English speakers Albert and Jim (Singler 1991).

To summarize, Table 5.18 shows both striking similarity and non-trivial differences across datasets, and both need to be explained.[47] There are two general possibilities involving functionalist explanations: (1) A functional constraint is at work in all of the synchronic grammars, but its effects are distorted in some varieties by some other difference between the varieties (cf. the discussion of t/d deletion and unreleased

[46]Rickford is researching whether AAVE has creole origins, using the creole varieties as a point of comparison and the historical attestations and diaspora recordings as potential sources of information about earlier stages of AAVE.

[47]Although some of the difference between the data sets could be due to differences in e.g., coding across the different studies.

stops above). (2) A functional constraint was involved in the diachronic development of these systems, but it got grammaticized, opening up the possibility for arbitrary, learned differences between languages.

One possible kind of functional constraint (and the one tacit in the OT constraints given in §5.3.4) has to do with the canonical part of speech of predicates. Since finite verbs are the canonical predicates, one might expect that the further a category is from finite verb, the more likely the language would 'help' it become a predicate—with a copula of some sort. The underlying reason for this could have to do with canonical predicates carrying tense information, and tense information having more affinity with verbs semantically. If there is a functional constraint along these lines, one would expect to find it reflected cross-linguistically. To put it differently, functional constraints, not being learned, should be universal. Any universal constraint should be able to leave its mark on language evolution, because language change progresses through variation. Functional constraints on variation should therefore favor particular systems in the long run, and the effect of a functional constraint should be apparent in typological study. According to the proposed constraint, languages should only allow NP predicates without copular support if they also allow adjective and locative predicates without copular support, and those only if they also allow non-finite verbs to head sentences.[48] Indeed, any functional constraint capable of producing the distribution of coupla absence in AAVE should produce the same cross-linguistic typological pattern.

To test this prediction, I studied the reports on 18 languages prepared by John McWhorter under the auspices of the copula project at Stanford University.[49] These reports provide an overview of copular constructions (what Hengeveld (1992) calls 'non-verbal predications') in: Bambara, Bengali, Ewe, Finnish, Gã, Haitian Creole, Hindi, Hungarian, Igbo, Indonesian, Jacaltec, Nahuatl, Nama, Sranan, Swahili, Vietnamese, Yagaria, and Yoruba. The information was collected from grammars

[48] Of course, it's always possible that other factors have intervened in the development of the languages that don't fit the pattern. But if we can't observe its effect cross-linguistically, how do we know that a proposed constraint is really an extragrammatical functional factor and not grammaticized in the language in question?

[49] "Copula Contraction and Absence in Vernacular Black English and Other Varieties", NSF grant BNS-8913104, PI John Rickford.

(usually multiple sources per language) and some consultation with native speakers. In addition, Hengeveld (1992) presents a typological study of non-verbal predication. Among the languages in his sample, the following allow copulaless clauses with NP, AP or locative predicates:[50] Babungo, Chukchee, Gilyak, Guaraní, Hixkaryana, Ibambura Quechua, Jamaican Creole, Ngalakan, Ngiyambaa, Tagalog, Tamil, Thai, and Yessan-Mayo.

The first thing that is clear from this data is that the set of environments for *be* in various Englishes is not necessarily treated uniformly in other languages. There is a tendency for what McWhorter calls the "equational" and "attributional" (roughly NP and AP) sentences to involve a common form of the copula, while locatives use a different formative. Progressive is, of course, not always a compound tense, and even when it is, the auxiliary involved may or may not be the same formative used in the other copula environments. Nonetheless, it is still possible to look at which predicates require the support of some formative across languages.

Not all of the languages considered have (or were reported to have) compound tenses. When a language did have compound tenses (some including a progressive), the auxiliary in the compound tenses was always obligatorily overt. Of course, a language without compound tenses might be simply allowing non-finite verbs to head sentences. To determine whether this is the case would require close study of each language to determine the tests for finiteness.

Turning now to NP, Adj and Loc, we find the following patterns. Sranan (a creole spoken in Suriname) has an obligatory copula with NP, and an optional copula with AP and Loc in the present tense. This pattern supports the proposed functional universal. Similarly, Jamaican Creole and Babungo (a Niger-Congo language spoken in Cameroon) allow locative predicates without the copula, but not APs or NPs. These are the only languages in the data set that support the functional universal (although many others don't contradict it, see below). Note that Sranan and Jamaican Creole share with AAVE many similarities in their development as creoles. Further, Babungo comes from the region that supplied the substrate languages for these creoles.

[50] This list does not include languages that only allow Hengeveld's (1992) 'zero-1' copulaless clauses, those where the predicate bears verblike morphology.

Haitian Creole and Tagalog (Austronesian, Philippines[51]) simply have no copula across the board. Ngiyambaa (Pama-nyungan, SE Australia), Ibambura Quechua (Andean, Ecuador), and !Xu (Khoisan, Namibia) have optional copula absence across the board. As such, these languages would be compatible with any implicational scale. Also in this category are Tamil (Elamo-Dravidian, South India and Sri Lanka), Yessan-Mayo (Sepik-Ramu, North New Guinea), Hixkrayana (Ge-Pano-Carib, North Brazil), and West Greenlandic (Eskimo-Aleut), which allow copula absence with locatives. For various reasons, the Adj and NP environments are not relevant in these languages.

Bambara (Niger-Congo, Mali) has an optional copula in "equational" (NP-pred) sentences and an obligatory copula (of a different form) elsewhere. McWhorter gives these examples, from Brauner 1974:[52]

(19) Bambara:

a. O ye lakòli ye.
that COP school COP
'That is the school.'

b. N'tògò ye Camara.
my-name COP Camara
'My name is Camara.'

c. N'tògò Fatumata Koné.
my-name Fatumata Koné
'My name is Fatumata Kone.'

d. Jiri ka kóró.
tree COP tall
'The tree is tall.'

[51]Language family and locations for language are as in Hengeveld 1992 or *Ethnologue*, Barbara F. Grimes, ed., web edition, http://www.sil.org/ethnologue/

[52]Rickford (1998) notes that copula absence examples in sentences giving names (e.g., (19b)) is less than clear-cut, as many languages have verbs meaning 'be named' which may have the same form as the noun 'name'. Nonetheless, it is interesting that (19b-c) show that the copula is variable in this environment in Bambara.

e. Mobili bè yan.
Car COP here
'The car is here.'

Similarly, in Jacaltec (Mayan, Guatemala and Mexico), sentences with NP predicates never take a copula, although those with AP predicates do in some cases. McWhorter gives the examples in (20), from Craig 1977.[53]

(20) Jacaltec:

a. Sonlom naj.
marimba player he
'He is/was a marimba player.

b. C'ul ix.
good she
'She is good.'

c. Itz'at ye ix.
smart COP she
'She is smart.'

d. Ay-ah-toy naj swi' te' nah.
COP-up-away he its-head the house
'He is on the roof of the house.'

Abstracting away enough to compare, both Bambara and Jacaltec have a distribution of copular forms that runs exactly counter to that found in AAVE.

A more common pattern, also at odds with the AAVE pattern, is for locatives but not NP or adjectival predicates to appear with copula support, either optionally or obligatorily (usually only in the present tense). Here I am counting as optional copula absence both free variation and variation associated with semantic differences such as temporary/permanent state. This pattern shows up in Bengali (Indo-European, Bangladesh, India and elsewhere), Chukchee (Chukchi-Kamchatkan, Northeast Siberia), Hungarian (Uralic), Indonesian, Nahuatl (Uto-Aztecan, Mexico),

[53]The form *ye* is unusual in that it appears medially in this otherwise VSO language.

Swahili (Niger-Congo, Zaíre), Vietnamese (Austro-Asiatic), and Yagaria (Trans-New Guinea, Papua New Guinea). In both Bengali and Nahuatl, the same form that is used with locatives and a progressive form shows up in the past tense for NPs and adjectives. For Bengali, McWhorter provides the examples in (21), from Ferguson 1972.

(21) Bengali:

a. Lokti kerani.
   man clerk
   'The man is a clerk.'

b. Lokti dhoni.
   man wealthy
   'The man is wealthy.'

c. Boiti tebile ache.
   book table-LOC COP
   'The book is on the table.'

d. bolchi < bole + achi
   say COP.1sg
   'I am saying'

Yet another pattern is evident in some of the languages from Hengeveld's (1992) sample. Hengeveld separates "equative" sentences (those with "referring phrases" as predicates) from "ascriptive" sentences (where the predicate denotes a property, not an individual). Gilyak (Gilyak, Eastern Siberia, Northern Japan), Guaraní (Equatorial-Tucanoan, Paraguay), Ngalakan (Gunwinyguan, Northern Australia), and Thai (Daic) allow equative sentences to be copulaless, but no others. Indeed, Hengeveld argues that equative sentences are the most conducive to copulalessness. With the exception of Jamaican Creole and Babungo, any language in his sample that allows copula absence in some environments allows copulaless equative sentences. This would seem to be in stark contrast to the AAVE pattern, as equatives (prototypically, at least) involve NP predicates. However, as the variationist studies of AAVE and related varieties have not typically considered equatives separately from predicative NPs. Therefore, it could be that equatives favor copula absence in AAVE, but are so infrequent as to have little effect on the overall distribution of copula absence before NP.

The remaining languages in the sample (Ewe, Finnish, Gã, Hindi and Yoruba) have categorical copula presence with NP, adjectival and locative predicates. However, the form of the copula can differ across these environments.

As Kiparsky (1988) argues, any universal functional consideration can potentially be overridden or otherwised disguised in particular languages. Nonetheless, this preliminary review of crosslinguistic patterns of copula presence/absence is not promising for a functional explanation of the pattern of non-categorical constraints in AAVE. Above, I suggested two possible functional explanations for the possible similarities and differences across the datasets given in Table 5.18: a functional constraint active in all languages but disguised in some, or a functional constraint that got grammaticized in the development of the varieties studied. Given the cross-linguistic evidence reviewed here, it seems unlikely that a general functional constraint of the type proposed is involved.

Perhaps the root of the similarities is to be found in the similar histories of the varieties studied. Indeed, Rickford suggests that the similarities are due to sharing a history of decreolization:

> Overall, if one simply compares the quantitative patterns of copula absence by following environment in the creole varieties and in AAVE, one is struck by the parallels between them (with one or two exceptions), and it is this parallelism which has provided one of the main planks for the hypothesis that AAVE might have been the diachronic outcome of a decreolization or variation process similar to that synchronically evidenced in the Caribeean, the Sea Islands, and Liberia. (1998:179)

Singler (1991) and Winford (1992) sketch a description of how the process of decreolization might lead to the pattern of copula absence found in modern AAVE. This model is illustrated in Figure 5.9, which is Rickford's (1998:179) adaptation of Winford's Figure 6 (1992:48). The key point is that basilects tend to have different

	Basilect	Lower mesolect	Upper mesolect	Acrolect
NP	*a* →	Invariant *is*→	*is*/forms of *be*→	Inflect. *be*
Adj	ϕ →	ϕ →	ϕ/forms of *be*→	Inflect. *be*
Loc	*de* →	ϕ →	ϕ/forms of *be*→	Inflect. *be*
Prog	*a* V →	ϕV+*in* →	(*be*)V+*in* →	*be*V+*in*
Fut	*a go* V→	ϕ *goin*+V →	(*be*) *goin to* V→	*be goin to* V

Figure 5.9: Model of decreolization in the Caribbean English Creole copula system

copulas for NP and Locative predicates, and no copula with adjectival predicates, as adjectives are just stative verbs in these varieties. Progressive and future forms are again treated separately.[54] Moving up the creole continuum, the basilectal forms are gradually replaced in all environments by forms of *be*. The differences in copula absence across different grammatical environments in the mesolects (AAVE is thought to correspond to a mesolect) correspond to how early forms of *be* come in. This model was constructed on the basis of a study of basilects, mesolects and acrolects (in Winford's case, of Trinidadian Creole). However, as Rickford points out, it is merely a description of what (may have) happened, and provides no explanation for why forms of *be* come in in the different environments at different times.

If AAVE is the result of decreolization, then it shares many things with the creoles Rickford compared it to: the process of creole genesis, the process of decreolization and/or the early establishment of a creole continuum, the fact of being a creole with an English lexifier, and (with the exception of Hawaiian Creole English) the fact of having African substrate languages. The pattern of non-categorical constraints on copula absence might be the result of any one of these factors, or of some combination of them. While functional considerations might clearly be active in the processes of creole formation and decreolization, this is distinct from claiming that functional processes are what determines synchronically the distribution of copula absence across the environments.

[54]Although in Winford's illustration, the future and progressive both involve a form that is homophonous with the copula for NP predicates.

5.4.4 Summary

In this section, I have argued that a functionalist explanation of non-categorical constraints on copula absence is fully compatible with stylistic variation, with copula absence having social value, and with non-categorical constraints affecting that social value. However, the available evidence on copula absence in AAVE, related varieties, creoles, and other languages suggests that any Kiparskian functional constraint in operation is masked in many other languages by interacting factors. This makes establishing such an explanation more difficult, as either the interacting factors would have to be enumerated, or some other means of establishing the grammar-independence of the functional constraint proposed would have to be found. On the other hand, the similarity between AAVE and the other varieties in Table 5.18 could also be explained by similar development. While functional constraints can certainly play a role in the development of creoles and other varieties, this is not the same as using functional constraints in a synchronic explanation: the pattern resulting from the historical development is still a matter of grammar synchronically. At any rate, I will argue in the next chapter that the results of the experiment reported in Chapter 4 entail that the non-categorical constraints are represented in the grammar, even if they are functionally motivated.

Finally, as noted in Section 5.4.1 above, the perception data reported in Chapter 4 suggest that speakers have knowledge of the non-categorical constraint tested, even if the production data are consistent with a functionalist explanation. According to the functionalist account how social value can be associated with individual instances (§5.4.1), in order to rate copula presence as sounding more 'educated' or 'reliable' in the disfavoring environment (__V+ing), the listeners in my experiment had to know that __V+ing is a disfavoring environment for copula presence. This knowledge could either be frequentistic (knowledge of the distribution of copula presence across environments) or qualitative (some direct representation of the functional pressure underlying the distribution), but it must be represented somehow.

If people have and use this knowledge as listeners, they may also use it as speakers, choosing copula absence or presence on the basis of how they expect their listeners to evaluate it in a certain environment. This suggests a way for functionalist constraints on variation to become grammaticized, if the variable in question is socially meaningful. Speakers who know that copula presence before a verb is uncommon, and therefore particularly charged in its social value, might avoid copula presence before verbs except when they do really want to express that social value. Since copula presence before nouns is (known to be) more common, and thus is less charged with social value, it will be used more often. In this way, the system is perpetuated doubly: by whatever functional constraint is operative, and by speakers using the forms differentially because of their social value. Further, this feedback loop mediated by social value could perpetuate a pattern even if its original motivation disappears, as in the decreolization model.

5.5 Conclusion: Social value and grammar

This chapter has considered three previous approaches to modeling non-categorical constraints on variation, with special attention to how they could handle meaningful variation. The three approaches contrast in how much they stipulate with respect to non-categorical constraints in the grammar. They also constrast in how well they can handle the social signficance of variation. One version of the OT approach (Boersma and Hayes 1999) can marginally handle stylistic variation, but no OT approch can handle the other aspects of socially meaningful variation. The variable rule approach can likewise handle stylistic variation, but not the rest. Only the functionalist approach provides a succesful (in principle) model of the social signficance of variation.

The strength of the functionalist account is that it allows for the association of social value with individual forms, because it does not (necessarily) treat variation as inherently probabilistic. On this account, the effect of the grammatical environment on the social value of a variant would follow from Gricean principles: if the speaker went out of his/her way to use a variant disfavored by the environment, then s/he must be particularly interested in conveying the social value associated with that variant. However, this explanation requires that the listener have and exploit either knowledge of the functional constraint in question, or knowledge of distribution of variants across contexts. On this view, stylistic variation or meaning-in-frequency is not the setting of the input probability to "informal" (or by a choice of grammar) but the sum of choices made by speakers over some stretch of time/in some set of interactions.

Chapter 6 discusses the kinds of linguistic knowledge required by this model and whether each should be considered a matter of grammar.