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Language Use as Part of Linguistic Theory

1.1 Substance and Usage in Phonology

This book introduces into the traditional study of phonology the notion that language use plays a role in shaping the form and content of sound systems. In particular, the frequency with which individual words or sequences of words are used and the frequency with which certain patterns recur in a language affects the nature of mental representation and in some cases the actual phonetic shape of words. It is the goal of the present work to explore to the extent possible at the present moment the nature of the relation between the use of linguistic forms on the one hand, and their storage and processing on the other.

To someone approaching linguistics from other disciplines, it might seem odd that language use has not been taken into account in formulating theories of language. However, since language is such a complex phenomenon, it has been necessary to narrow the field of study to make it manageable. Thus we commonly separate phonology from syntax, synchrony from diachrony, child language from adult language, and so on, constantly bearing in mind that interactions exist that will eventually have to be taken into account. We then go on to formulate theories for these domains – a theory of syntax, a theory of phonology, a theory of language acquisition – knowing all the while that the ultimate goal is to encompass all these subfields in one theory of language.

Early in the twentieth century, a proposal was made to distinguish the shared knowledge that a community of speakers has from the actual uses to which that knowledge is put (de Saussure 1916). Many researchers then focused their attention on the structure of that shared knowledge (called 'langue' by Saussure and 'competence' by Chomsky

1965) and paid little attention to language use in real time. The focus on competence, or the structure of language, turned out to be extremely productive. Structuralism provided linguists with a workshop of analytic tools for breaking down the continuous speech stream into units, and these units into features; structuralism postulated hierarchical relations among the units and assigned structures to different levels of grammar, organizing language and the people who study it into subfields – phonology, morphology, syntax, and semantics.

The present work proposes to demonstrate that the focus on structure needs to be supplemented with a perspective that includes more than just structure, a view that includes two other important aspects of the language phenomenon – the material content or substance of language, and language use. The SUBSTANCE of language refers to the two polar ends – phonetics and semantics – that language molds and structures, the two ends between which language forms the bridge. Language USE includes not just the processing of language, but all the social and interactional uses to which language is put. For present purposes, in the context of phonology, the frequency with which certain words, phrases, or patterns are used will be shown to have an impact on phonological structure. I will return to a discussion of these two aspects of language and the role they play in past and future theories after describing some recent developments in linguistics and related fields that suggest a need for an enlarged perspective on language.

In the domain of morphosyntax, a substantial development beyond structuralism has already taken place. The content of grammatical categories has been studied as a substantive rather than a structural matter, for example, in crosslinguistic studies of subject, topic, noun, verb, tense, aspect (Comrie 1976, 1985, Dahl 1985), mood, and so on. Also use is being studied as a prime shaper of syntactic structure (Givón 1979, Haiman 1994, Hopper and Thompson 1984, and others) and morphological structure (Bybee 1985, Bybee et al. 1994, DuBois 1985). So far, no comparable development has occurred in phonology, but there are several indicators that it is time to open up the field to new questions and new sources of data and explanation.

Despite having looked carefully at matters of structure, having defined and redefined units such as phoneme and morpheme (or formative), having shifted and reshifted levels such as phonemic and morphophonemic, we find that problems and questions still remain. Units and levels do not submit to definitions that work for every case. We still do not have strict definitions of even the most basic units, such as

segment, syllable, morpheme, and word. Instead we find variation and gradience commonplace in empirical studies, and we find phonological phenomena intimately bound up with lexicon and morphology, syntax, discourse, and social context.

Developments from outside linguistics also point to a new view of language. Studies of natural categorization by psychologist Eleanor Rosch and her colleagues have had an impact on the way that linguists view categories, including word meaning (Lakoff 1987), grammatical classes such as gender (Zubin and Köpcke 1981), verb classes (Bybee and Moder 1983), grammatical functions such as subject and topic, and phonetic categories (K. Johnson 1997, Miller 1994, and other 'exemplar' approaches to phonetic categories). In particular, these studies show that the way human beings categorize both nonlinguistic and linguistic entities is not by discrete assignments to categories based on the presence or absence of features, but rather by comparison of features shared with a central member. All category members need not have all of the features characterizing the category, but a member is more central or more marginal depending on the number and nature of shared features. Moreover, Nosofsky (1988) has shown that the perceived center of a category can shift toward the more frequently experienced members.

A second development important to linguistic modeling is the development of computer models that can reproduce apparent 'rule-governed' behavior as well as probabilistic behavior using parallel distributed processing (Daugherty and Seidenberg 1994, Rumelhart and McClelland 1986, and others). In such models, labeled connectionist models, structures are not given in advance (i.e., innate), but take their form from the nature of the input, just as neurological matter is structured by the input it receives. Connectionist models, then, are quite compatible with usage-based theories of language. Langacker (1987) and now Ohala and Ohala (1995) argue that storage of linguistic percepts should be like the storage of other mental percepts.

Yet a third recent development applicable to a large array of sciences is the study of complex systems and their emergent properties. The basic idea behind emergence as it will be applicable here is that certain simple properties of a substantive nature, when applied repeatedly, create structure. Lindblom et al. (1984) are, to my knowledge, the first to apply the notion of emergent structure in linguistics. They illustrate emergence in the following way:

> Termites construct nests that are structured in terms of pillars and arches and that create a sort of 'air-conditioned' environment. The form of these nests appears to arise as a result of a simple local behavioral pattern which is followed by each individual insect: the pillars and arches are formed by deposits of glutinous sand flavored with pheromone. Pheromone is a chemical substance that is used in communication within certain insect species. Animals respond to such stimuli after (tasting or) smelling them. Each termite appears to follow a path of increasing pheromone density and deposit when the density starts to decrease. Suppose the termites begin to build on a fairly flat surface. In the beginning the deposits are randomly distributed. A fairly uniform distribution of pheromone is produced. Somewhat later local peaks have begun to appear serving as stimuli for further deposits that gradually grow into pillars and walls by iteration of the same basic stimulus-response process. At points where several such peaks come close, stimulus conditions are particularly likely to generate responses. Deposits made near such maxima of stimulation tend to form arches. As termites continue their local behavior in this manner, the elaborate structure of the nest gradually emerges. (Lindblom et al. 1984: 185–186)

Lindblom et al. point out that the importance of this notion for linguistics is that structure can be explained without attributing a 'mental blueprint' to the creatures creating the structure – that substance and form are intimately related (see also Hopper 1987, Keller 1994). Note further that in this example and others of emergence in complex systems, substance and form are related via the PROCESS by which the structure is created.

If we apply emergence to language, the substance and use interact to create structure. The substance in question includes both phonetics and semantics. Phonetic substance has always been included in the field of phonology. Only a few phonologists have ever proposed that phonology is independent of phonetics (see Postal 1968). On the contrary, most phonologists see phonetics as motivating phonology (for a recent statement, see Hayes 1999). They have perhaps not always been serious enough about pursuing the phonetic facts, however. One prominent feature of generative phonology has been its disdain for the 'low-level' phonetic properties of speech, properties that presumably border on performance.

Semantics, on the other hand, has been considered irrelevant to phonology. This would not seem to be such a serious allegation to level at phonologists, except that phonological descriptions and theoretical works are full of references to notions such as morpheme and word boundaries – both of which delimit meaningful units – as well as to specific grammatical categories or specific morphemes. Generative phonologists and Optimality Theory phonologists have proceeded as

though the content of these categories did not matter. I have shown in Bybee (1985) that the phonological fusion of morphemes reflects their degree of semantic fusion, and in the chapters of this book, I will explore further the relation between grammatical and lexical units and phonological structure. Generative theories have largely neglected such topics: even though morphological decomposition has played an important role in the development of generative theories from *The Sound Pattern of English* to Lexical Phonology and Optimality Theory, the semantic derivations that should parallel the phonological ones have never been attempted.

While substance has found its way into phonology from both the phonetic and semantic end, USE has been systematically excluded from structuralist theories altogether. As mentioned earlier, distinctions such as langue versus parole (de Saussure) and competence versus performance (Chomsky) were specifically designed to set up a mental object that is separate from the uses to which it is put and to designate the mental object as the proper domain for linguistics. Of course, there is some value in distinguishing mental representations from the social activities upon which they are based, but totally excluding factors of use from consideration ignores the potential relation between representation and use. It is certainly possible that the way language is used affects the way it is represented cognitively, and thus the way it is structured.

In fact, a good deal of progress in morphology and syntax has been made in explaining specific phenomena by making just this assumption. It has been shown that syntactic structures are the result of the conventionalization of frequently used discourse patterns (e.g., DuBois 1985, Givón 1979), and that grammatical morphemes develop from lexical morphemes in particular constructions through increases in the frequency of use and through extension in use to more and more contexts (Bybee et al. 1994, Haiman 1994). Greenberg (1966) has demonstrated that markedness effects are directly related to frequency of use, with unmarked members of categories being the most frequent, and Tiersma (1982) has shown that this hypothesis also explains cases of local markedness in morphology. Psycholinguists have long known that high-frequency words are accessed faster than low-frequency ones, and I have argued that high-frequency irregular morphological formations tend to maintain their irregularities precisely because of their high frequency (Bybee 1985, Hooper 1976b). In all of these findings we have a dynamic aspect – language structure is becoming or remaining

because of the way language is used. Thus the emphasis on the static, synchronic language as the object of study has given way to the view of language as slowly, gradually, but inexorably mutating under the dynamic forces of language use.

Very little attention has been given to phonology in this usage-based approach to language, yet these same ideas CAN be applied to phonological phenomena with very interesting results. It is the purpose of this book to explore the phenomena that have traditionally been studied as phonology, reevaluating structural notions in terms of use and substance. The successes of structuralism in its various guises are not being discarded. Rather structural notions will first be empirically evaluated to ascertain their viability, then the basis of such notions will be considered, and the role that substance and especially, use, plays in the phenomena will be discussed. The phenomena discussed here point to a deep involvement of phonology with lexicon and grammar, and a role for both token and type frequency in shaping phonological structure. A dynamic view of language is taken here, one that integrates both synchronic and diachronic sources of explanation.[1]

1.2 Some Basic Principles of a Usage-Based Model

The ideas that I will apply to phonology are for the most part already present in the literature and are now shared by a number of linguists, phoneticians, and psychologists. A brief statement of these ideas follows.

1. Experience affects representation. The use of forms and patterns both in production and perception affects their representation in memory. High-frequency words and phrases have stronger representations in the sense that they are more easily accessed and less likely to undergo analogical change. Low-frequency words are more difficult to access and may even become so weak as to be forgotten. The lexical strength of words may change as they are used more or less in different contexts. Patterns (represented as schemas, see below) that apply to more items are also stronger

[1] The phonological theory developed here is quite different from Natural Generative Phonology (NGP) (Hooper 1976a). For while NGP had very concrete lexical representations, much involvement of morphology and the lexicon with phonology, and the same view of the relation of synchrony to diachrony, it was a structuralist theory and provided no means of representing the impact of language use on language structure.

and more accessible, and thus more productive than those applying to fewer items. This is in contrast to modular approaches in which representations and rules or constraints are all static and fixed, and in which all rules or representations in the same component have the same status (for instance, all being equally accessible no matter how many forms they apply to).

2. Mental representations of linguistic objects have the same properties as mental representations of other objects. Of course, this is the simplest assumption we can make – that the brain operates in the same way in different domains. One consequence of this assumption is that mental representations do not have predictable properties abstracted away from them, but rather are firmly based on categorizations of actual tokens. As Langacker (1987) and Ohala and Ohala (1995) have pointed out, if predictable properties are taken away from objects, they become unrecognizable. (See Chapter 2 for further discussion.)
3. Categorization is based on identity or similarity. Categorization organizes the storage of phonological percepts. What form this categorization takes is an interesting question and one that can be approached through phonetic and psychological experimentation as well as through analogies with findings in other perceptual domains. From structural linguistic analysis we can already identify many different types of relations among linguistic objects – for example, the relation between two phonetic tokens of the same word, that between tokens of the same morpheme in different words, and that between two similar phones in different words in the same or different contexts.
4. Generalizations over forms are not separate from the stored representation of forms but emerge directly from them. In Langacker's terms, there is no 'rule/list separation' (see Chapter 2). Generalizations over forms are expressed as relations among forms based on phonetic and/or semantic similarities. New forms can be produced by reference to existing forms, but most multimorphemic words are stored whole in the lexicon.
5. Lexical organization provides generalizations and segmentation at various degrees of abstraction and generality. Units such as morpheme, segment, or syllable are emergent in the sense that they arise from the relations of identity and similarity that organize representations. Since storage in this model is highly

redundant, schemas may describe the same pattern at different degrees of generality (Langacker 2000).

6. Grammatical knowledge is procedural knowledge. Anderson (1993) and Boyland (1996) distinguish declarative or propositional knowledge (e.g., 'Washington, DC is the capital of the United States') from procedural knowledge (how to drive a car, tie your shoelaces, and so on). While linguistic knowledge is in part declarative (in the sense that we can cite the meanings of words, for instance), much linguistic knowledge is procedural (Boyland 1996). A native speaker can form an acceptable sentence quite automatically, yet be unable to explain how this was done or to list what the properties of an acceptable sentence are. Thinking of grammatical constructions as procedural units has profound consequences for our view of phonology. Phonology then becomes a part of the procedure for producing and decoding constructions, rather than a purely abstract, psychological system.

1.3 The Creative Role of Repetition

Usage-based functionalism emphasizes language as a conventionalized, cultural object. In order to understand the nature of language, we need to understand what it means for behavior to be conventionalized. Haiman (1994, 1998) discusses grammar as ritualized behavior and points to various properties of both ritual and grammar that are the result of repetition. It is useful here to distinguish between a ritual and a convention: though both represent repeated behavior, a ritual can be individual and idiosyncratic, but a convention is agreed upon socially and evokes a consistent response in other members of a society (Tomasello et al. 1993). What both concepts have in common is that their structure is shaped by repetition. The following is a summary of some aspects of language that are shaped by repetition.

Through repetition we get lexical strength – strong, easily accessible representations, such as a greeting when you see someone you know or responses such as 'thank you' and 'you're welcome'; that is, any kind of learned automatic response. It is repetition that ritualizes these responses and makes them readily available. These are just extreme examples of a general phenomenon that pervades linguistic representation – repetition leads to strength of representation (Bybee 1985).

Repetition also leads to reduction of form. This is true of nonlinguistic gestures such as making the sign of the cross. It is true in nonhuman rituals: among chimpanzees (according to Plooij 1978, cited in Haiman 1994) the original gesture of lying down is reduced to just leaning slightly backwards. And it is true of language in many obvious cases. Greetings become reduced, (*how are you* becomes *hi*), grammaticizing phrases with increasing frequency reduce and compress (*going to* becomes *gonna*), and, in less obvious cases, there is a general frequency effect in reductive sound changes (see Section 1.4).

Repetition also leads to the reduction of meaning. This reduction or bleaching of meaning can be related to what Haiman calls habituation, or the loss of impact due to repetition. Habituation is also a general phenomenon, not restricted to language or to humans. It is 'a decline in the tendency to respond to stimuli that have become familiar due to repeated or persistent exposure' (Haiman 1994:7). We recognize habituation in the trivialization by repetition of great music (Beethoven's Fifth Symphony) or great art (Van Gogh's sunflowers). We also find it in language in cases where the emphatic becomes the normal. For instance, in the French negative construction *ne . . . pas*, *pas*, literally 'step', was once an emphatic added to the original negative *ne*, but is now obligatory and nonemphatic.

Finally, and perhaps most importantly, repetition leads to emancipation. In emancipation, instrumental actions are disassociated from their original motivation and are free to take on a communicative function instead. The military salute derives from the more instrumental gesture used in the Middle Ages when knights in armor greeted one another. They raised the visor of their helmet to show their faces as an indication of a peaceful greeting. The armor is gone, the visor is gone, but a reduced form of the gesture remains, though without its instrumental function. It no longer raises the visor, but it has been imbued instead with the function of communicating respect for the military hierarchy.

Applications of the principle of emancipation through repetition in language involve all sorts of cases of conventionalization, and most commonly, cases in which one communicative function is replaced by another. For instance, the inquiry into someone's current state of being, *how are you*, is not just reduced phonologically to *hi*, but also is emancipated from its original communicative value and now serves simply as a greeting. (A more conservative function of *hi* is found in some dialects of Black English where speakers commonly respond to *hi* with

fine). Emancipation is also richly illustrated in the process of grammaticization during which words lose their categoriality. For instance, verbs become auxiliaries and sometimes affixes, and also become dissociated from their lexical meaning and take on pragmatic or grammatical functions, as when *be going to* loses its motion sense and becomes a future marker.

Haiman (1994) demonstrates that the development of ritual is a common process in the animal kingdom, and by no means restricted to humans, or even primates, as dog and cat owners can attest. He further argues (Haiman 1998) that ritualization is the basis for the development of grammar. The process of grammaticization depends upon repetition and is characterized by the reduction of both meaning and form, by strong entrenchment of patterns, and by emancipation in the sense that forms in their grammaticizing constructions often shift from propositional meaning to discourse-oriented functions (Traugott 1989). Our understanding of the ritualization process can be applied to syntax, as Haiman has shown, but also to phonology, as we investigate the role of repetition in the structuring of phonological patterns and lexical representations.

1.4 Frequency Effects

Much is already known about frequency effects in language, and much remains to be learned. In this section, I will lay out the basic notions and terminology that will be taken up again in later chapters.

There are two ways of counting frequency of occurrence that are applicable to language: token frequency and type frequency. *TOKEN FREQUENCY* is the frequency of occurrence of a unit, usually a word, in running text – how often a particular word comes up. Thus *broke* (the past tense of *break*) occurs 66 times per million words in Francis and Kučera (1982), while the past tense verb *damaged* occurs 5 times in the same corpus. In other words, the token frequency of *broke* is much higher than that of *damaged*.

TYPE FREQUENCY refers to the dictionary frequency of a particular pattern (e.g., a stress pattern, an affix, or a consonant cluster). For instance, English Past Tense is expressed in several different ways, but the expression with the highest type frequency is the suffix *-ed*, as in *damaged*, which occurs on thousands of verbs. The pattern found in *broke* has a much lower type frequency, occurring with only a handful of verbs (depending upon how you count them: *spoke*, *wrote*, *rode*,