ICONICITY IN SYNTAX

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Volume 6

John Haiman (ed.)

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Proceedings of a Symposium on
Iconicity in Syntax,
Stanford, June 24-6, 1983

edited by

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JOHN BENJAMINS PUBLISHING COMPANY
Amsterdam/Philadelphia

1985

Library of Congress Cataloging-in-Publication Data

Symposium on Iconicity in Syntax (1983: Stanford, Calif.)
Iconicity in syntax : proceedings of a symposium on iconicity in syntax, Stanford, June 24–26, 1983 / edited by John Haiman.
p. cm. (Typological Studies in Language, ISSN 0167-7373 ; v. 6)
Includes bibliographical references and index.
1. Grammar. Comparative and general -- Congresses. 2. Linguistic analysis (Linguistics) -- Congresses. 3. Universals (Linguistics) -- Congresses. I. Haiman, John. II. Title. III. Series.
PI51.S98 1985
415--dc 85011047
ISBN 978 90 272 2872 7 (EUR) / 978 0 915027 31 6 (US) (Hb ; alk. paper)
ISBN 978 90 272 2871 0 (EUR) / 978 0 915027 32 3 (US) (Pb ; alk. paper)
ISBN 978 90 272 8639 0 (Eb)

John Benjamins Publishing Co. · P.O. Box 36224 · 1020 ME Amsterdam · The Netherlands
John Benjamins North America · P.O. Box 27519 · Philadelphia PA 19118-0519 · USA

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INTRODUCTION

JOHN HAIMAN

All great philosophers, Bertrand Russell once observed, have been forced to choose between consistency and credibility. And almost all of them, he added, have opted for consistency. Much the same could be said for most theoretical linguists. In their mad pursuit of a rigorous and consistent formal system, they discard mountains of relevant data which don't "fit", and manufacture scarcely smaller mountains of Linguish, which do. The fact that Linguish does not occur outside the pages of theoretical journals is no more a deterrent than the fact that the mu meson does not occur outside of an accelerator.

Neither the inherent plausibility, nor the exciting possibilities, of this research strategy, are disputed. Nevertheless, the contributors to this volume share a different outlook which may be summarized in the following way:

1. Many linguistic universals are tendencies rather than absolute restrictions;
2. They may be explained;
3. Formalism is not explanation.

All of the papers collected here explore one kind of functional explanation for various aspects of linguistic form: that linguistic forms are frequently the way they are because, like diagrams, they resemble the conceptual structures they are used to convey; or, that linguistic structures resemble each other because the different conceptual domains they represent are thought of in the same way. These ideas are not new; they are simply somewhat unfashionable at the moment. They will probably continue to be unfashionable until and unless linguistics gets over its envy of physics, and given the staggering triumphs of physics since Galileo, this may not happen soon. In the meantime, however, the data and analyses assembled here may serve as a useful reminder that language (as opposed to linguish) still exists, and that there are interesting things that one can say about it.

With the partial exception of papers by Givón and Kirsner, which are of broader scope, the papers fall into three categories.

Those of part I deal with aspects of *motivation*: ways in which the linguistic form is a diagram of conceptual structure, and homologous with it in interesting ways. Bybee makes the important point that the closeness between verb stems and inflectional categories tends to reflect the conceptual closeness, or mutual relevance, of the concepts these morphological categories express. A similar point is made in passing in the contributions of both Givón and Slobin. While the principle was enunciated by Behaghel (1932:4), Bybee's paper is one of the most careful and solid documentations of its validity in universal morpho-syntax.

Tai's discussion of temporal sequence and Chinese word order develops another aspect of the iconic potential of linearity: that the order of mention in the speech chain corresponds to the order in which the concepts occur. Again, the principle was enunciated by Behaghel (ibid.), and reemphasized by Jakobson (1965) in his famous "Quest" article, recalling Caesar's veni, vidi, vici. Tai's analysis goes much further, however, in demonstrating how pervasive the principle of temporal sequence is in Chinese (and, possibly, other isolating languages which lack elaborate grammatical morphology). Of crucial importance here is Givón's passing mention of a precisely opposite principle of "actuality" (Jespersen 1949:56), restated by Givón as "attend first to the most urgent task". Givón cites this principle to motivate the finding, paradoxical in the context of Tai's analysis, that the more predictable a sentence-topic in discourse, the more likely it will *follow* (rather than precede), the comment. Givón's paper thus touches here on the most serious limitation of "linear iconicity": the problem of competing motivations for expression in a limited medium.

My own paper deals with a conceptual relationship — symmetry — for which the asymmetrical linear linguistic sign might seem to be totally unsuited a priori, and investigates some of the ways in which parallelism, balance, and antithesis may be established by morphological and prosodic diacritics.

Bolinger's paper deals with intonation, whose status has always been exceptional in discussions of the arbitrariness of the linguistic sign. Even Whitney, whose classic article on thesei or phusei is one of the most uncompromising attacks on iconicity (1875), conceded in this article that intonation was both iconic and universally so.

Nevertheless, it has been seriously argued that intonation, no less than any other linguistic signal, has become grammaticalized and arbitrary, and Bolinger takes issue with this interpretation. He urges that the underlying meaning of intonational contours in general, as exemplified by a single one,

is much more "primitive" and protean than the grammaticalized interpretations that other researchers have proposed: and that this primitive meaning is both an icon and an index of a state of mind.

Langacker's discussion of subjectivity is one of the few totally convincing (to me) analyses of the iconic function of *zero*, or non-expression. Langacker argues that, given the location and orientation of our sensory organs, there is a fundamental perceptual asymmetry between the observer, or subject, and the thing observed, the object. Non-expression of the observer's position, as in "there's snow all around __" is an icon of the absence of the oberver in those cases where subject/object asymmetry is maintained. Full expression of the observer's position, as in "there's snow all around me" is an iconic indication that the observer is part of the scene observed, while fuller, and less personal locutions for the observer, such as the coy use of phrases like "the author" or "der Verfasser dieser Zeilen", are used to indicate that the observer is treated no differently from any other entity on the perceptual stage.

Hopper and Thompson's paper is also a discussion of the significance of zero. Broadly speaking, the categories "noun" and "verb" are universal and distributed in such a way that "time-stable" concepts are represented by nouns, and non-time-stable concepts, by verbs (cf. Zipf 1935:231-2 for an earlier statement of this view); but lexical roots themselves are functionally relatively undifferentiated: their "nouniess" and "verbiness" is reflected in the characteristic morphological trappings — case and tense markings, etc. — with which they may occur.

Givón's wide-ranging paper also deals with the iconicity of reduced expression. He argues that reduced expression of more predicable information is in general an icon of the lesser attention that is paid to such information. Greenberg makes a similar point in passing when he notes that in some languages the articles are simply reduced unstressed forms of demonstrative pronouns, adding that "the loss of accent and phonetic reduction in the change from deixis to anaphora mirrors the loss of prominence which comes from making known, to the mere expression of something as already known, a change from new to old information". Both Givón and Greenberg here echo Zipf (1935) (and also earlier linguists like Meillet 1912/1958, Havers 1931, and Meinhof 1936) that what is familiar and predictable is given reduced expression. A somewhat similar point is made in several recent discussions of "markedness assimilation" (Andersen 1972, Tiersma 1982, Witkowski and Brown 1983, Shapiro 1983): loss of marking, and consequent formal reduc-

tion, is not so much an icon of lesser complixity, but an economically motivated index of familiarity, which is culturally determined and variable, rather than intrinsic and absolute. Whether the motivation for reduction in such cases is essentially iconic or economic is perhaps less significant than the fact that the end result of reduction in all of the examples discussed is an increase in opacity, and a loss of motivation, or of iconicity. The locus classicus for a discussion of this inverse covariation is Saussure's *Cours*.

Slobin's paper is the only one in the collection to focus on child language, long recognized to be more iconic than the grammaticalized adult code which it approximates. His paper, like most of the contributions to part II, focusses on *isomorphism*: the tendency to associate a single invariant meaning with each single invariant form. Pidgins evolving into creoles manifest the same development (cf. Hancock 1979); so does ASL (Frishberg 1975); so too do most symbolic systems whose origins are not totally shrouded in obscurity. In the absence of cogent evidence to the contrary, it seems sensible to assume that in human language ontogeny may recapitulate phylogeny.

Kirsner's paper, like Givón's, covers a wide range of issues. Deriving from the form-content tradition of the Columbia school, his work is a careful and fine-grained analysis of problems in the syntax of modern Dutch. Of particular interest is his demonstration that subtle variations in word order not only entail communicative differences, but that these differences are motivated: for example, presence of the beneficiary within the verb phrase iconically signals the presence of the beneficiary as a participant on the scene; where the beneficiary is referred to outside the verb phrase, the preferred inference is that the beneficiary may be absent.

The papers by Greenberg and Traugott deal principally with a less controversial variety of iconicity, characterized by Andersen as *automorphism*: whereas isomorphism denotes a one-to-one correspondence between a sign system and the concepts it denotes, automorphism denotes a similar correspondence between two or more parts of the same system. For Greenberg, the fact that time, space, and discourse deixis are mapped on to the same set of demonstrative words (e.g. the same form may signal first person; closeness to the speaker; immediate future) is a signal that these conceptual domains are thought of in the same way. For Traugott, the fact that the same tightly delimited set of lexical markers is found at the origin of conditional markers is a sign that the categories they originally express (time, duration/iteration, topics, interrogation, and modality) are related in human conceptualization.

Given the extremely limited number of linguistic categories relative to the vastness of experience, equally iconic motivations may in effect compete for expression in the same linguistic form. Of all sources of arbitrariness in language, this is one of the most difficult to acknowledge without sounding absurdly Panglossian. The papers in part III deal with the apparent arbitrariness that arises when different motivations are in competition for what DuBois calls "the limited good" of linguistic expression in a grammatical paradigm.

Of these papers, Wierzbicka's is perhaps the most ambitious. The "limited good" she investigates is the very restricted grammatical category *singular/plural*, the arbitrariness of which is a standard topos in all the linguistic textbooks. She undertakes to show that seemingly arbitrary distinctions like the one between *wheat* and *oats* are in fact motivated by a set of principles with predictive power.

DeLancey's paper, in contrast, argues that the familiar analysis/synthesis/analysis cycle is not motivated, in at least one case, by the familiar competing motivations of sound change (= erosion; = economy) and analogy (= iconicity), but by two competing iconic pressures: the tendency to give a periphrastic componential analysis for verbs of motion is iconically motivated, as is the countervailing tendency to give synthetic expression to concepts (*motion* and *direction*) which are perceived simultaneously. The relative speed with which the cycle repeats itself in Tibeto-Burman suggests that more than economic pressures alone are responsible for fusion and reduction here.

DuBois argues that both nominative/accusative, and nominative/ergative, morphology are iconically motivated when considered in conjunction with a loosely economical principle to achieve a simplified "preferred argument structure" in sentences, of *V NP*. Nominative/accusative morphology is motivated by the tendency to give a common marking to the agent/topic, while nominative/ergative morphology is motivated by a no less iconic tendency to give a common marking to *new* arguments. Where everything is motivated, nothing is explained: but DuBois makes the extremely important observation that split ergativity (nominative/accusative marking within an ergative system) arises in exactly those places where the given/new distinction need not be marked: typically, where the arguments are first and second person, and thus specified as given in the context of the speech act. The strongest argument in favour of the "competing motivations" hypothesis is a demonstration that where there is no competition, there is no variation.

DuBois' account of split ergativity gives some promise of accounting for the correlations noted by Silverstein 1976, while eschewing Silverstein's explanation for these correlations, which Wierzbicka 1982 has shown to be untenable.

If areas of disagreement are those which most invite future research, then such research might focus on the contrast between iconic and economic motivation, and on ways of identifying conflicting motivations cross-linguistically. In addition, the psychological reality of some of the iconic tendencies discussed in these papers is something that may be testable, and if so, definitely should be tested.

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PART I: MOTIVATION

DIAGRAMMATIC ICONICITY IN STEM-INFLECTION RELATIONS

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There is a tendency in languages for utterances to be organized around nouns and verbs, such that the position of the other elements in the utterance is often definable in relation to the position of nouns and verbs. Hence the notion that nouns phrases and verb phrases are major constituents of the clause. There are also a smaller number of elements whose position might be defined in terms of the clause as a whole. It has often been observed that the proximity of elements in a clause follows some natural (iconic) principle whose result is that elements that go together semantically tend to occur close together in the clause.[1] Following this principle, we would expect that elements whose position is defined in terms of the position of the noun would have meanings that modify or relate to the meaning of the noun or noun stem, while elements whose position is defined with respect to the verb would have meanings that modify or relate in some way to the meaning of the verb or verb stem. Similarly, elements whose position is determined with respect to the whole clause would have the entire proposition in their semantic scope.

In this paper obligatory grammatical markers, and more specifically, obligatory grammatical markers that are bound to the verb, are studied in the light of this general principle. Verbal inflections differ with respect to the extent to which they are *relevant* to the verb, that is, the extent to which their meanings *directly affect the lexical content of the verb stem*. The different degrees of relevance of verbal categories that can be inflectional are reflected diagrammatically in three ways: (1) The more relevant a category is to the verb, the more likely it is to occur in a synthetic or bound construction with the verb: (2) The more relevant a morphological category is to the verb, the closer its marker will occur with respect to the verb stem: (3) The more

relevant a morphological category is to the verb, the greater will be the morpho-phonological fusion of that category with the stem.[2]

In a cross-linguistic survey using 50 genetically and areally unrelated languages, I gathered data concerning these three predictions, i.e. data on the frequency of occurrence of inflectional categories for verbs, their order with respect to the verb stem, and their degree of fusion with the stem. These data bear out all of the predictions made by the relevance principle. In the first section of this paper, I will demonstrate how the principle is applied to the various verbal categories. In the second, I will present the data that supports the hypothesis that relevance is reflected iconically in morphological expression. In the third section, I will discuss some seemingly problematic cases.

1. The *relevance* of morphological categories

The particular verbal categories investigated were those that can be *inflectional* in some language, although derivational expression of these categories was noted also, and will be discussed here. An *inflectional category* is one that is *bound* to the stem, and whose expression is *obligatory* in the particular grammatical context.[3] If a category is obligatory the lack of a marker for the category in the context will be taken as signalling one member of the category, i.e., as the zero expression of the category. For example, the Australian language Tiwi (Osborne 1974) has a verbal prefix meaning "at a distance". It is not considered an inflectional prefix, however, because when the prefix is absent, the verb does not mean "close by", but rather says nothing whatever about distance. On the other hand, the Spanish verb *canta* has no marker for person or number, and yet is interpreted as 3rd person singular. Thus person and number are inflectional categories of Spanish.[4]

It was hypothesized in advance that the inflectional categories would be valence, voice, aspect, tense, mood, subject agreement for number, person, and gender, and object agreement for the same.[5] The categories were also defined in advance using definitions from the literature on morphology. It was recognized that these definitions might have to be modified in light of the categories actually found in the fifty languages. However, this was not the case. The definitions proved remarkably suitable for the individual languages investigated, a confirmation of the accuracy of the collective intuitions of linguists, and the inherent comparability of the languages of the world.[6] The few problems that did arise with the definitions will be mentioned below in various places.

The relevance of the category to the verb was also predicted before the survey was begun, by applying the concept of relevance to the definition of the category, in the following way. The inherent lexical content of a verb stem describes an event or state. A category is relevant to a verb to the extent that it directly modifies the event or state described. A category is less relevant if it affects or refers to other elements in the clause instead of or in addition to the verb. Note that in addition to relevance, which refers only to the scope of the modifying category, there is also a difference in the amount of semantic change resulting from the combination of the morphological category with the verb stem. The amount of semantic change ordinarily increases and decreases as relevance does, since the more relevant a category is to the verb, the more profound effect it can have on the meaning of the verb. Thus, for the most part, it will not be necessary to maintain a distinction between them. So for each category we will describe in general terms the extent to which it affects the meaning of the verb stem, as opposed to affecting other elements in the clause.

A confirming diagnostic for relevance was also considered in advance: this is the ability of the semantic notion expressed by the category, or a closely related semantic notion, to be expressed *lexically* as a component of a verb's meaning. Thus changes in valence (the number of arguments a verb can take) are morphological in many languages, but may have lexical expression in English pairs such as *sit* and *set*, *lie* and *lay*, *die* and *kill*. Thus the term *lexical expression* will be used to mean the combination in a single lexical unit of the lexical meaning of the verb with a meaning similar to that expressed in a morphological category.[7] Lexical expression is more likely when a greater meaning change results from the combination of a stem and a modifying semantic notion. Thus lexical expression becomes important in explaining why the most relevant categories are not necessarily the most frequent inflectional categories: a highly relevant category that makes a large meaning change can have lexical or derivational expression, thereby detracting from the number of instances of inflectional expression.

We turn now to the application of the notion of relevance to the verbal categories that can be inflectional in the languages of the world:

Valence refers to changes in the number and the roles of the arguments that the verb stem can take. Valence-changing categories such as transitive, intransitive and causative are relevant to the situation described in the verb stem, in the sense that any changes in the number and role of the participants can have a profound effect on the situation described by the verb stem. While

valence affects the choice of arguments of the verb, it does not refer to the arguments or have the arguments in its scope. Valence only affects the meaning of the verb stem, which then determines the number and role of the arguments selected. (Cf. subject agreement markers, which refer only to the arguments and do not affect the lexical content of the verb stem.) The change in meaning is sometimes dramatic, as in the case of causatives, predicting a tendency toward lexical expression of valence categories, such as the English *die* vs. *kill* and *fall* vs. *drop*. Very often in languages a distinction such as that between transitive and intransitive figures is an important morphological distinction, even if it does not always qualify as an inflectional one. For example, the following intransitive/transitive pairs represent a widespread distinction made in Hebrew (Berman 1978): *avad* 'work' vs. *ibed* 'cultivate'; *yaca* 'go out' vs. *yice* 'export'; and *paxat* 'lessen' vs. *pixet* 'devaluate'.

Voice indicates the perspective from which the situation described by the verb stem is viewed, and in particular, voice distinctions, according to a description by Barber 1975, change the relation that the surface subject has to the verb. In the active, the subject is the doer of the action; in the passive, the subject is affected by the action; in the reflexive, reciprocal and middle, the subject both performs the action and is affected by the action. Voice, then, is relevant both to the verb and to its arguments. In signalling a "deviant function" of the subject, it changes the roles of the NPs in the sentence, as well as the perspective from which the situation described by the verb is viewed. It is not surprising, then, that voice may be morphologically coded on the NPs of the sentence, on the verb, or on both. Distinctions in perspective that resemble voice distinctions also occur lexically, for instance in English verbs such as *buy* and *sell*, *give* and *receive*. Some reflexive verbs in Romance languages, such as Spanish, have taken on unpredictable meanings, and have become lexicalized: *acordar* 'to agree, to decide upon' vs. *acordarse de* 'to remember', *echar* 'to throw' vs. *echarse (a)* 'to begin to', *volver* 'to turn, to return' vs. *volverse* 'to become'. These examples show that the meaning expressed by voice categories is relevant enough to the verb to be combinable in lexical expression, and further that the amount of semantic change is sufficient to lead to lexicalization, at least in some cases.

Distinctions in *aspect* include different ways of viewing "the internal temporal constituency of a situation" (Comrie 1976, taken from Holt 1943). The perfective aspects (inceptive, punctual and completive) view the situation as a bounded entity, and often put an emphasis on its beginning or end. The imperfective aspects in contrast do not view the situation as bounded,

but rather as ongoing in either a durative, continuative or habitual sense. Aspect, then, refers exclusively to the action or state described by the verb. It does not affect the participants, nor does it refer to them.[8] Thus, it might be said that aspect is the category that is most directly and exclusively relevant to the verb.

Many languages have aspectual distinctions expressed lexically (*Aktionsart*), such as English *do* vs. *complete*, and *know* vs. *realize*. It is also common to find aspectual distinctions expressed in derivational morphology, as in Latin *facere* "to do" and *cōnficere* "to complete", or inchoative *amō* "I love" and *amascō* "I begin to love", *dormiō* "I sleep" and *obdormiscō* "I fall asleep". These usually express more specific meanings, such as inchoative, as in the Latin example, or completive as in Russian *užinat'* 'have supper', which contrasts with *otužinat'*, which means 'finish supper'.

When *aspect* is an inflectional category, the meaning change effected by it tends, as predicted, to be small. Hopper (1977, 1979) has argued that inflectional aspect serves to indicate how the action or state described by the verb should be viewed in the context of the whole discourse. Background information is expressed by imperfective verb forms, and the foregrounded information of the main narrative line appears in perfective verb form. This discourse use of aspect leaves the basic meaning of the verb unaffected, and only changes its relation to the discourse unit.

Tense is a deictic category that places a situation in time with respect to the moment of speech, or occasionally with respect to some other pre-established point in time. It is a category that has the whole proposition within its scope, and yet it seems to be always marked on the verb, if at all. This is so in part because it is the verb that binds the proposition together, and makes it refer to a situation that can be placed in time. But another reason that tense is marked on the verb rather than on, for example, the nominal arguments, is that, as Givón 1979 has observed, nouns usually refer to time-stable entities, while verbs refer to situations that are not time-stable.[9] Thus it is the verb that needs to be placed in time if the event or situation is to be placed in time, since the entities involved in the situation usually exist both prior to and after the referred to situation. Because tense has the whole proposition in its scope, it is somewhat less relevant to the verb than aspect, but somewhat more relevant than mood and agreement categories.

A *tense* distinction does not affect the meaning of the verb, since the situation referred to by the verb remains the same whether it is said to occur in the present or the past. Consequently, it is rare to find examples of a tense

distinction expressed lexically. To illustrate what a real case would be like, consider English *go* and *went*. They are lexicalized in form, since there is no way to predict the form of one from the other, but they do not constitute a real example of lexical expression, since they must be viewed as a suppletive expression of a general inflectional category of English. A similar pair in a language with no inflectional tense categories would be a genuine example.

Mood distinctions express what the speaker wants to do with the proposition in the particular discourse. This will include expression of assertion (indicative), non-assertion (subjunctive), command (imperative), and warning (admonitive). It also includes other expressions of the speaker's attitude about the truth of the proposition, such as indications about the possibility, probability or certainty of the truth, as well as the source of the information (evidentials). Even when mood is expressed as a verbal inflection, it is clear that it has the whole proposition in its scope, and does not only modify the verb. Furthermore, since it expresses the speaker's attitude, it does not have a direct effect on the situation described by the verb. Both of these properties make mood less relevant to the verb than either aspect or tense. Thus we might expect mood to occur less frequently as an inflectional category of verbs than aspect and tense. Since mood cannot affect the meaning of a verb, examples of lexical expression of mood-like distinctions are rare or non-existent.[10]

Agreement categories in verbal inflection refer not to the situation described by the verb, but rather to the participants in the situation. Thus agreement categories are less relevant that categories that more directly affect the meaning of the verb. Agreement categories commonly include distinct markers for person (usually 1st, 2nd and 3rd), number (singular, dual and plural) and less frequently agreement by gender or classifier. Not all of these agreement categories have the same status with regard to our hypothesis, however. While person and gender categories seem to have little effect on the meaning of a verb, and are, as mentioned above, rarely lexicalized, number is somewhat differnt. The number of participants in a situation, whether agents or recipients of an action, can affect the situation. Thus lexicalized distinctions based on singular vs. plural participants do exist, e.g. English *run* vs. *stampede*, *murder* vs. *massacre*. And, as we shall see below, some examples of systematically lexicalized or derivational expression of number showed up in the cross-linguistic survey.

To summarize this section, a diagram is presented below with the inflectional categories we have discussed arranged in approximate order of degree

of relevance to a verb. The categories on the higher end allow lexical as well as inflectional expression, while those on the lower end allow only inflectional.

Expression	*inflectional*	*lexical*
Category		
valence	x	x
voice	x	x
aspect	x	x
tense	x	
mood	x	
number agreement	x	(x)
person agreement	x	
gender agreement	x	

This scale predicts which categories are most likely to be expressed morphologically in conjunction with a verb stem. It alone does not predict which categories are the most likely to be expressed as inflectional categories. To arrive at that prediction, we must take this linear scale and bend it into a bell-shaped curve. The categories in the middle will be the highest points on the curve, that is, the most likely to be inflectional categories for verbs. The likelihood of inflectional expression drops off on either end, but for different reasons. On one end it drops off because the categories become less relevant to the verb. On this end of the scale lie the agreement categories. On the other end the scale drops off because the categories involved make larger and less predictable semantic changes, and are thus more likely to be lexicalized. Such a curve, then, emphasizes nicely the position of inflectional morphology as lying between syntactic expression and lexical expression.

2. Cross-linguistic data

The sample of languages used in this survey is described in detail in Perkins 1980, and summarized in Bybee 1985. One relevant fact will be noted here: because the sample was chosen to be representative of the languages of the world, and free of genetic or areal biases, and *not* chosen for convenience, as most samples are, it happens that in some cases the information about the languages is not complete. It is preferable to tolerate this situation, and take account of poor descriptions where they occur, than to bias the sample by chosing languages on the basis of the availability of information.

Poor documentation is not a serious problem, however, since close to 90% of the descriptions used give a very complete account of the verbal morphology of the language.

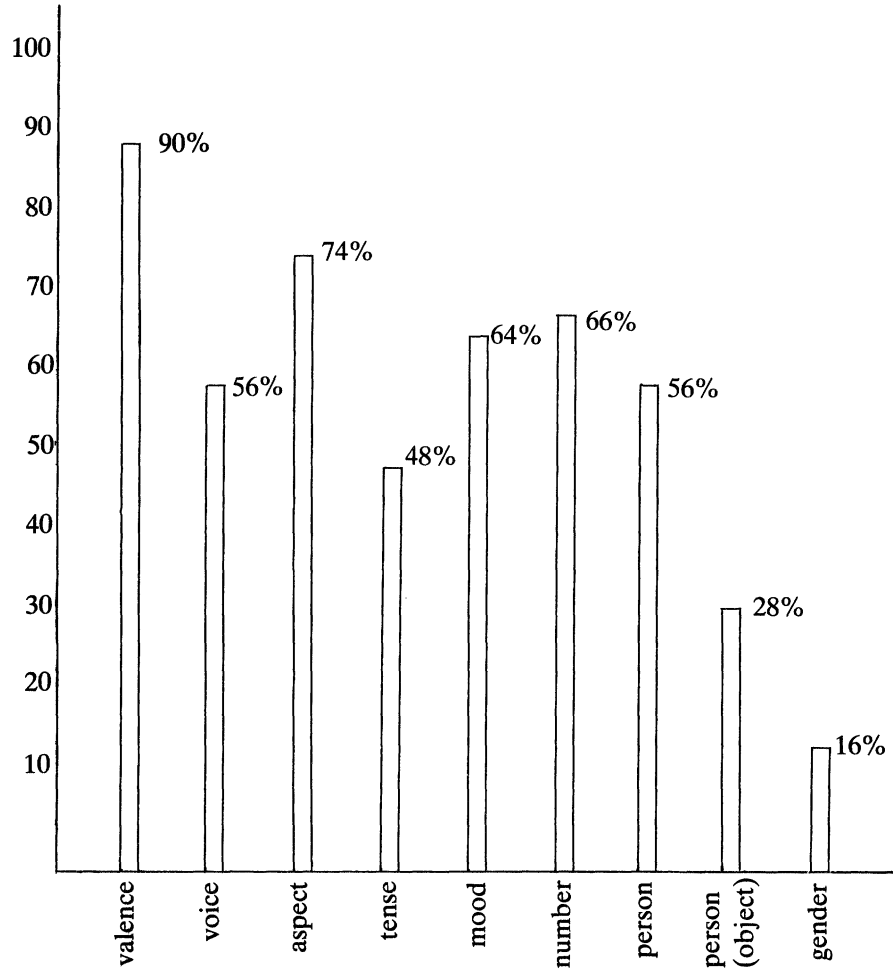

Figure 1. Morphological categories marked on verbs.

The descriptions of the fifty languages were studied and information concerning the verbal morphology was extracted, and coded according to the definitions of categories given above. Figure 1 shows the percentage of languages that have each of the categories as morphological markers on verbs. Note that the markers counted here are not necessarily inflectional, that is, obligatory, but the occurrence of any verbal morphology, whether inflectional or derivational is recorded.

The categories are listed in the order of their relevance to the verb, as established above. The prediction was that the more relevant categories would be more frequent, and there would be a gradual decrease in frequency as relevance decreased. The prediction is upheld in a general way, but important deviations from a simple linear scale point to the need to consider factors other than relevance. Indeed it was not expected that the scale would be any more regular than it is, since the categories differ so much in their functions. What the deviations would be, however, was not always predictable in advance. We will discuss the various surprises as we examine each category individually again.

Perhaps the most striking finding is the near universality of *valence-changing* morphology in the languages of the world. In 90% of the languages of the sample there was evidence for causative, transitivizing or intransitivizing morphology, with causative markers tending to be the most frequent. Of the six languages not included in this 90%, the information about three of them was incomplete, and I suspect that all of these also have valence-changing morphology. There were only two languages which appeared to actually lack valence morphology, and these languages, Haitian Creole and Vietnamese, have very little verbal morphology of any kind. There were six languages which had valence morphology but lacked any other morphological categories for verbs. This means that if a language has any verbal morphology at all, it has valence-changing morphology.

This generalization seems to hold for developing creole languages as well. Mühlhäusler 1980 reports that the first verbal morphology in Tok Pisin, besides the general predicate marker *i-*, which occurs on all verbs, is the transitive verb marker *-im*, which develops into a causative suffix. While Tok Pisin also shows the development of aspect and number morphemes, these morphemes are not bound to the verb. Only the valence morphology is bound to the verb stem.

The centrality of *valence* is evident not only in the frequency with which verbal markers of valence are found, but also in the number of times the

transitive/intransitive distinction is mentioned as a basic organizational dichotomy in the construction of the verb and the clause. It is easy to see why this should be so. One of the most basic manipulations of a situation is a change in the number and role of the participants. Valence changing morphology allows the expression of similarity among situations involving a different set of participant roles, by using the same verb stem, while simultaneously signalling a difference in the situation by adding an affix. When languages do not have valence morphology, they must either use the same unchanged verb stem despite valence changes, as in English *The door opened.* vs. *The clerk opened the door*, or have separate lexical stems for describing similar situations with a different set of participants, as in English *go* vs. *send* or *fall* vs. *drop*. The former solution fails to register the change in the situation in the verb itself, and the latter fails to register the similarity among situations involving different participant roles.

The lower frequency of *voice* categories as verbal markers is probably due to the fact that changes in sentence perspective can be signalled in various ways that do not involve verbal morphology, e.g. by changes in word order, or by markers on nouns. Voice is in the position of having more than the verb stem in its scope. We could say, perhaps that it has the whole proposition in its scope, since it affects the arguments in addition to the verb. However, it differs from mood, which also has the whole proposition in its scope, in that voice can have an effect on the meaning of the main verb of the proposition. That is, an event can be viewed as a different event depending on the perspective, e.g. *buy* vs. *sell*. Perhaps this is a case where relevance and semantic change should be distinguished: voice is less relevant to the verb since it affects the arguments of the verb as well as the verb, but it can produce a meaning change in the verb, which accounts for the possibility of lexicalized voice distinctions.

Aspect morphology is the second most frequent after valence changing morphology. This is to be expected, given the importance of aspect to the verb, and the fact that aspect rarely affects any element in the sentence other than the verb. Note that the languages that were not counted as having morphological aspect might have aspect expressed through auxiliary constructions or other periphrastic means.

Tense, which should be more relevant to the verb, is less frequent as a morphological category in the languages of the world than mood and even the agreement categories of person and number. This is not because tense is expressed in some other way in the sentence. In fact, it is my guess that

tense is not commonly expressed in any way other than by verbal morphology (although this is not something I checked in the survey). Thus it appears that for some reason tense is simply not as common as a grammatical category

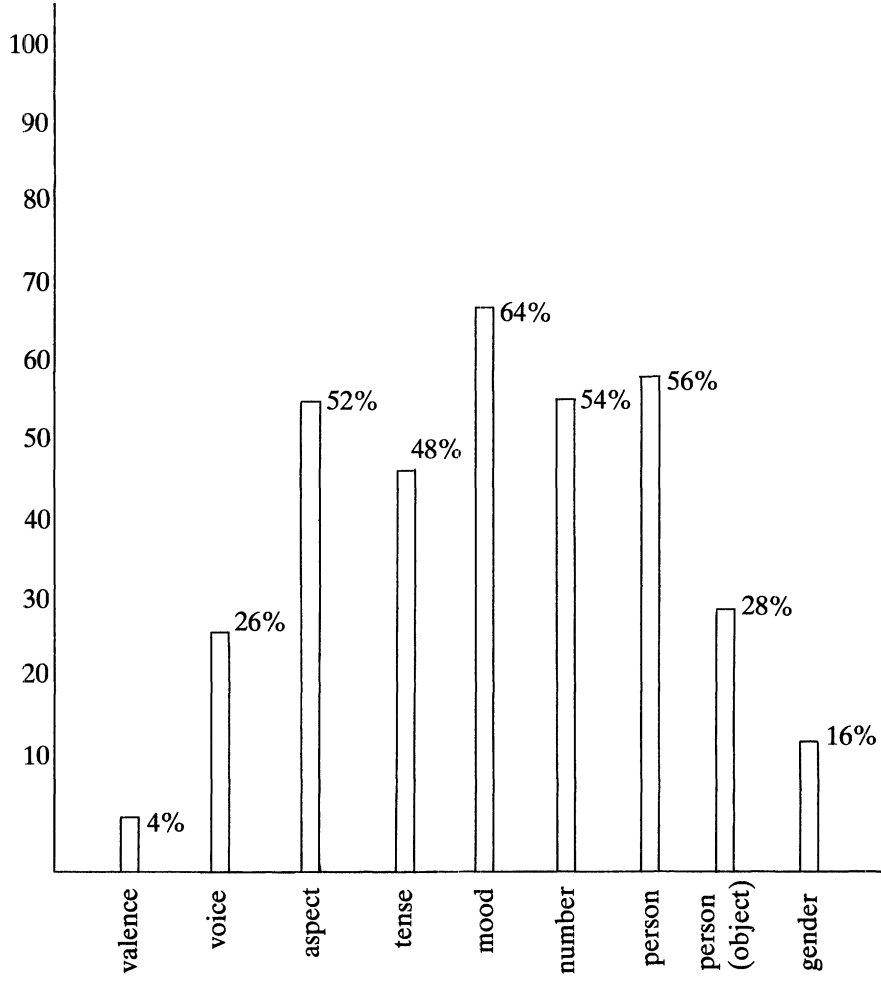

Figure 2. Inflectional categories marked on verbs.

as, for example, mood.

Mood and *number* and *person* agreement with the subject are less frequent than valence and aspect as verbal morphology, as the relevance hypothesis predicts, and agreement with the object, and agreement by gender are even less frequent. Since these categories are almost always inflectional, and rarely derivational or lexical, they will be discussed in conjunction with Figure 2.

Figure 2 shows the percentage of languages that have each category as an *inflectional* category. Recall that in addition to being bound to the verb stem, an inflectional category is defined as one that is *obligatorily* expressed given the grammatical context. While Figure 1 includes both derivational and inflectional expression, Figure 2 includes only inflectional expression. As we said at the end of the last section, we expect the inflectional categories to occur in the middle of the relevance scale, with the likelihood of inflectional expression dropping off at both ends. It drops off at the high relevance pole because of the increased likelihood of derivational or lexical expression, and it drops off at the other end because of the likelihood of periphrastic or syntactic expression. This prediction is nicely supported by the data. Figure 2 shows the predicted bell-shaped curve.

There are differences between Figures 1 and 2 only in valence, voice, aspect and number. These were the only categories that were found to have derivational expression. Valence, voice and aspect were predicted in advance to allow derivational expression, because they are highly relevant to the verb, but number, as an agreement category, would not be expected to occur as a derivational category. This interesting anamoly will be discussed in section 6.

Valence categories hardly ever fit the definition of an inflectional category because there are few cases (if any) of languages in which a specific marker is required on a verb to signal valence, and in which the absence of that marker signals a particular member of the valence category. This rarely occurs because all languages seem to have verbs that are inherently transitive or intransitive. On the other hand, languages that have object agreement marked on the verb have an obligatory expression of valence, but its markers are not uniquely valence markers, since they signal number, person, and gender categories of the object. There are only two languages that were counted as having inflectional valence, Kutenai and Maasai. Both of these languages have benefactive and instrumental markers for verbs. Presumably

these markers occur obligatorily in clauses that have an instrument or a benefactor present, and their absence signals the absence of these arguments. There might still be verbs that do not need these markers, but inherently take instruments or benefactors, in which case the inflectional status of valence would be questionable here, too. In addition, Maasai, a Nilo-Hamitic language, may have other evidence of inflectional valence. Maasai has object agreement. If object agreement is not present on a transitive verb, it is still interpreted as transitive with a 3rd person object. If an intransitive reading is desired, then a suffix must be added to the verb: *arany* "I sing it or them", *adol* "I see it or them", *aranyisho* "I sing", and *adolisho* "I see" (Tucker and Mpaayei 1955). Maasai appears to come very close to having obligatory, bound expression of valence.

Voice is inflectional if there is a general verbal marker for forming non-active voices, and if the absence of this marker necessarily signals active voice. Voice morphemes were counted as derivational in cases such as Diegueño, where two suffixes were described as having a passive-like meaning (be in a state resulting from an action), but were described under the category of "stem-formation" (which usually means derivation). These suffixes appear to be restricted to certain verbs, and further, Langdon points out that in some cases it is not clear whether a form should be analyzed as containing one of these suffixes or not, because the meaning is not transparent enough to be a sufficient clue (Langdon 1970:97).

Where *aspect* is inflectional it usually involves a very general perfective/imperfective distinction, with further distinctions occasionally made in the imperfective. Where it is derivational, it often represents an iterative meaning, with inceptive and durative also occurring. *Tense*, as we said before, is only inflectional and never derivational. The tenses represented in the sample were present, past, future and recent past (or anterior, resultative).

Mood turned out to be the most frequent inflectional category. This is partly due to the high frequency of markers to distinguish imperative from indicative, which occurred in 50% of the languages. It is also related to the large number of contrasts available in the mood category. The following were found to occur in three or more languages of the sample (listed in decreasing order of frequency): imperative, indicative, negative, probable, interrogative, subjunctive, optative, conjunctive, conditional, and dubitative. Further, a single language contrasts up to eight members of the mood category (eight moods were counted in Pawnee and Yukaghir).

The most common type of inflectional system for verbs includes mood and either tense or aspect or both. There were only five languages that have mood but neither tense nor aspect. Among these, however, three have derivational aspect, and in the other two cases the information appears to be incomplete. Languages with tense or aspect and not mood are even rarer. In one of these, the perfective form is used in the imperative and in two cases the information appears to be incomplete. But even when we do not make allowances for derivational aspect and unclear cases, 73% of the languages that have any verbal inflection at all have mood and either tense or aspect as inflectional categories.

Greenberg's 1963 finding that person/number inflection on verbs implies tense, aspect or mood inflection is true of this sample as well. There are no languages that have person or number marking that do not also have either tense, aspect or mood inflections. However, the number of languages that have tense, aspect or mood inflections and do not have person or number agreement is not as great as might be expected. Out of 35 languages that have tense, aspect or mood, only 7 or 20% do not have agreement.[11] It happens, further, that six of these seven languages are SOV languages, and the seventh, Logbara, has SOV word order in imperfective clauses, and SVO in perfective clauses (Crazzolara 1960). Thus it is much more common for a language with tense, aspect or mood to also have person or number agreement than not. In the present sample, all VO languages with tense, aspect or mood inflections also have agreement categories marked on the verb.

3. The order of morphemes

It is often observed that derivational morphemes occur closer to the root to which they attach than inflectional morphemes do. If there is a correspondence between what can be derivational or lexical and its relevance to the root meaning, then we might also expect the degree of relevance in general to predict the order of occurrence of morphemes with respect to a root or stem. More specifically, among the inflectional categories that we have surveyed, we would expect the most relevant to occur closest to the verb stem, and the least relevant to occur at the greatest distance from the verb stem. This type of ordering relation appears to hold for nouns. Greenberg 1963 reports that when both number and case are present on the same side of the noun base, "the expression of number almost always comes between the noun base and the expression of case" (Greenberg 1963:112).

We would interpret this as having a principled basis: namely that the expression of *number* occurs closer to the noun base because it is more relevant to the meaning of the noun. *Number* has a direct effect on the entity or entities referred to by the noun. *Case*, on the other hand, has no effect on what entity is being referred to, but rather, only changes the relation of that same entity to the other entities in the clause.

The prediction concerning the ordering of verbal inflections was tested on the most frequent of the inflectional categories — aspect, tense, mood, and person — in the 50 languages surveyed, and it was found to be a valid prediction with very few exceptions.

Before presenting these results, it is necessary to mention several factors that complicated the test of the ordering hypothesis. First, there are many cases in which it is impossible to discern the relative order of two morphemes because they are fused together in *portmanteau* expression. This was especially true of *aspect* and *tense* morphemes, and of *mood* and *person* morphemes. These cases had no bearing on the test of the hypothesis. Second, in some cases, the two morphemes in question occurred on different sides of the verb stem. These cases were also irrelevant, unless one morpheme occurred adjacent to the stem while the other occurred at least one morpheme removed from it. Then, in these cases, the former was counted as being closer to the stem than the latter. A third situation which rendered a case irrelevant was a situation in which the morphemes in question were mutually exclusive and occurred in the same position. Finally, there were cases in which one morpheme was an affix, but the other was expressed through a modification of the stem, i.e. by reduplication or a vowel change. In these cases, the morpheme expressed by stem modification was counted as occurring closer to the stem than the morpheme expressed by affixation.

The morphemes were examined in pairs to determine their relative order. The results are as follows:

Aspect markers were found to be closer to the stem than *tense* markers in 8 languages, while the opposite order did not occur in the sample. There were a total of 18 languages that have both aspect and tense, but in 10 cases their ordering was not relevant to the hypothesis.

Aspect markers were found to be closer to the stem than *mood* markers in 10 languages, out of a total of 23 that have both aspect and mood. There were no languages in the sample in which the mood marker occurred closer to the stem than the aspect marker.

Aspect markers were found to be closer to the stem than *person* markers in 12 out of 21 languages. In one language, Navaho, the person markers occur closer to the stem than the aspect marker.

Tense markers occur closer to the stem than *mood* markers in 9 languages out of 21 that have both tense and mood. In one languages, Tiwi, the mood markers occur closer to the stem than the tense markers.

Tense markers occur closer to the stem than *person* markers in 8 languages out of the 17 that have both tense and person.

Mood markers occur closer to the stem than *person* markers in 13 languages out of 26. In 5 languages the opposite order occurs.

The position of *number* markers was not tested because in a large majority of languages these markers occur in portmanteau expression with person markers and an ordering of elements is impossible to determine. Thus for the most part, where "person" occurs above, one may read "person and number". This fusion of person and number markers is no doubt due to their diachronic origins as subject (or object) pronouns. We will have more to say below about the diachronic source of the order of morphemes.

The results of this survey give striking confirmation of the hierarchical ordering of aspect, tense, mood and person. The strongest differences are found between aspect and the other categories, and between tense and the other categories, where there are almost no counter-examples to the predicted ordering. The ordering of mood and person is somewhat freer. These results would correspond to the higher relevance of aspect and tense to the verb, and lesser relevance of mood, which has the whole proposition in its scope, and person, which refers to the participants. These results suggest a "diagrammatic" relation between the meanings and their expression, such that the "closer" (more relevant) the meaning of the inflectional morpheme is to the meaning of the verb, the closer its expression unit will occur to the verb stem. This type of diagrammatic relation is also evident in the degree of fusion between the expression of the verb stem and the inflectional morphemes, a topic to which we now turn.

4. Degree of fusion with the stem

If the meaning of an inflectional morpheme is highly relevant to the verb, then it will often be the case that their surface expression units will be

tightly fused, while the less relevant morphemes will have a looser association with the verb stem. This hypothesis can be tested by examining both the effect that the inflectional category has on the surface expression of the stem, and the effect that the stem has on the surface expression of the inflectional category. We are interested here in morpho-phonemic effects that have gone beyond the point of being phonologically conditioned, and are morphologically or lexically conditioned. As examples of cases where the inflectional category has an effect on the verb stem, we will cite languages in which a change in the verb stem is the main signal for an inflectional category or regularly co-occurs with another overt signal of an inflectional category

Aspect conditions changes in the verb stem more frequently than any other inflectional category. In Burushaski and Touareg, vowel and consonant changes in the stem are the primary signals of aspect. In Temiar, reduplication of the stem is the only signal of aspect. In Sierra Miwok and Wappo, stem changes (especially of stress and length in the former language) regularly accompany aspectual suffixes. In Serbo-Croatian, a system of highly fused prefixes and suffixes, accompanied at times by internal stem changes, are the signals of verbal aspect. In Nahuatl, Pawnee, Ojibwa, Zapotec and Navaho there are internal sandhi processes that accompany the affixation of aspectual morphemes. This internal sandhi is often specific to these morphemes, and involves fusion of the affix to the stem by means of consonant and vowel loss or modification.

Stem changes are much less frequent with other categories, but they do occur. Sierra Miwok and Wappo have stem change processes for *tense* that are similar to those for aspect. Nahuatl has stem changes associated with tense in some irregular verbs. As for *mood*, Sierra Miwok has stem changes associated with the Volitional, while Navaho, Pawnee and Ojibwa have internal sandhi associated with the affixation of various mood morphemes. There seem to be no examples in the sample of languages in which the only method of signalling tense or mood is by internal changes in the verb stem.

There are no cases in which simple *number* agreement conditions stem changes as a regular process, but in Acoma and Pawnee there are some verb stems that change in the plural forms. In cases such as Diegueño, where number distinctions by stem change permeate the whole system, number is not so much an agreement category as it is an aspectual one. See the discussion in section 6.

Stem changes with *person* categories are even more rare (Hooper 1979). Acoma has stem changes with non-third person objects in a handful of

verbs, and Navaho and Zapotec have limited internal sandhi with some stems when certain of the person markers are contiguous. Only Maasai has something slightly more spectacular: reduplication of the stem in second person plural of the habitual, and reduplication of the suffix in the same person of the continuous. Further, in second singular and plural, and in first plural, some verbs take an extra nasal after the stem prefix.

There are some languages in the sample that undoubtedly have stem modifications that were not mentioned in the descriptions because the descriptions were brief, e.g. Yukaghir. For that reason, the data presented here are not complete, and are not reliably quantifiable. However, they most likely indicate what would be found in a more complete survey — that stem modifications associated with aspect are about twice as frequent as those associated with other categories.

The effect of the verb stem on the affix, when it is not a purely phonological effect (and perhaps also when it is), may be taken as an additional measure of the degree of fusion of the two elements. Under this heading are cases in which the particular verb stem determines the choice of the allomorph of the inflectional morpheme. For example, in Spanish, the entire verb conjugation system is based on three lexical classes of verb stem — the three conjugation classes. These lexical classes determine the choice of the allomorphs of certain aspects, such as the imperfect, but have no effect on the person or number morphemes. This dependency of the imperfect allomorphy on the verb stem is taken to be an indication of greater fusion.

In the sample, we find lexically-determined allomorphy for *valence* in Ainu, Georgian, Malayalam and Quileute, for *voice* in Nahuatl, Georgian and Quileute, for *aspect* in Serbo-Croatian, Nahuatl and Pawnee, for *tense* only in Malayalam, and for *mood* in Burushaski, Iatmul and Yupik. There are no cases of lexically-determined allomorphy for number or person.

The data, then, seem to support the relevance principle and the hypothesis that the semantic fusion of elements is paralleled in the fusion of expression units. In the case of the effect of the inflectional category on the stem, *aspect* stands out as the category most frequently affecting the stem. In the case of the effect of the stem on the inflectional allomorphy, number and person stand out as the categories most rarely affected by the lexical choice of the verb stem.

5. Explaining the correlations

We have now examined data on the frequency of occurrence of inflec-

tional categories in the languages of the world, the relative order of occurrence of the expression units of these categories within an inflected verb, and the degree of fusion of these expression units with the verb stem. We have found, as predicted earlier, that some categories occur more frequently in the languages of the world, and these same categories tend to occur closer to the verb stem, and exhibit a greater degree of fusion to the stem. These correlations are undeniably strong, but their proposed explanation — that some categories are semantically more relevant to verbs than others — is viable only to the extent that mechanisms can be proposed which suggest how relevance may influence the evolution of inflectional categories. Here we will propose such mechanisms. Since much less is known about the evolution of languages than is known about their synchronic states, this section must of necessity be speculative.

First, it is assumed that inflectional morphemes have their origins in full words that develop a high frequency of use. These frequent items are gradually reduced both phonologically and semantically, and are simultaneously gradually fused, again both phonologically and semantically, with lexical matter contiguous in the syntactic string. The relevance principle predicts that morphemes expressing meanings highly relevant to verbs will be more likely to fuse with verbs than morphemes whose meanings are less relevant. I would claim that there are two reasons for this: first, material that is highly relevant to the verb tends to occur close to the verb in the syntactic string, even before fusion takes place, and second, the psychological restructuring of two words into one depends on the relatedness of the semantic elements being joined, and their ability to form a coherent semantic whole. These two points will be discussed separately.

It seems to be generally true that the order of morphemes within a word reflects an earlier ordering of words within a sentence (Givón 1971, Vennemann 1973). Thus the high frequency of, for example, aspectual inflections, and their proximity to the verb stem, could be traceable solely to the occurrence in earlier times of words expressing aspectual notions in positions contiguous to the verb. This undoubtedly accounts for most morpheme order, but it defers the questions rather than answering it, for we must still explain why words expressing aspectual notions occur close to the main verb. Here we find a wider domain for the relevance principle. As I mentioned at the beginning, it has often been observed that words that function together in the sentence tend to occur together in the sentence. Vennemann cites the "principle of natural constituent structure" proposed by Bartsch, which he

describes as follows:

> This principle says that elements belonging together in the hierarchy of semantic representation tend to be lexicalized and serialized in the surface representation in such a way that hierarchical dependencies are directly reflected in categorial operator-operand relationships

Vennemann illustrates this principle with examples from the ordering of modals and auxiliaries, and the order of elements in a noun phrase. A similar analysis is proposed by Foley and Van Valin 1981 who argue that the ordering of elements in the English auxiliary reflects the increasingly wider scope of the operators. The operator whose scope is primarily the verb (aspect) appears closer to the verb, while the operator whose scope may include the whole proposition (tense) occurs furthest from the verb. If there is a diagrammatic relation between the function of two semantic units and the proximity of their expression units in the clause, then the morphological universals we have discussed here may follow directly from these syntactic principles.

While it is true that a great deal about morphology may be explained by applying the relevance criterion on the level of syntax, we cannot assume that morphology is only fossilized syntax and stop at that. There is a great deal of evidence that speakers actively reanalyze and sometimes restructure their morphological systems, especially during language acquisition. For instance, in Bybee and Brewer 1980 we discuss the restructuring of the preterite in Provençal. In Old Provençal, the segmentation of the preterite forms into clear markers for aspect vs. person and number had become difficult. The only consistent mark of the preterite was the stressed vowel following the verbal root:

canta 'to sing'		*venre* 'to sell'	
cantéi	cantém	vendéi	vendém
cantést	cantétz	vendést	vendétz
cantét	cantéren	vendét	vendéron

Many Provençal dialects restructured these forms by taking a consonant, often the /t/ of the third singular, to be the preterite marker, and adding person/number markers to it (Ronjat 1937:193):

cantéte	cantétem
cantétes	cantétetz
canté	cantéton

In this particular dialect, the third singular form eventually lost its final /t/ due to a regular sound change. However, we can still observe the clear pattern of restructuring, in which /-ét-/ functions as the preterite marker with the person/number markers added after it. It is interesting to note that among all the variations on this restructuring pattern in the many dialects of Provençal, not one added the preterite marker after the person/number markers.

Another interesting example of restructuring that more directly involves the order of morphemes within the verb occurs in Pengo, a Dravidian language (Burrow and Bhattacharya 1970). In Pengo, the past tense has the following conjugation.

Past tense "to see"

	singular		*plural*
1	huṛtaŋ	ex.	huṛtap, incl. huṛtas
2	huṛtay		huṛtader
3m	huṛtan		huṛtar
3f,n	huṛtat	f	huṛtik, n. huṛtiŋ

The perfect was apparently originally formed by the addition of the auxiliary /na/ to the forms of the past tense. In fact, this pattern is still observable occasionally, in forms such as *vātaŋna* 'I have come', *kuccikna* 'they (fem. pl.) have sat down' and *ravtiŋna* '(the rats) have excavated'. However, the more usual conjugation shows forms in the first singular, and in the third feminine and neuter plural in which a person/number marker is added after the perfect marker, with phonological changes in the perfect marker in the third feminine and neuter plural.

Perfect

huṛtaŋnaŋ	huṛtapna, huṛtahna
huṛtayna	huṛtaderna
huṛtanna	huṛtarna
huṛtatna	huṛtiknik, hurtiŋniŋ

In addition, sometimes the other forms are heard with the person/number suffix added after /na/: *tustannan* '3s has put on', *kuccatanat* 'fem. or neuter sg. has sat down', *temal pantatnat* 'hair has grown long' and *vātapnap* 'we have come'. In a less common paradigm the person/number suffixes occur only once *after* the perfect marker:

huṛtanaŋ	huṛtanap, huṛtanas
huṛtanay	huṛtanader

hurtanan	hurtanar
hurtanat	hurtanik, hurtiniŋ

These examples show that the order of morphemes need not necessarily reflect an earlier order of words, nor the chronological order in which inflectional morphemes develop. (See also Comrie 1980). Cases of reordering of morphemes are not very common, so it will often be the case that morpheme order reflects an earlier order of words, but it is important to recognize that morphology is not immovable fossilized syntax. Speakers will sometimes rework parts of their morphology. Thus the facts that have emerged from the cross-linguistic survey may be interpreted as indicating the existence of universal synchronic principles of linguistic organization. The implementation of these principles, however, must be understood partly in diachronic terms. Thus we have claimed that the order of morphemes is in large part a result of the order of words in the verb phrase, and that the frequency of occurrence of certain categories as verbal inflections is a reflex of their frequent occurrence contiguous to the main verb. We have claimed that the order of words in the verb phrase is at least partly determined by the relevance principle. And this same principle may continue to apply in the active restructuring of morphology that goes on in every generation of language users.

Now we return to the question of whether the frequency of occurrence of categories such as aspect in the languages of the world is merely a reflex of the fact that words expressing aspectual notions often occur contiguous to the main verb. I will claim that the creation of an inflectional category by fusion is not just a mechanical operation that takes place automatically when one word is reduced in the company of another. Rather, the process depends upon the relatedness or relevance of the semantic notions in question, and their ability to form a coherent semantic structure. A reducing morpheme cannot fuse with just any adjacent lexical matter. Its fusion is both phonological and semantic, and the conditions must be right on both levels.

An interesting case that is relevant here is the case of the English auxiliaries, which undergo extreme phonological reduction, attaching themselves to the subject noun or pronoun: *I'll*, *I've*, *I'd*, *I'm*, *he's*, etc. These forms are highly fused phonologically, and yet when children acquire them, they carefully split pronoun from auxiliary, and go through a long stage in which the auxiliaries are produced primarily in their emphatic, whole word forms (Bellugi 1967, Slobin 1973). The fusion of these elements is delayed, or perhaps prevented entirely, by the incompatibility of modifying nominal meanings with tense or aspectual notions. On the other hand, the reduced

form of *have* that follows the modals *should*, *would*, *could*, and *might* has largely lost its identity as the separate aspectual marker *have* for many speakers of English, who, when required to spell this sequence often render *should've* as *should of*, and *would've* as *would of*, etc. Here the *'ve* has come to signal a tense difference, and is well on the way to becoming fused to the modal it follows. The combinability of the tense notion with the modality notions accounts for the possibility of total fusion in this case.[12]

The total fusion of two morphemes into one word, whether it be a lexical and inflectional morpheme or some other combination, depends entirely upon the ability of a generation of language learners to analyze the sequence of morphemes as belonging together in a single word. This means that the sequence must have a meaning that is learnable as a whole. Interestingly enough, the child language literature is full of observations about the very early interpretation of verbs as expressing aspectual notions (Antinucci and Miller 1976, Stephany 1981, Simões and Stoel-Gammon 1979, Bloom et al. 1980), even in languages where aspect is not a part of the inflectional morphology (i.e., in Turkish [Aksu, personal communication], and in Hebrew [Berman, personal communication]). In languages that inflect verbs for aspect as well as person and number, for instance, children mark the aspectual distinctions on verbs long before they mark person/number agreement. It is not that person and number are difficult concepts, because they are mastered in the pronominal system long before they occur on verbs. It is simply the combination of the notions referring to person/number agreement with verbal notions that is more difficult to master. It seems that children exhibit a natural tendency to treat certain notions together. This is a clear manifestation of the relevance principle, and it has an effect on the formation of inflectional morphology.

Consider now the developments in Romance languages, especially Spanish. There is a series of direct and indirect object pronouns which have become clitics and occur in a fixed position right before the finite verb. These pronouns are considered clitics because they are unstressed and do not occur unless the verb is present. They are not considered inflections, however, because they are not obligatory. If full noun phrases for direct or indirect object occur in the sentence, the clitic pronouns need not occur. In other words, the transitive verb is complete without the object pronoun clitics. In another development in Spanish and other Romance languages, the Latin auxiliary verb *habere* in its present and imperfect forms developed into a suffix that marks future tense and conditional mood. These suffixes are bound

to the infinitive, and are an obligatory part of the verb conjugation. If a verb refers to a future activity it must be in the future tense, even if the tense is clear from the context. Incidentally, object pronoun clitics formerly occurred between the infinitive and the form of *habere*. Since the forms of *habere* have become attached the clitic pronouns no longer occur in this position. The clitic pronouns and *habere* are juxtaposed here to suggest that there may be semantic reasons why the formation of inflection has gone to completion where tense and mood concepts are concerned but is delayed where person/number agreement with objects is concerned. Since we have no absolute timetable for the formation of inflection, this case can only be used to illustrate my suggestion, and not as evidence in favor of it.

My conclusion, then, with respect to the frequency of occurrence of inflectional morphemes, as well as their order with respect to the verb stem, is that the relevance principle governs the formation of inflection at every stage. It sets up the syntactic conditions necessary, and in addition governs the likelihood that an actual fusion will eventually take place.

6. Apparent problems — number, negation and object agreement

Number agreement, negation and object agreement would appear to present problems for our hypothesis for the following reason: these categories exhibit properties of both high and low relevance categories. In this section we will find that examining this problem in detail clarifies some of the assumptions behind the previous discussion, and reveals that far from contradicting the relevance principle, the idiosyncracies of these categories lend further support to it. We begin with a discussion of number categories.

Since number marking on verbs is an agreement category referring to the arguments of the verb, and is often fused in expression with person agreement, our hypothesis predicts that number should have little if any effect on the shape of the verb stem and that it should not be found in derivational or lexical expression. However, the survey of 50 languages revealed fourteen languages where number does not behave as predicted. The languages are Acoma, Ainu, Burushaski, Diegueño, Garo, Kiwai, !Kung, Kwakiutl, Maasai, Ojibwa, Pawnee, Sierra Miwok, Tarascan, and Tongan. Six of these languages are North American, but the geographic discontinuity of the others makes it impossible to consider this just an areal phenomenon. In Acoma, Burushaski, Maasai, Ojibwa and Pawnee there are inflectional categories of number agreement for both subject and object, and in addition stem changes accompanying the inflection for a large number

of verbs in Acoma, and for a small number in the other three languages. Diegueno and Kwakiutl do not have obligatory categories for number agreement but signal plural subjects through stem modifications of some irregularity. Ainu, !Kung and Tongan have no real inflectional morphology for verbs at all, and yet have lexical or derivational differentiation of stems for number. Tongan has different stems for a small number of mostly intransitive verbs, but !Kung and Ainu show differentiation according to the number of the object of the transitive verb and the subject of the intransitive for a substantial list of core verbs. In Ainu, some of these are formed with the addition of a suffix *-pa*, as in *ama*, *amapa* "to put or place", *rai*, *raipa* "to die", but there are also a number of suppletive stems, such as *ashte*, *roshki* "to set up", and *raige*, *ronnu* "to kill". In !Kung the singular/plural pairs appear to be morphologically unrelated: *qu* "take (sg. obj.)" and *n/'hwi* "take (pl. obj.)"; *!ei* "die (sg. subj.) and *!ao* "die (pl. subj.)". In !Kung, it appears that the number of the absolutive is a lexical or subcategorization distinction rather than an agreement category.

We have already mentioned that the stem-changing category of plural in Diegueño and Kwakiutl behaves like a derivational category because of the non-obligatoriness, the formal irregularity and the unpredictability of meaning. Pawnee, Sierra Miwok and Tarascan have non-obligatory affixes that signal plurality of the absolutive or object. In Pawnee and Sierra Miwok, the meaning of the derivational affix or process covers plurality of subject or object, but also (and sometimes primarily) iteration of action. In Diegueño distribution of action for objects is included, and in Kwakiutl and Pawnee distribution over space. Some verbs in Diegueño have two plural forms, one distributive and one collective. Consider the following examples (Langdon 1970: 123):

u:cal "he splits it"
u:ca:l "they each split one thing, or he splits it several times" (distributive)
ucəca:l "they (a bunch) each split one, or they (together) split it several times" (collective)

ti:kay "he asks for something"
ti:ka:yp "he is (or they are) a beggar (beggars), i.e., to be in a state resulting form repeatedly asking for things" (possibly a distributive connotation)
tətəka:y "they ask for something (or things)" (collective)