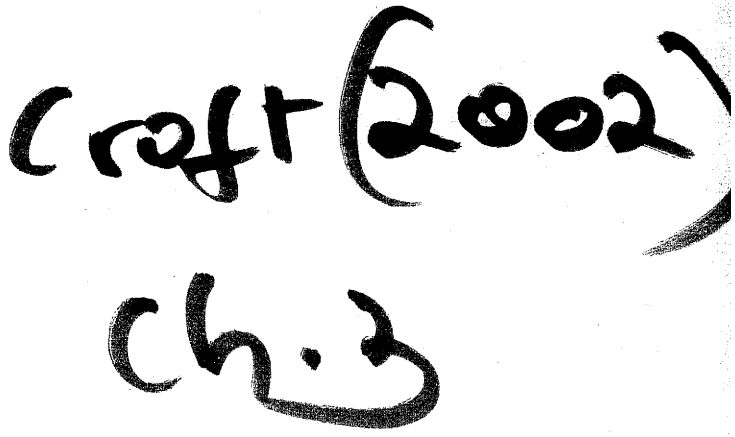
is, the classification of languages – or more precisely elements of a language – by structural features of maximal generality. The individualizing approach, taken to its extreme, defines languages by their individual and perhaps unique combination of grammatical features. The truth has to be somewhere in between, since languages are different structurally, though not so different as to be incommensurable. If language as a structure does hang together in a certain way, then the identification of one structural feature – the feature defining the linguistic type – would imply the presence of certain other structural features.

The generalizing approach to typological classification, with its emphasis on single morphosyntactic features rather than the language as a whole, is the primary contribution to modern typology. It does so by separating the typological classification of **logically independent** grammatical properties of languages from the discovery and explanation of relationships *between* features *across* languages. The latter is the topic of the next five chapters.




3

# Implicational universals and competing motivations

## 3.1 Restrictions on possible language types

The first step beyond typology as the classification of types and toward the explanation of the cross-linguistic variation that classification describes is the discovery of restrictions on possible language types. Linguistic theory in any approach, formalist or functional–typological, has as its central question, what is a possible language (§1.2)? This question can in turn be paraphrased as: of the logically possible types of languages, how do we account for what types actually exist?

One of the features that distinguishes the typological method of discovering constraints on possible language types is the empirical method applied to the problem. If a typologist wants to find restrictions on possible relative clause structures, for example, he or she gathers a large sample of languages and simply observes which of the possible relative clause types are present and which are absent. That is, the restrictions on logically possible language types are motivated by the actually attested language types. If there is a gap in the attested language types, then it is provisionally assumed that the gap represents a constraint on what is a possible language, and explanations are sought for the gap. This is the **inductive** method, which must be used in constructing generalizations from empirical data. In contrast, the generative approach uses a rationalist deductive method, in which it is argued that certain analyses of a single language represent universals of human language because they cannot possibly be learned by a child (the 'poverty of the stimulus' argument; §1.2).

There are a number of objections that have been raised to the inductive method for determining gaps in logically possible language types. The first is that there may have existed languages that represented an unattested language type, or there may come to exist languages that do so. Virtually all linguists, however, use a working hypothesis of linguistic uniformitarianism; that is, it is assumed that the rules that govern language structure today are the same that governed language structure yesterday and will be the same that will govern language structure tomorrow. Although human language arose from some prelanguage in perhaps some gradual

way, those steps in the evolution of language are unattested, and the oldest records of human languages display the full range of structural complexity and the same kinds of structural types found in modern languages. In fact, the greatest problem facing typological research is that the number of living languages, most of which are poorly described at best, is decreasing so rapidly that there may indeed be such a reduction of the data base that the resulting typological generalizations will be less secure.

A second objection is that an unattested language type is not necessarily an impossible language type. This fact cannot be denied, of course; it can only be mitigated. The primary mitigation is to have a language sample that is larger than the space of possible language types. For instance, let us consider a typological study of the word order of demonstratives, numerals, genitives and adjectives relative to the head noun. Each element may precede or follow the head noun; hence, each parameter has two possible values (modifier precedes or modifier follows). There are four logically independent parameters corresponding to the four kinds of modifiers. Multiplying together the number values on each independent parameter yields $2 \times 2 \times 2 \times 2 = 16$ logically possible types. For this study, a sample of fifteen languages is simply inadequate. Even if every language were of a different type, one type would be unattested simply because the number of logically possible types is one more than the number of languages in the sample. A much larger sample, such as fifty or a hundred languages, is necessary to avoid this problem.

Determining sample size for a typological study presupposes a clear definition of **logically possible** language types. This is not as easy as it appears. Some language types are logically impossible and hence can be excluded from the set of possible language types. For example, in a typological study of pronouns and definiteness, one would not find a language with indefinite first person pronouns. This corresponds to a logically impossible type: indefiniteness means the referent is not known to the hearer, but the first person refers to the speaker by definition and hence is known as such to the hearer. Likewise, one will not find a language with pharyngeal or laryngeal nasals: 'with a closure in the pharynx or larynx it is not possible for air to pass into the nasal cavity' (Ladefoged and Maddieson 1996:103). Logically impossible types are of course accounted for by straightforward external semantic or phonetic reasons.

Nevertheless, the number of logically possible types is usually far greater than the possible types typically explored in typological studies. For example, studies of the category of number examine categories such as singular (one referent), dual (two), trial (three) and plural (unrestricted nonsingular number). Universals can be formulated such as Greenberg's Universal 34: 'No language has a trial number unless it has a dual. No language has a dual unless it has a plural' (Greenberg 1966a:94). This universal constrains the partitioning of sets of referents of the noun



by the cardinality of the set. But the categories singular, dual, etc. by no means exhaust the logical possibilities. A language might have one number inflection if the number of referents is even, or a prime number, and another if the number is odd, or not a prime number. Yet no languages do (Greenberg 1969/1975:300). This fact is as deserving of explanation as Greenberg's Universal 34 (see Greenberg 1969/1975:301). Another example of a similar phenomenon is in the study of number in person marking systems (pronouns and pronominal indexation systems). In a survey of 265 person marking systems, Cysouw (2001:72) argues that no language distinguishes a true first person plural – multiple speakers, as in a chorus – from the usual first person plural (speaker plus other nonspeakers), and likewise no language distinguishes a true second person plural (multiple addressees) from a pronoun denoting addressees plus possible non-addressees. This universal also demands theoretical explanation.

The range of genuinely logically possible types for any grammatical phenomenon is probably very large and in some cases infinite. Can – or should – one decide in advance how many logically possible types there are, and thus how large a sample is necessary? The answer is no. One constructs a small sample and observes the range of attested types and, more important, the logically independent formal and external parameters defining the attested types. For example, a small survey of number systems will turn up some duals and perhaps a trial as well as plurals, but no odd–even or prime–nonprime systems. One can quickly form the universal that number categories will subsume contiguous portions of the cardinal number sequence – which, if made properly explicit, can be further tested – and then construct a sample intended to capture the sorts of types Universal 34 refers to, and also other plausible possible categories such as quadral and quintal. A typological study always involves an interplay between deductive hypotheses and inductive generalization from languages.

One might still object that even if we examined every existing human language, this still does not guarantee that unattested language types cannot ever come to exist. This objection to the empiricist method applies to any other method, however. Any method for proposing constraints on possible language types can only be verified by the examination of actual languages. In those cases one cannot be absolutely certain that one has verified the proposed constraint, any more than one can be certain that an empirically arrived at typological universal is absolutely valid.

A final important point about empirical generalization is that theoretical significance also accrues to the *frequency* of a language type, not just to whether it is attested or unattested. This is a crucial point because most language universals (other than those excluding bizarre types like prime–nonprime number) have exceptions. A language universal is in fact a universal of cross-linguistic distribution (Greenberg 1957:87). If one language type is very rare and another type very

common, this distribution merits explanation even though both types are classed as attested. For example, the first universal listed in Greenberg's original paper on implicational universals is 'In declarative sentences with nominal subject and object, the dominant order is *almost always* one in which the subject precedes the object' (Greenberg 1966a:77; my italics). As the italicized words indicate, Greenberg was aware of exceptions (Greenberg 1966a:105, note 5); a later probability sample indicated that the exceptional languages numbered approximately 5% of the total (Tomlin 1986). Although Greenberg's universal has some exceptions, it still remains to be explained why 95% of the world's languages have the subject preceding the object in normal declarative sentences, whereas only 5% have the opposite order. Dryer argues that most universals are of this type: a 'core' of frequent types, fading out to a periphery of progressively rarer types, without a sharp line between 'possible' and 'impossible' types (Dryer 1997a:124, Figure 1a; see also §8.2). One important theoretical mechanism for explaining frequency patterns, competing motivations, will be introduced in this chapter. For didactic purposes, however, we will begin by treating universals as exceptionless.

## 3.2 Unrestricted and implicational universals

Greenberg's first universal on the order of subject and object is an example of an **unrestricted universal**. An unrestricted universal is an assertion that all languages belong to a particular grammatical type on some parameter, and the other types on the same parameter are not attested (or are extremely rare). Unrestricted universals characterize the distribution of languages along a single parameter; for example, the order of subject and object, or whether or not a language has oral vowels. The parameter allows for the logical possibility of more than one type, but only one type is attested (or is extremely common, in the case of unrestricted universals with exceptions). This is illustrated here with the unrestricted universal 'all languages have oral vowels' (√ = languages of that type exist; – = no languages of that type exist):

| Oral vowels | No oral vowels |
|---|---|
| √ | – |

In other words, there is a gap in the logically possible language types, and the unrestricted universal states the constraint on language types along the relevant parameter.

The number of unrestricted universals, again other than those excluding bizarre types such as prime–nonprime number, is relatively small. Most unrestricted universals are built into the frameworks of linguistic theories because they are true of



all languages. Nevertheless, as noted above, unrestricted universals require deeper explanation just as much as implicational universals or other more complex cross-linguistic patterns do.

**Implicational universals** differ from unrestricted universals in that they do not assert that all languages belong to one type. Instead, they describe a restriction on logically possible language types that limits linguistic variation but does not eliminate it. We may illustrate this with a simple implicational universal, 'If a language has noun before demonstrative, then it has noun before relative clause' (Hawkins 1983:84, Universal XI′). This implicational universal covers the following four logically possible types:

(i) Demonstrative and relative clause both follow the noun (NRel, NDem): Tinrin (Osumi 1995:267, 90):

(1a) nrâ ta traiki nrâ **moo** [**nrâ fi ghe mê giwe**]
3SG hit dog SBJ man 3SG go from to.here mountain
**N** **Rel**
'The man who came from the mountain hit the dog.'

(1b) moo **hòrrò** **ha**
DET prayer this
**N** **Dem**
'this prayer (going on now)'

(ii) Relative clause precedes the noun and demonstrative follows the noun (RelN, NDem). This type is not unattested but it is quite rare, found in only nine genera of 201 for which information is available (Dryer 2001).

(iii) Relative clause follows the noun and demonstrative precedes the noun (NRel, DemN), as in English:

(2a) the **book** **[that she is reading right now]**
**N** **Rel**

(2b) **this** **book**
**Dem** **N**

(iv) Demonstrative and relative clause both precede the noun (RelN, DemN): Limbu (van Driem 1987:196, 359):

(3a) [**anchige** **thuŋ** **-ɛ** **-tch** **-u** **-ge** **-bɛ** **-n**] **thi:**
1DU.EX drink -PRET -DU.A -3.P -EX -NR -ABS millet.beer
**Rel** **N**
'the millet beer we drank'

(3b) **khɛŋ** nɛpphu **cum** -ha?
that two friend -PL
**Dem** **N**
'those two friends'

The implicational universal restricts language variation to types (i), (iii) and (iv) by excluding type (ii). Thus, implicational universals capture a pattern in language *variation*, and differ from unrestricted universals, which account for uniformity, not variation. As such, implicational universals cannot even be discovered without cross-linguistic comparison. One can examine a single language alone, such as English, and observe properties such as the presence of oral vowels that turn out to manifest unrestricted universals. (Even so, one cannot assume that oral vowels are universal without examining a significant range of other languages.) However, one could not guess from looking at English, which is type (iii), that types (i) and (iv) are attested but type (ii) is not. One must look at a large sample of languages to determine the range of possible variation. This is what makes implicational universals the paradigm example of typological generalization: they represent the simplest form of restriction in language variation, and they can only be discovered through cross-linguistic comparison.

What makes implicational universals more interesting than unrestricted universals above all, however, is that they state a dependency between two **logically independent** parameters. The four logically possible language types described in the preceding paragraph actually represent two independent parameters, demonstrative–noun order and relative clause–noun order. Each parameter has two values: the modifier precedes or the modifier follows. We may construct a table, called a **tetrachoric table**, that displays the two parameters as two dimensions:

| | DemN | NDem |
|---|---|---|
| RelN | √ | – |
| NRel | √ | √ |

The tetrachoric table is a useful means of displaying the empirical data of attested and unattested language types. An implicational universal, on the other hand, is a relation that characterizes the distribution of attested and unattested language types. The pattern in the tetrachoric table basically matches the pattern of truth values in the truth table for implication found in propositional logic, where T stands for 'true' and F for 'false':

Truth table for implication

| P | Q | P ⊃ Q |
|---|---|---|
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

Distribution of attested types

| Type | NDem | NRel | Attested (NDem ⊃ NRel) |
|---|---|---|---|
| (i) | yes | yes | yes |
| (ii) | yes | no | no |
| (iii) | no | yes | yes |
| (iv) | no | no | yes |



The truth table indicates that when P is true and Q is false, the proposition 'if P, then Q' is false. When both P and Q are true, the proposition is, of course, true. When P is false, then the proposition 'if P, then Q' is not false because it only indicates what must be the case when P is true. In logic, 'if P, then Q' is taken to be true in these conditions. The same applies to the implicational universal NDem ⊃ NRel. If a language is NDem but not NRel, then it would violate the universal NDem ⊃ NRel, and in fact that is the unattested type (ii). If a language is NDem and NRel, then it is allowed under the implicational universal. If a language is not NDem, then it can be either NRel or RelN: the implicational universal does not exclude either type. Thus, we may retitle the column titled 'attested' by the implicational universal NDem ⊃ NRel, with the values 'yes/no' in the second table corresponding to 'T/F' in the truth table.

The implicational universal characterizes the gap in attested language types as a dependency between values on two logically independent parameters, in this case, NDem and NRel. Unlike unrestricted universals, implicational universals begin to assemble the independent parameters of a grammar together into an integrated whole. Implicational universals are central to typological analysis, because they are the lowest-level link between grammatical parameters. More complex universals of the types to be described in the following chapters, and the deeper patterns described later in this chapter, are ultimately decomposable into a set of simpler implicational universals.

Another important feature of both unrestricted and implicational universals is that they are universal, not language specific. Unlike assertions of dependencies between grammatical properties in individual languages, unrestricted and implicational universals hold – or are intended to hold – for all languages (setting aside exceptions for now). In the case of implicational universals, the universal dependencies between grammatical properties may not even be apparent in individual languages taken one at a time, because they are patterns of variation. Even so, since implicational universals cover all human languages, the forces that account for their existence must be operating in the grammars of individual languages (see §§3.3, 3.5, 5.3, 7.1, 9.3).

Implicational universals represent an application of propositional logic to typology. For that reason, we have the full power of propositional logic at our disposal, and we now use it to further illuminate the dependencies among grammatical parameters.

Propositional logic asserts that for every universal of the form P ⊃ Q, there is a logically equivalent universal, ~Q ⊃ ~P ('if not Q, then not P'), called the **contrapositive**. We may illustrate this with the truth tables for the contrapositive of RelN ⊃ DemN:

| Type | NDem | NRel | NDem ⊃ NRel | ~NRel | ~NDem | ~NRel ⊃ ~NDem |
|---|---|---|---|---|---|---|
| (i) | yes | yes | attested | no | no | attested |
| (ii) | yes | no | unattested | yes | no | unattested |
| (iii) | no | yes | attested | no | yes | attested |
| (iv) | no | no | attested | yes | yes | attested |

One can observe that the truth values for the columns headed by NDem ⊃ NRel and ~NRel ⊃ ~ NDem are identical, demonstrating their logical equivalence. Since the opposite of NDem is DemN and the opposite of NRel is RelN, we may replace ~NRel with RelN and ~NDem with DemN. This yields RelN ⊃ DemN for the last column, and we can see that RelN ⊃ DemN is equivalent to NDem ⊃ NRel.

We can construct the contrapositive of NDem ⊃ NRel because each parameter has two values, and each value can be treated as the opposite of the other value. This is not possible, however, if there are more than two values for a parameter. Consider Greenberg's Universal 3: 'Languages with dominant VSO order are always prepositional,' and the table of attested languages that it is derived from the following (Greenberg 1966a:78; exceptions were found after this date, however):

| | VSO | SVO | SOV |
|---|---|---|---|
| Prep | 6 | 10 | 0 |
| Post | 0 | 3 | 11 |

In this example, the parameter of declarative-clause word order has three values: VSO, SVO and SOV. Greenberg's universal can be restated as the formula VSO ⊃ Prep, but its contrapositive is only Post ⊃ ~VSO, since languages that are not VSO can be either SVO or SOV.

A standard implicational universal is a generalization over a tetrachoric table in which three types are attested and one type is not (or is extremely rare). The pattern of attested and unattested language types in a tetrachoric table (or larger table) is the central fact; an implicational universal is a hypothesis of an inductive generalization over that pattern. There are other possible patterns of attested language types in which only two types are attested, or even just one type is attested. If just one type is attested, then one is typically dealing with two unrestricted universals, such as 'All languages have consonants' and 'All languages have vowels':

| | Consonants | No consonants |
|---|---|---|
| Vowels | √ | – |
| No vowels | – | – |

If two types are attested and two are unattested, there are two possible patterns. In one pattern, the unattested types are in the same row or column (it does not matter whether it is a row or a column, since a table can always be inverted). In the vast majority of cases, this represents an unrestricted universal on one parameter,



and a second parameter in which both types are attested:

| | Uvular consonants | No uvular consonants |
|---|---|---|
| Vowels | √ | √ |
| No vowels | – | – |

The unattested types in the second row are accounted for by the unrestricted universal, 'All languages have vowels,' while the two columns simply note that some languages have uvular consonants and some languages do not. This does not indicate any relationship or dependency between the presence or absence of uvular consonants and the presence of vowels, since all languages have vowels anyway.

This is not true in all cases, however. Greenberg (1978d:50–51) describes the example of oral vowels and nasal vowels:

| | Nasal vowels | No nasal vowels |
|---|---|---|
| Oral vowels | √ | √ |
| No oral vowels | – | – |

Based on this table, one may formulate an unrestricted universal that states 'All languages have oral vowels.' However, this unrestricted universal may not be the best generalization from the perspective of an explanatory account of the cross-linguistic facts. The unattested type with no oral vowels or nasal vowels can be accounted for by the unrestricted universal 'All languages have vowels,' and the unattested type with nasal vowels but no oral vowels can be accounted for by the implicational universal 'If a language has nasal vowels, then it has oral vowels.'

Other evidence suggests that the alternative hypothesis is the correct one. First, there is additional evidence about the relationship between nasal vowels and oral vowels that implies that a dependency holds between the two of the sort described by the implicational universal (see §4.4). Second, the unrestricted universal 'All languages have vowels' can be attributed to the impossibility, or at least extreme difficulty, of articulating speech without vowels, whereas the unrestricted universal 'All languages have oral vowels' cannot be accounted for in the same fashion, since a language with only nasal vowels does not have the same articulatory restrictions.

The lesson to be drawn from this example is that unrestricted and implicational universals cannot be mechanically read off tables of attested and unattested language types. Both wider typological patterns and deeper explanations of what is going on must be appealed to in order to construct the best combination of unrestricted and implicational universals to account for the data. Above all, the choice of the correct generalization(s) to account for the constraints on possible language types is determined by the proposed theory behind the relationships between parameters.

The other pattern of two attested and two unattested types is much more straightforward, and can be illustrated by Greenberg's Universal 2: 'In languages with prepositions, the genitive almost always follows the governing noun, while in languages with postpositions it almost always precedes' (Greenberg 1966a:78):

| | NGen | GenN |
|---|---|---|
| Prep | √ | – |
| Post | – | √ |

In this universal, which is not exceptionless (see §8.1), the unattested types are found on a diagonal in the tetrachoric table. Greenberg phrased his universal as two opposite implicational universals: Prep ⊃ NGen and Post ⊃ GenN. These can be combined to a **biconditional universal**: Prep ≡ NGen (and its contrapositive, Post ≡ GenN). The relationship between a biconditional universal and a logical equivalence (indicated by ≡) is given below (compare to the truth table for implication above):

Truth table for implication

| P | Q | P ≡ Q |
|---|---|---|
| T | T | T |
| T | F | F |
| F | T | F |
| F | F | T |

Distribution of attested types

| Prep | NGen | Attested (Prep ≡ NGen) |
|---|---|---|
| yes | yes | yes |
| yes | no | no |
| no | yes | no |
| no | no | yes |

A biconditional universal is not the same as an implicational universal. For example, RelN ⊃ DemN is not equivalent to DemN ⊃ RelN; in fact, DemN ⊃ RelN is *false* (look at English, for example). The true equivalent to RelN ⊃ DemN is its contrapositive, ~DemN ⊃ ~RelN, or NDem ⊃ NRel, as we saw above. One way to remember this is that the tetrachoric table for a genuine biconditional universal will have two gaps in it, whereas a tetrachoric table for a one-way implicational universal will have only one gap in it.

So far, we have discussed universals that involve only one typological parameter (unrestricted universals) or two parameters (simple implicational universals of the form 'If P, then Q'). It is quite possible to combine three or more parameters into implicational universals involving the full power of propositional logic. There are two arguments for using complex implicational universals instead of simple ones (Hawkins 1980; 1983). The first is that adding further conditions on a simple implicational universal can remove exceptional cases, making the universal into an exceptionless universal. This process can be quite useful, because it may turn out that the further condition can contribute to the correct explanation for the exception to the simpler version.

For example, consider a candidate universal, 'If a language is postpositional, then the genitive precedes the noun' (SOV ⊃ GN). However, there are a number of languages which are postpositional and NG. It turns out that in all of those languages the adjective follows the noun. Thus, we may modify this universal to read, 'If a language is postpositional, then if the noun precedes the genitive, then the noun precedes the adjective,' i.e. Post ⊃ (NG ⊃ NA), equivalent to (Post & NG) ⊃ NA (Dryer 2001). This universal is now exceptionless in Dryer's sample. Since one has to include adjective–noun order in the universal in order to make it exceptionless, it implies that genitive–noun order is somehow dependent on adjective–noun order as well as declarative clause order. Matthew Dryer (pers. comm.) suggests that this is because the genitive construction is adjectival in character in these languages (see §3.4).



On the other hand, adding conditions to make an implicational universal with exceptions into an exceptionless universal may turn out to be unproductive if the additional conditions do not have anything to do with the universal. Dryer gives the example of the implicational universal VO ⊃ NRel (Dryer 1997a:142). There is only one exception to this case, the family of Chinese languages. Hence, any property that Chinese accidentally has may be added to the antecedent to make the universal exceptionless. Changing the universal would make it exceptionless but it would not help to account for the exceptions. The logical structure of the implicational universal implies a deeper set of dependencies between the grammatical properties found in the universal. For that reason, it is worth complicating implicational universals to make them exceptionless only if there is reason to believe that the additional complications play a role in explaining the exceptions that are removed.

The second reason that Hawkins has argued for more complex implicational universals is that by combining individual universals, one can discover larger patterns that underlie individual implicational universals. These larger patterns – which can be found with sets of simple implicational universals as well – will concern us for the rest of this chapter and most of the following chapters.

## 3.3 Competing motivations

If one examines all of Greenberg's universals that refer to adjective–noun order, a striking pattern emerges:

| | |
|---|---|
| (SOV & NG) ⊃ NA | Universal 5 |
| VSO ⊃ NA | Universal 17 |
| NDem ⊃ NA | |
| NNum ⊃ NA | (both derivable from Universal 18) |

In all of the implicational universals involving adjective–noun order, one finds the order noun–adjective in the implicatum of the universal. If the contrapositive of

these universals were taken, they would all have the order adjective–noun in the implicans:

AN ⊃ ~(SOV & NG)
AN ⊃ ~VSO
AN ⊃ DemN
AN ⊃ NumN

The generalization that covers these universals is that all implicational universals whose implicatum involves the order of noun and adjective will have the order NA as the implicatum (and a complementary statement for the contrapositives). Greenberg calls this pattern **dominance** (Greenberg 1966a:97): the dominant order is the one that always occurs in the implicatum. To say that some word order D is dominant is to say that implicational universals involving D will be of the form X ⊃ D (or the contrapositive ~D ⊃ ~X), and never of the form X ⊃ ~D (or D ⊃ ~X). Intuitively, the dominant order can be thought of as the preferred order of elements, other things being equal.

Dominance can be read directly from a tetrachoric table. Consider the table for AN ⊃ DemN:

| | DemN | NDem |
|---|---|---|
| NA | √ | √ |
| AN | √ | – |

The dominant order is the order that occurs with either possible order of the cross-cutting parameter. Thus, NA is dominant because it occurs with either DemN or NDem, whereas AN can occur with DemN only. Likewise, DemN is dominant (note also that with the universal RelN ⊃ DemN, DemN order is dominant as expected). The orders that are not dominant, AN and NDem, are called **recessive** by Greenberg.

The status of a word order in an implicational universal is not the only evidence for dominance. The dominant word order is generally more frequent cross-linguistically than its recessive opposite order. For example, DemN order occurs almost twice as frequently as NDem order. The greater cross-linguistic frequency of DemN order does not necessarily follow from its being the implicatum of the implicational universal. The implicational universal NDem ⊃ NRel means that DemN will occur in both RelN and NRel languages, but NDem will occur in only NRel languages. But it could still be the case that NDem languages would outnumber DemN languages, if the following imaginary situation held:

| | NRel | RelN |
|---|---|---|
| DemN | 30 | 30 |
| NDem | 80 | – |



Table 3.1 *Dominance patterns for word order universals*

| Dominance | Universals | Frequency | Source |
|---|---|---|---|
| *Clausal elements* | | | |
| SO | 1 | 96% | Tomlin 1986 (n = 402) |
| | | 91% | Dryer 2001 (g = 286) |
| SV | *5*, 17 | 86% | Tomlin 1986 (n = 402) |
| | | 83% | Dryer 2001 (g = 325) |
| VO?? | 5, 13, *17*, 21, 25 | 54% | Tomlin 1986 (n = 402) |
| | | 40% | Dryer 2001 (g = 325) |
| *Phrasal elements* | | | |
| NRel | 24, IX′, XI′, XII′, XXIII | 69% | Hawkins 1983:96, 100 (n = 163) |
| | | 73% | Dryer 2001 (g = 191) |
| DemN | V′ (= 18), XI′ | 63% | Hawkins 1983:96, 100 (n = 158) |
| | | 61% | Dryer 2001 (g = 309) |
| NumN | VI′ (= 18), XII′ | 68% | Hawkins 1983:96, 100 (n = 147) |
| | | 55% | Dryer 2001 (g = 272) |
| NA | 5, 17, 18, 21, 24, *40*, XXI | 55% | Hawkins 1983:96, 100 (n = 350) |
| | | 68% | Dryer 1988 (n = 287) |
| | | 63% | Dryer 2001 (g = 309) |
| GN? | IX′ | 53% | Hawkins 1983:96, 100 (n = 348) |
| | | 69% | Dryer 2001 (g = 298) |
| Prep?? | 24 | 37% | Dryer 2001 (g = 275) |

*Notes*: Universals supporting hypotheses: Greenberg 1966a (Arabic numerals), Hawkins 1983 (Roman numerals). Universals in italics are counterexamples to the proposed dominance pattern. Frequency: n (languages), g (genera; see §1.5). The percentages from Dryer 2001 represent the average of the percentage of genera with the putatively dominant word order in each of his six large linguistic areas.

In this situation, NDem occurs in eighty languages and DemN occurs in only sixty languages (compare Greenberg 1966a:97). Hence the fact that DemN is indeed more common than NDem is an independent piece of evidence supporting the dominance of DemN.

Table 3.1 lists the word orders for which there is some evidence that one order is dominant and its opposite is recessive. Some orders in the table are probably not dominant. For example, there is only one implicational universal supporting dominance for each of Prep and GN, and the cross-linguistic frequency for Prep (for genera across areas) is only 37%, the opposite that one would expect from the universal. VO has several universals supporting dominance, and one universal questioning it; but the proportions of VO languages and VO genera differ drastically. OV is more common in only four of six areas, and in one of them (North America) by only one genus (Matthew Dryer, pers. comm.). These counts must

be taken with a grain of salt. Genus frequencies represent the linguistic state of the world some four millennia ago, apart from genera that have died out without trace, whereas language frequencies represent the current linguistic state of the world (§1.5). It appears that at that earlier stage, there were significantly more OV languages, or at least more than survived to the present, and also significantly more GN and Post languages. And these orders happen to be strongly correlated with each other, as we will see immediately below. Hence some of the variance in figures may represent the possibility that the proportions of language types have not reached a stationary distribution (§1.5). Nevertheless, it is unlikely that adposition order or object–verb order display any dominance pattern.

The other pattern that Greenberg discovered in his universals is **harmony**. This pattern is also derivable directly from the tetrachoric table, though it is less obviously manifested in the implicational universal. A word order on one parameter is **harmonic with** an order on the cross-cutting parameter if it occurs *only* with that other order. In the implicational universal AN ⊃ DemN for example, AN and DemN are harmonic, and NDem and NA are harmonic.[1]

In a biconditional universal, Prep is harmonic with NG and vice versa, and Post is harmonic with GN and vice versa. However, there is no dominant order in a biconditional universal, since each word order type occurs with only one word order type on the other parameter. Conversely, in an unrestricted universal such as Greenberg's Universal 1 (subjects almost always precede objects), there is a dominant order – SO in this case – but there are no harmonic orders.

In other words, Greenberg's model of harmony leads to a complex set of pairwise harmony relationships between word order patterns. These relationships are illustrated in Figure 3.1, for the universals in Greenberg (1966a) and Hawkins (1983), using an arrangement of word order types that will be applied to more recent analyses in §3.4. The figure is quite complex but, as we will see in §3.4, later attempts to simplify the relationships are problematic. The orders on the right hand side of Figure 3.1 are clause level orders, and those on the left hand side are phrasal orders. The orders enclosed in the dotted region are those for a head with an NP or PP dependent (genitive, standard of comparison, subject, object, prepositional object). The vertical stroke indicates harmony of a binary order parameter and its opposite: for example the link between A|N and Num|N means that AN is

[1] Greenberg is unclear whether harmony should be asymmetric or symmetric. He writes regarding VOprn ⊃ VO: 'the order noun object – verb is harmonic with pronoun object – verb but is disharmonic with verb – pronoun object *since it does not occur with it*' (Greenberg 1966a:97; my italics). However, later on the same page he writes: 'The entry [in the tetrachoric table] with zero is always the recessive one for each construction, and the two constructions involved are disharmonic *with each other*' (p.97; my italics). It appears that Greenberg probably intended harmony to be symmetric. All subsequent research (other than the first edition of this book) has assumed harmony to be symmetric, and I will follow that view here.



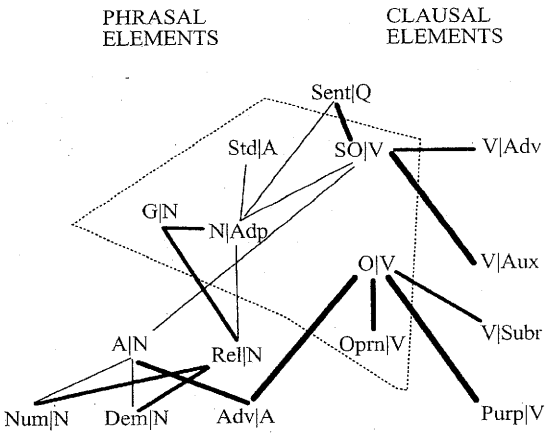



Figure 3.1 *Harmonic relations between word orders based on evidence in Greenberg 1966a and Hawkins 1983*

harmonic with NumN and NA is harmonic with NNum. The parameter SO|V refers to Greenberg's universals involving VSO vs. SOV languages. The lines link two word orders that are harmonic according to Greenberg's and Hawkins' universals. The thickness of the lines represents the strength of the implicational relation in terms of Greenberg's or Hawkins' descriptions: thicker lines represent universals with fewer exceptions.

Greenberg's analysis illustrates the next step in a typological analysis. Whereas an implicational universal describes a relationship between just two parameters (or maybe three or four, in the case of complex implicational universals), concepts like dominance and harmony describe a relationship between a large number of parameters in a single stroke. The concept of dominance, for example, defines a relationship between a particular word order type and any other parameter that is involved with it. Many of these deeper and broader typological concepts can be recast in terms of a generalization over implicational universals. However, they can also be directly read off tetrachoric tables or other descriptive representations of the distribution of attested language types. As more of these broader concepts have been discovered and employed, they have replaced the implicational universals as typological generalizations.

Greenberg considers both dominance and harmony to operate in explaining word order patterns. He proposes the following generalization:

(4) 'A dominant order may always occur, but its opposite, the recessive, occurs only when a harmonic construction is likewise present' (Greenberg 1966a:97).

Greenberg's generalization is one of the earliest examples of an important type of explanation of cross-linguistic variation, the concept of **competing motivations** (see also DuBois 1985; Optimality Theory is compared to competing motivations in §3.5). Competing motivations models describe the interaction of universal typological principles or **motivations** in order to account for the existence of variation in language types. The motivations are generally functionally based in typological analyses, but the competing motivations model does not require the motivations to be functional. Competing motivations such as dominance and harmony are not strictly functional, although functional explanations have been offered for them (see §3.4).

In a competing motivations model, no one language type is ideal (wholly motivated) because the different principles governing the existence of language types are in conflict (competition). In Greenberg's word order analysis, some word orders, such as NA, are motivated by dominance, while either NA or AN order is motivated by harmony in terms of its alignment with the order of other modifiers. Since for some modifiers, modifier–noun order is dominant, and for others noun–modifier order is dominant, a language cannot be harmonic without having some recessive orders. However, an order is predicted not to be both recessive and disharmonic at the same time.

The value in competing motivation models for typology is that they can account for both variation in language types and also frequency of language types across the world. Thus, competing motivations provide an important class of explanations for both typological variation and constraints on that variation. However, it should not be thought that in, say, an NA language only dominance is part of its grammar of modifiers, and in an AN language only harmony is part of its grammar of modifiers. The motivations are ultimately functional in origin (see §3.4), and are present for all speakers of all languages. Competing motivations influence (i.e. constrain) the conventions of a grammar of a particular language, and can alter the conventions in the process of language change (see chapter 8). But they are not part of the conventions of a particular language at a particular time per se. All speakers have all motivations as part of their social and cognitive context.

Competing motivation analyses can exclude certain logically possible types, and therefore are not necessarily 'vacuous' (see below). In Greenberg's analysis of word order, one logically possible type is excluded: the type in which the two word orders are disharmonic and both recessive. This type is, of course, the one type excluded by the implicational statement of the word order pattern. In general, we may characterize a **nonvacuous** competing motivation model as one in which:

(i) Satisfaction of all motivations simultaneously is logically impossible (hence the competition between the two).



(ii) Some allowed logically possible type(s) can be attributed to satisfaction of one motivation.

(iii) The other allowed logically possible type(s) can be attributed to satisfaction of another motivation.

(iv) The prohibited logically possible type(s) represent the satisfaction of no motivation.

At this point, the value for typology of nonvacuous competing motivation analyses should be clear: they allow for universal characterization of typological variation. All languages, and therefore all human beings, have both underlying motivations attributed to them. A particular language at a particular historical stage has *conventionally* resolved the competing motivation in one of the several possible acceptable ways. Moreover, languages can change over time, reflecting a reassertion of one motivation at the expense of the other (see chapter 8). Nevertheless, certain possible types are excluded – or at least assumed to be very rare – by virtue of satisfying no motivation.

Condition (i) above may be too strong for specific subsets of competing motivations. For example, NRel order appears to be dominant, and VO order may be dominant (see Table 3.1). If so, then VO&NRel languages satisfy both dominance and harmony simultaneously, violating condition (i) (Matthew Dryer, pers. comm.; note also that Greenberg himself did not posit a direct relationship between verb–object and noun–relative order). If all motivations are satisfied, why do OV&NRel and OV&RelN languages exist? Presumably, it is because we have examined only a subset of the competing motivations involved, and other competing motivations may not be satisfied in VO&NRel languages.

In a vacuous competing motivation analysis, condition (iv) above does not apply. Hence, every logically possible type is allowed. In other words, one could reach the same explanatory goal simply by stating that every logically possible type is actually possible. Most linguists would select the latter explanation over a vacuous competing motivation analysis because the latter is simpler. However, the latter explanation – anything goes – is really a non-explanation. Typologists generally take two approaches to vacuous competing motivation models. The first is to refine a vacuous competing motivation analysis so that some logically possible language type is indeed excluded by the analysis, and is indeed empirically unattested. The second is to make quantitative predictions instead of qualitative ones. The fact that a competing motivation analysis does not exclude any possible types does not mean that the analysis is invalid: if it can predict relative frequencies of the language types, then it is a genuine explanation. We illustrate both strategies here.

A number of linguists have proposed a set of universal pragmatic principles motivating word order. These principles have a long history in functionalism; the

three most important ones are listed here, as formulated by Haiman (1985:237–38; see also Jespersen 1909–49, vol. VII:54; Behaghel 1923–32, vol. IV; Tomlin 1986; Mithun 1987; Givón 1988):

1 What is old information comes first, what is new information comes later, in an utterance.
2 Ideas that are closely connected tend to be placed together. [see §7.2.1]
3 What is at the moment uppermost in the speaker's mind [less predictable, more important, more intended to be attended to by the hearer; Givón 1988:275–76] tends to be first expressed.

Most critical attention has been focused on principles 1 vs. 3. New information is generally what is at the moment uppermost in the speaker's mind and old information is not. By principle 1, new information should follow old information. By principle 3, new information should precede old information. Principles 1 and 3 appear to provide a classic vacuous competing motivation for the ordering of old and new information in utterances. A more refined definition of old vs. new and of being 'uppermost in the speaker's mind' may allow us to separate these motivations and construct a proper nonvacuous competing motivations analysis.

But Haiman notes that principle 3 is in conflict with principle 2 as well. Fronting of uppermost information often splits up otherwise conceptually close constituents. Thus, principle 2 will tend to place certain constituents together, and principle 3 will tend to separate them, other things being equal. This is again a classic case of vacuous competing motivation, since no possibility is excluded.

Haiman's argument against vacuity is applied to one word order phenomenon: the position of the questioned element in information questions and of the often identical relative pronoun in relative clauses (so-called *wh*-movement). Haiman identifies principle 3 with linguistic focus, which is most likely to be uppermost in the speaker's mind. He argues that principle 3 applies to information questions only: the questioned element is in focus, and will therefore be found in the focus position (if focus is indicated by a special position). Haiman predicts that relative pronouns will behave differently from interrogative pronouns, even though they are usually analyzed to be the same kind of syntactic element as interrogative pronouns. Principle 3 does not apply, since they are not in focus (and, apparently, principle 1 does not apply either). Instead, principle 2 applies: they are attracted to the head noun of the relative clause. In other words, for information questions, focusing – generally governed by principle 3 – overrides conceptual closeness, while for relative pronouns focusing does not apply, and so principle 2 is free to apply. Typologically this means that language types in which the relative pronoun is not positioned next to the head noun should not exist, even



if the question word (allegedly the same constituent type) is moved to a focus position.

Haiman's conjecture is confirmed by his typological survey, with one exception (Luganda). The crucial test cases are those languages in which focused elements are not fronted. An example of this language type is Hungarian, in which relative pronouns consist of the definite article *a* combined with the interrogative pronoun. In Hungarian, focused elements are placed immediately before the verb. Relative pronouns are moved next to the head noun, which precedes the relative clause. The crucial examples are those in which the question word is not initial, thus demonstrating that it is in preverbal, not sentence-initial, position:

(5) A lova -t **ki** hozta haza?
the horse -ACC **who** brought home
'Who brought the horse home?'

and those in which the relative pronoun is separated from the verb, thus demonstrating that the relative pronoun position is sentence initial, not preverbal (Haiman 1985:244):

(6) az újság **amit** Pista végig olvasott
the newspaper **which** Stephen to.the.end read
'the newspaper which Stephen read to the end'

Haiman has demonstrated that principles 2 and 3 exist and operate independently in the ways that a competing motivation analysis would predict.[2]

The second approach to competing motivation analyses can be illustrated for generalizations over affix order within words. It has long been noted that there is an overall cross-linguistic frequency preference for suffixes (Greenberg 1957; Cutler, Hawkins and Gilligan 1985; Hawkins and Cutler 1988). This evidence suggests that the morpheme order Root–Suffix is dominant. Hawkins and Gilligan (1988) also provide evidence supporting the implicational universal OV/Post ⊃ Root–Suffix and conversely, Prefix–Root ⊃ VO/Prep (they did not distinguish between object and adposition orders in the cross-linguistic studies they made and/or drew upon). This implicational universal supports the dominance of Root–Suffix over Prefix–Root order. It also suggests that OV is harmonic with suffixing and that prefixing is harmonic with VO. Thus, we have a typical dominance–harmony competing motivation analysis.

[2] One apparent problem with Haiman's analysis is that anaphoric, as opposed to relative, pronouns do not move to the antecedent; instead they stay in their 'normal' position. Haiman argues that the normal position of anaphoric pronouns is maintained due to analogy with main clauses. This does not, however, explain why anaphoric pronouns are not attracted to their antecedents in main clauses. An alternative analysis is that an anaphoric pronoun is not truly anaphoric, but indexical, referring directly to an external referent (Barlow 1988; Ariel 1990; van Hoek 1997).

Hawkins and Gilligan support the implicational universal by examining specific affix types, such as gender suffixes on nouns. In this case, they extrapolated the following proportional distribution of gender affixes (Hawkins and Gilligan 1988:232):

| Word order type | Gender prefixes | Gender suffixes |
|---|---|---|
| VO or Prepositional | 20% | 30% |
| OV or Postpositional | 0% | 50% |

This distribution would arise if there is approximately equal balance between Root–Suffix dominance and affix–word-order harmony. In OV languages, dominance and harmony motivate exclusive suffixing. In VO languages, dominance and harmony compete, motivating an approximately equal division between prefixing and suffixing.

Hawkins and Gilligan propose that the overall suffixing preference is simply a sum of individual suffixing preferences; there is no general suffixing preference. However, while the pattern given above for gender is found also with affixes encoding indefiniteness, definiteness, plural, tense, aspect, modality and causative, the pattern for case is different: case affixes are almost exclusively suffixes, no matter what the word order is. This fact can be analyzed in two ways. The first analysis is that case has a much stronger motivation for suffixing. The second analysis is that there is an overall suffixing preference for all affixes, which accounts for gender, etc., but that case has an additional suffixing motivation.

Also, Hawkins and Gilligan observe that five types of affix are found as both prefixes and suffixes in both VO and OV languages: person indexation for subject, object and possessor, negative affixes, and (more equivocally) voice affixes (Hawkins and Gilligan 1988:235). However, another possibility is that these affixes have individual motivations that compete with word-order harmony and possibly with a general suffixing dominance. The proportions for the indexation patterns and for negation from one cross-linguistic sample are given below (Dryer 2001):

*Negation (g = 123)*

| | Prefix | Suffix |
|---|---|---|
| VO | 17% | 7% |
| OV | 21% | 55% |

*Possessor indexation (g = 186)*

| | Prefix | Suffix |
|---|---|---|
| VO | 19% | 25% |
| OV | 35% | 21% |

*Subject indexation (g = 227)*

| | Prefix | Suffix |
|---|---|---|
| VO | 26% | 15% |
| OV | 19% | 40% |

*Object indexation (g = 131)*

| | Prefix | Suffix |
|---|---|---|
| VO | 10% | 32% |
| OV | 32% | 26% |

There seems to be a motivation for person and negative affixes to be prefixes despite the harmony of OV with suffixation found with other affix types. On the other hand, one would then expect a higher proportion of prefixes than suffixes in VO languages, and that is clearly found only with negation: subject and possessor indexation are approximately equal. Object indexation seems to have an anti-harmonic pattern: more prefixes in OV languages, and more suffixes with VO languages (see §3.4). In this model, then, there are three competing motivations:

(i) an overall suffixing preference;
(ii) harmony of VO/Prep with prefixing and OV/Post with suffixing;
(iii) individual preferences for particular inflectional categories (suffixing for case, prefixing for negative and subject and possessor indexation).

The lesson to be drawn from the competing motivation analysis of affix order is that a more fine-grained approach to typological classification (here, differentiating affix types) will reveal significant universals as well as more complex patterns of cross-linguistic distribution in some cases. The more complex interactions in a competing motivation analysis will require more sophisticated quantitative techniques; however, competing motivation analysis provides a theoretical framework in which to convert statistical distributions into underlying motivating factors.

In sum, competing motivations analyses offer an explanation for language variation. There are multiple motivations for language types. The motivations compete with one another, such that no single language type satisfies all competing motivations simultaneously. All language types that are partially motivated may exist; hence, variation in language types is found. Moreover, the proportions of attested language types reflects the number and/or degree of motivation of each language type.

## 3.4 Deeper explanations for word order and affix order universals

Many proposals have been made to explain the patterns of dominance and harmony that Greenberg discovered. Before reviewing these proposals, however, an important rephrasing of Greenberg's typological classification of clausal word order must be made.

Greenberg's original classification of clausal word order was based on a six-valued parameter: SOV, VSO, SVO, VOS, OVS and OSV. Of those orders, Greenberg analyzes only SOV, VSO and SVO, although he was aware of the existence of VOS and OVS languages. Later research confirmed the existence of VOS and OVS languages, and has suggested that there also exist OSV languages (Derbyshire 1977; Derbyshire and Pullum 1981; Pullum 1977, 1981).

The six-way classification can be divided into binary parameters, SV/VS and OV/VO. This division has a number of advantages (Dryer 1997b). Many languages have much freer word order than English, yet some orders are more frequent than

others, and hence one can reasonably speak of a basic clausal word order for that language. However, very few sentences in texts have full nominal subjects and full nominal objects (see §6.3.3). An analysis of the SOV/VSO, etc. order in such a language would be based on a tiny fraction of the whole corpus. However, many sentences have just a nominal subject or just a nominal object. Hence, it is much sounder to evaluate SV/VS and OV/VO orders for such languages.

Also, there are many languages which are verb-initial, but which are difficult to classify as VSO or VOS. Such languages can be classified as VS&VO, with no value for SO/OS. Likewise, some verb-final languages frequently have OSV order, and can be described as SV&OV. In fact, verb-initial languages share many typological features, which led Hawkins (1983) to collapse them into a single type, V-1 (i.e. VS&VO). Finally, some languages may not have a basic verb–subject order but may have basic verb–object order (e.g. Masakin is VO but SV/VS; Dryer 1997b:85); or lack a basic verb–object but may have basic verb–subject order (e.g. Logbara is SV but VO/OV; Dryer1997b:85).

One consequence of this recasting of the typological classification of clausal word order is that many of Greenberg's universals are now complex universals. For instance, the universal VSO ⊃ QSent must now be phrased as (VS & VO) ⊃ QSent, or more precisely as (VS & VO & SO) ⊃ QSent. This modification has important consequences for the analysis of harmony in work after Greenberg 1966a.

Two main approaches for explaining the motivations underlying word order and affix order have been taken: by the processing of syntactic structure, and by diachronic relationships between word orders. These two approaches need not be mutually exclusive.

Hawkins has largely proposed processing explanations for word order patterns. In his earlier work (Hawkins 1980; 1983), he proposed separate principles for dominance and harmony. Hawkins used a sample of over 300 languages and thus brought in a much greater range of data, especially data for the various noun modifiers (demonstrative, numeral, adjective, genitive and relative clause). Hawkins introduces two competing motivations for noun–modifier order. The first motivation is **heaviness** (Hawkins 1983:90). Certain types of modifiers tend to be larger grammatical units, in terms of number of syllables, number of words and syntactic constituency (relative *clauses* vs. genitive *phrases* vs. single-*word* demonstratives and numerals), and could be ranked in order of heaviness as follows:

(7) Rel < Gen < Adj < Dem, Num

Hawkins interprets 7 as a preference for heavier modifiers to follow the head noun, and lighter modifiers to precede (see §5.1). This concept resembles Greenberg's concept of dominance in its effect of complementing harmony: heavier modifiers follow the noun even if the harmonic order is modifier–noun, and lighter



modifiers precede the noun even if the harmonic order is noun–modifier. Since demonstrative and numeral are lighter, and adjective and relative clause are heavier, Hawkins' heaviness ranking in 7 corresponds roughly to Greenberg's dominant orders DemN, NumN, NA and NRel.

Hawkins' heaviness principle, if it is indeed equivalent to Greenberg's dominance, can be thought of as an explanation of many cases of word order dominance. The dominant order is that which places the lighter element before the heavier element. This explanation actually represents a putative relationship between one grammatical parameter – word order taken in general, and another, independent grammatical parameter – the length (in phonological and syntactic terms) of the grammatical element. This relationship has a plausible and well-supported functional explanation: order of constituents reflects ranking in size for processing reasons (see Hawkins 1983:98–106 and references cited therein).

The dominant subject–verb order may also be accounted for by heaviness. Recent text studies have demonstrated that across languages subjects, especially transitive subjects, tend to be pronominal, and nominal subjects when they occur tend to follow the verb cross-linguistically (DuBois 1985; 1987; Lambrecht 1987). Thus with subjects as well, heaviness may be a contributing factor to the dominant word order, though DuBois and Lambrecht emphasize principles of information flow (such as those discussed in §3.3 above). Principles of information flow may also be involved in the unequivocal dominance of subject–object order and antecedent–consequent order in conditionals.

Hawkins' second motivation is harmony. Explaining harmony has drawn much greater attention. Word order typologists immediately after Greenberg focused almost exclusively on harmony (e.g. Lehmann 1973; Vennemann 1973). The two harmonic types were named **OV** and **VO** after the declarative-clause order type, and included the word orders shown in Table 3.2 (p.72). The major drawback of this approach, still widespread today, is that it is empirically less adequate than Greenberg's original formulation. The harmony-only analysis treats all of the word order universals as if they were biconditional universals, but in fact most of them are not; dominance also plays a role in word order typology. Although many languages fit one or the other of the two harmonic word order types, many other languages do not, having instead one or more dominant word orders that are disharmonic with the overall pattern of the language. Harmony is only one half of the picture (for a critique of the harmony-only approach, see Comrie 1989:94–102). Another difference between Greenberg's original formulation of harmony and later proposals is that Greenberg only posited two-way harmonic relations (see Figure 3.1 and below). The Lehmann/Vennemann analysis assumed an n-way cluster correlation among all the VO orders and all the OV orders.

In a series of recent papers, Dryer has applied his sampling technique to a very large word order database and in so doing has challenged a number of empirical

Table 3.2 *The OV and VO word order types*

| | | |
|---|---|---|
| Clausal orders | OV | VO |
| | SV | VS |
| | VAux | AuxV |
| | VAdv | AdvV |
| | VSubr | SubrV |
| | PurpV | VPurp |
| | OcompV | VOcomp |
| | SentQ | QSent |
| Phrasal orders | Post | Prep |
| | GN | NG |
| | RelN | NRel |
| | AN | NA |
| | DemN | NDem |
| | NumN | NNum |
| | AdvA | AAdv |

*Sources:* Lehmann 1973; Vennemann 1973

generalizations on word order that have previously been taken for granted. For example, Dryer questions the correlation of adjective–noun order with verb–object order, by demonstrating that it is a side effect of the Eurasian bias of most language samples (Dryer 1988; Greenberg 1966a incidentally does not propose this correlation). In another paper (Dryer 1991), Dryer argues that SVO is not as 'mixed' a type as some typologists have argued: SVO languages pattern in most respects like verb-initial languages, and only in three characteristics do SVO languages display a 'mixed' behavior, two having to do with interrogative sentences and the third being genitive–noun order.

Dryer's major paper on word order (Dryer 1992a) returns to VO and OV as the basic predictors of word order correlations, and identifies correlations as statistically significant quantitative distributions rather than exceptionless implicational universals. His data show that certain word orders that were previously thought to be harmonic with VO and OV in fact do not appear to correlate, in particular adjectives, demonstratives and (arguably) numerals, which are three of the basic noun modifiers. The evidence presented in Dryer's paper supports the correlations in Figure 3.2, replacing Oprn|V in Figure 3.1 with PP|V.

Dryer argues that in general the orders that do correlate with OV/VO order are those that order a fully recursive phrasal category – i.e. NP, PP, VP or S – relative to a category that is not so; he calls this analysis the Branching Direction Theory (Dryer 1992a:108–17). Dryer concludes that the correlations in the Branching Direction Theory are ultimately to be explained in processing terms, namely that



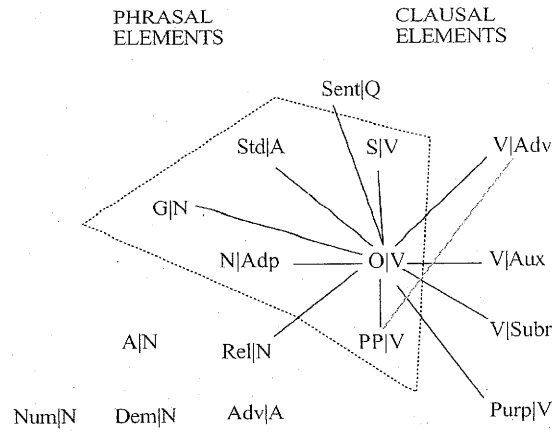
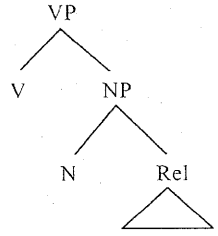


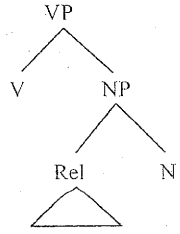

Figure 3.2 *Correlations between word orders based on evidence in Dryer 1992a*

utterance structures that conform to the Branching Direction Theory are easier to parse. For example, a harmonic VO&NRel language consistently has the recursive phrasal category on the right (right-branching), as in 8, while a disharmonic VO&RelN language would have the recursive object category to the right of the verb but the recursive relative clause to the left of the noun, as in 9.

(8) VO&NRel:




(9) VO&RelN:



Dryer compares his theory to other parsing models, including a more recent model of Hawkins' (Hawkins 1990; 1994). In this work, Hawkins has proposed a single principle, Early Immediate Constituents (EIC; Hawkins 1990; 1994) as a constraint on syntactic structures, including word order. EIC is based on a sophisticated processing model which cannot be fully described here. The basic idea is that certain elements in a phrase determine what parent node is constructed over the constituent in parsing a sentence into its syntactic constituents. The parsing model involves constructing the phrase structure tree as quickly as possible once construction begins. For example, in 8 the VP node is constructed when the first element, V, is recognized, and the NP node is constructed immediately afterward, when the second element, N, is recognized. In 9, on the other hand, although the VP node is constructed when the first element is recognized, the NP node cannot be constructed until the third element is recognized, since N is third. Hawkins argues that although languages may conventionalize word orders that have lower EIC ratios, such as 9, such languages will be cross-linguistically less frequent. Moreover, their cross-linguistic frequency will be proportional to their EIC ratio. Hawkins tests this prediction against Dryer's database for verb–object and adposition order, and several other orders, and Hawkins' prediction is confirmed (Hawkins 1994:250–82).

Dryer's Branching Direction Theory for harmony is very similar to Hawkins' Early Immediate Constituents theory (Dryer 1992a:131–32). Dryer's analysis is based on the most detailed empirical study of word order achieved so far, and contains a number of major insights. However, both Dryer's and Hawkins' parsing theories to account for the word order harmony correlations imply that there is a single correlation between all of the harmonic orders, since all of the harmonic orders share the same syntactic structure. Yet Dryer's cross-linguistic evidence for his theory is not a single n-way correlation, but a series of pairwise correlations between verb–object order and the other word order being compared (see Figure 3.2). Moreover, even this set of correlations – not the same as predicted by the Dryer–Hawkins theories – might not be the case. For example, manner adverbs are harmonic with verb – object order, contrary to the prediction of the Branching Direction Theory. Dryer suggests that manner adverbs may not be directly correlated with verb–object order but instead indirectly correlated via verb–PP order, indicated by the gray line in Figure 3.2; verb–PP order is strongly correlated with verb–object order (Dryer 1992a:92). But it is possible that the other orders which correlate with verb object order and conform to his Branching Direction Theory are indirect correlations also.

One way to resolve this issue is to use a more sophisticated quantitative analysis of the data, such as a log-linear analysis, as Justeson and Stephens (1990) have done. A log-linear analysis finds a best-fit model simultaneously considering all



possible interactions of variables. The equation used for a log-linear analysis of three variables is given in 9 (after Justeson and Stephens 1990:2372):

(10) $$\log x_{ijk} = u + u_i^1 + u_j^2 + u_k^3 + u_{ij}^{12} + u_{jk}^{23} + u_{ik}^{13} + u_{ijk}^{123}$$

The simple value $u$ represents a constant reflecting the overall mean of type frequencies. The values dependent on one variable are a preference of one value over its opposite; in the case of word order, this corresponds to dominance. The values dependent on two variables (i.e. two-way interactions) can be thought of as representing simple implicational universals involving two word orders. The last value, dependent on all three variables represents a more complex interaction, such as n-way relationship between word orders of the sort accounted for by the theories of Lehmann, Vennemann, Hawkins and Dryer.

Justeson and Stephens use a 147 language sample based on Hawkins (1983), with data on subject–verb, object–verb, adposition, genitive, adjective and relative clause order. They found a best-fit model that requires only values dependent on one variable (dominance) and two-way interactions (like the simple implicational universals proposed by Greenberg). The two-way interactions are presented in Figure 3.3 (adapted from Justeson and Stephens 1990:2375).

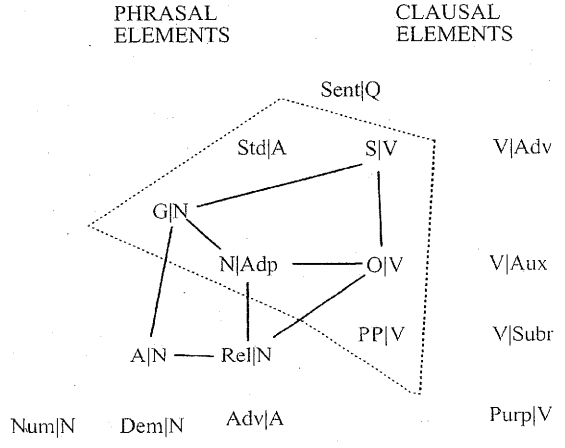



Figure 3.3 *Correlations between word orders based on log-linear analysis*

Justeson and Stephens' work suggests that global explanations such as Early Immediate Constituents and the Branching Direction Theory, which would correspond to n-way correlations, may not be necessary, and that the proper generalizations require explanations in terms of local interactions between pairs of word

orders, i.e. simple implicational universals involving just two word order types. In fact, Justeson and Stephens argue that Greenberg's original universals of word order provide an excellent fit to the log-linear analysis (Justeson and Stephens 1990:2373).

One possible explanation of the correlations between pairs of word orders is that the two word order types use the same or similar morphosyntactic construction. Greenberg cites Berber as a language in which the genitive form of the noun is the same as the subject form (provided the subject immediately follows the verb); thus, the VS construction is very close to the NG construction (Greenberg 1966a:99). In many languages, the genitive form of the noun is identical with the subject form, and/or the object form (Allen 1964; Siewierska 1998). In many more languages, the adposition construction is morphosyntactically parallel to a genitive construction, with the adposition the head. A good example of the constructional similarity of VS, PrepN, and GN can be found in K'iche' (Mondloch 1978:195, 24):

(11) šaq si š- Ø- aʔiʔ kān rī xun čicop
just really PST- 3SG.B- became.sunned left the an animal
V S

č- u- či rī mār
at- 3SG.A- edge the sea
Prep N

'And the animal was left sunning [= dead] at the sea shore.'

(12) u- ɸīʔ lē ala
3SG.A- dog the boy
N G

'the boy's dog'

K'iche' has two indexation prefix sets, A and B. Set B is used for intransitive subjects; set A is used for transitive subjects, prepositions and genitive constructions. The general construction is: [Prefix-Head Dependent], a construction that subsumes VS, PrepN and NG.

The examination of morphosyntactic constructions and word order can also account for anomalous word order patterns. In Mandarin Chinese, one finds prepositions and **circumpositions**, adpositional constructions with one element preceding the noun and one element following, as in (Li and Thompson 1981:400):

(13) wǒ bǎ yáng gǎn **dào** hòu yuán **li**
I OBJ sheep herd **to** back yard **in(side)**
'I herded the sheep into the backyard.'

Mandarin has a basic word order of SVO, but is GN. It turns out that the prepositions and the prepositional element in the circumpositions are verbal, and the postpositional elements in the circumpositions are nominal. In this case *dào* is also a verb meaning 'arrive', and *li* has a nominal source not unlike English *inside*. Thus, the PrepN construction is derived from the VO construction, and the NPost construction is derived from the GN construction.



Dryer (1992a) also observes a number of cases where how the category is expressed influences word order behavior. For example, if a negative or tense/aspect marker is expressed as an auxiliary then it harmonizes with VO/OV order, but if it is expressed as a particle, it has instead an overall preverbal tendency; numerals may differ in their word order preferences depending on whether or not they are heads; and demonstratives may also differ in their word order preferences depending on whether or not they are members of the class 'determiner' or not.

It may turn out that these constructional parallels underlie many of the harmonic patterns, particularly the patterns for which an explanation based on semantic analogy is not obvious. These constructional parallels almost certainly a result of the diachronic process of grammaticalization. For example, the widely observed strong correlation between genitive and adposition order, also found in Justeson and Stephens' analysis, is most likely explained by the fact that adpositions most commonly evolve from genitive expressions. Aristar (1991) extends the diachronic hypothesis by noting that in many languages a morpheme used to link a relative clause to its head is often identical to the morpheme used to link a genitive phrase to its head, and often the morpheme used in adjectival modification is similar to either the relative morpheme, the genitive morpheme, or both. Also, finite declarative-clause constructions commonly evolve from nominalizations with genitive arguments (see Aristar 1991). Aristar argues that the correlation between adjective, genitive and relative clause order may be due to a 'binding anaphor' (i.e. indexical) strategy which is often used to express any or all three modifier relations.

The diachronic word order harmony hypothesis suggests that certain word order pairs are harmonic because one historically evolves from the other. The constructions examined by Justeson and Stephens that are linked by historical processes are given in Figure 3.4 (p.78). If we compare Figure 3.4 to Figure 3.3, we find the diachronic word order harmony hypothesis supports most of the harmonic relations produced by Justeson and Stephens' log-linear analysis, but not all of them. Hence, a diachronic explanation is probably valid for many cases of word order relationships, but probably not all of them.

In sum, the explanation for harmony is still unresolved. Part of the problem lies with the empirical generalizations themselves. A comparison of Figures 3.1–3.3 demonstrates that it is not clear what word orders are in fact harmonic with what other orders. Most word order universals have significant exceptions, though that varies from one universal to another. This situation has led to the analysis of word order correlations by statistical techniques by Dryer and by Justeson and Stephens.

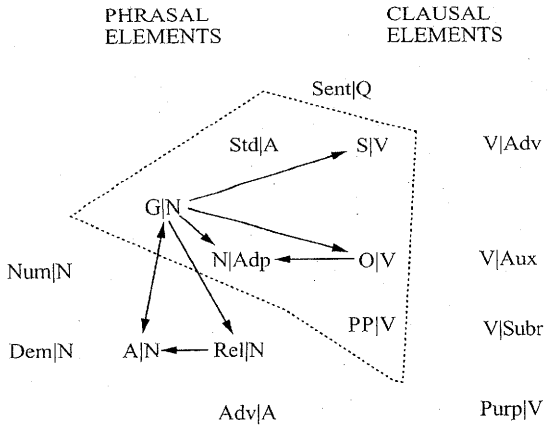



Figure 3.4 *Attested constructional changes across word orders analyzed by Justeson and Stephens 1990*

However, quantitative analyses require probability samples, and so are sensitive to the problems in such sampling procedures (see §1.5). The diachronic facts represented in Figure 3.4 at least have a firmer empirical reality. Further advances in explaining harmonic patterns will require better samples, more sophisticated statistical analyses, and cross-linguistic analyses of word order changes and the morphosyntactic constructions used for word order patterns.

All of the discussion in this section so far has assumed that implicational universals, and the deeper concepts, such as harmony, dominance/heaviness, capture only cross-linguistic variation. However, there is actually a good deal of *intra*-linguistic variation in the expression of particular constructions (§2.2), and word order is no exception to this phenomenon. Word order is particularly variable at the clause level and somewhat less so at the phrase level (in fact, one might propose the generalization that the lower the morphosyntactic level, the more rigid the word order). Of course, word order is never entirely free, and constraints on the variation can be found. Several of Greenberg's original word order universals refer to flexibility (or inflexibility) of word order. Universal 6 states that all VSO languages have at least SVO as an alternative order, while universals 7, 13 and 15 state that in SOV languages with at most OSV as an alternative order (the **rigid** SOV type), neither adverbial modifiers of the verb nor subordinate verbal forms can follow the main verb.

The most thorough study of word order variation in the declarative clause is Steele (1978). Steele discovered that certain alternative word orders are more likely to be found than others. In particular, VSO and SOV are most likely to have VOS and OSV respectively as alternative word orders. In other words, the most



likely alternative orders keep the verb in the same position and reverse the position of subject and object. SVO is also a very common alternative order to both VSO (note Universal 6) and SOV (this is the **nonrigid** SOV type). This phenomenon can be accounted for by the dominance of SV and (possibly) VO orders: nonrigid VSO languages allow subjects to shift to their dominant position and nonrigid SOV languages allow objects to shift to their (possibly) dominant position. Languages with basic SVO order are the least likely to have any alternative word orders; i.e. this is the language type that is most likely to have rigid declarative clause word order.

More detailed investigation of actual texts in many languages has revealed that word order is more flexible in more languages than was previously imagined. Close attention has been paid to so-called free word order languages, by which is meant largely discourse-determined clause constituent order and sometimes also so-called free noun phrase constituent order (Hale 1983; Heath 1986; Mithun 1987; Payne 1987; Dryer 1989b). The study of typological patterns of word order variation is a relatively new area, and will be increasingly important in typological word order research.

Processing and diachronic hypotheses have also been proposed for affix order. Hawkins and his associates (Cutler, Hawkins and Gilligan 1985; Hawkins and Cutler 1988; Hall 1992) account for the suffixing preference by a processing explanation, that the beginnings of words are processed and retained more easily than the ends of words, which in turn are more easily processed than the middles of words. This hypothesis is strongly supported by psycholinguistic evidence. Since the beginnings of words are the most salient, one is most likely to find the root there; the ends carry the affixes, and infixes (which would be in the middle) are avoided.

As with word order patterns, the affix data needs to be subjected to a log-linear analysis in order to capture precisely the cross-linguistic generalizations. However, even more than with word order, a diachronic perspective is critical, and has been persuasively presented by Bybee, Pagliuca and Perkins (1990). Bybee et al. argue that one cannot consider affix position separately from the position of nonbound morphemes expressing the same concepts. This is because the suffixing preference must be characterized not simply as a predominance of suffixes over prefixes, but a preference for postposed nonbound morphemes to become affixed (Bybee et al. 1990:3), and hence the distribution of prefixes and suffixes must be compared to the distribution of preposed and postposed nonbound morphemes that have the same function, which Hawkins et al. did not do.

Bybee et al. compare order of affixes and unbound forms for a large class of verbal affixes, comparing verb-initial, verb-medial and verb-final languages. They argue that harmony is still applicable, but question the existence of the suffixing preference. They suggest that affix position in many cases can be attributed to the likely position of the nonbound morphemes from which they evolved. For example, the anti-harmonic pattern of object indexation and object–verb order (VO suffixes,

OV prefixes; see §3.3) is probably because object indexation markers evolve from object pronouns (§2.1.3) and retain object position.

Bybee et al. also test the processing explanation for the suffixing preference by examining patterns of phonological decay, that is, susceptibility to phonological alternation and allomorphy, and find the typological evidence does not appear to support the processing model. Bybee et al. also argue that the distribution of prefixes and suffixes is also influenced by semantic factors: affixes expressing concepts that are more 'relevant' to verbal meaning (see chapter 7) are more likely to fuse to the root.

As in the case of diachronic explanations for word order patterns, more evidence demonstrating actual diachronic grammaticalization relations between nonbound morphemes and affixes is needed to confirm the hypothesis. Currently we may conclude that diachrony and processing both play a role in determining word order and affix order.

## 3.5 Typology, universals and generative grammar revisited

The description of typological universals and how they are instantiated in the grammars of particular languages given in this chapter bears some resemblance to the notion of parameters and their settings, introduced into generative theory two decades after Greenberg's original work in this area (Chomsky 1981:3–4). This is another locus of comparison between formal and functional–typological approaches to grammar. In principle, any correlation between two syntactic properties that generative grammar explains by an absolute universal or a universal parameter may be formulated as a typological universal and tested. However, formal parameter-based analyses rarely address data in more than a few languages, and typological analyses rarely examine the same syntactic interactions that generativists and other formalists do. This is an area in which more interaction between generative theory and typological theory might be fruitful. Generative syntactic argumentation has produced a large number of cross-construction correlations in English and other languages which could be surveyed more systematically in the world's languages by typologists. (Conversely, much typological research has concentrated on the cross-linguistic patterns of single constructions, which in turn could be taken into consideration by generative linguists.)

Gilligan (1987) bridges this gap to some extent, and demonstrates both the opportunities and difficulties of such a comparison. Gilligan conducted a typological study of the pro-drop parameter, a major topic of study in generative grammar in the 1980s and early 1990s. The pro-drop parameter differentiates languages requiring non-null thematic subjects (unstressed pronoun subjects that are not



impersonal) and those permitting null thematic subjects; compare the grammatical Spanish sentence to the ungrammatical English translation (Gilligan 1987:74):

*Null thematic subjects*

(14) Hemos trabajado todo el día
have:1PL.PRS work:part all the day
'*Worked all day.'

A number of proposals in the literature have correlated this distinction with three other binary distinctions (Gilligan 1987:72–96): null/non-null nonthematic (impersonal or expletive) subjects, as in 15; (p.74); presence/absence of subject inversion, as in 16; and presence/absence of *that*-trace violations, as in 17, all illustrated again with Spanish vs. English (Gilligan 1987:74–75, 77):

*Null nonthematic subjects*

(15) Llueve
rain.3SG.PRS
'*Is raining.'

*Subject inversion*

(16) Salió María
leave:3SG.PRT Mary
'*Left Mary.'

*that-trace violation*

(17) Quién dijiste que ___ salió temprano?
who say:2SG.PRT that leave:3SG.PRT early
'*Who did you say that ___ left early?'

In all cases, the Spanish sentences are grammatical and the English equivalents ungrammatical.

Gilligan tests the pro-drop correlations in an areally and genetically balanced 100-language sample (Gilligan 1987:131–33). Taking all four properties together, there are sixteen possible types. The chief proposals in the literature discussed by Gilligan are Rizzi (1982), which predicts three types (see also Taraldsen 1980), and Safir (1985), which employs three parameters and predicts two additional types. Gilligan's 100-language sample contains ten languages with data for all four properties. Gilligan adds three more types not in his sample from a survey conducted by van der Auwera (1984). A comparison of the predictions to the actual data for all four properties is given in Table 3.3 (p.82). As can be seen from the table, there is only a partial match between the types predicted by Rizzi and Safir and the attested types where data for all four properties are available: although most of the predicted types are attested (except for one predicted by Safir), many other types are attested as well.

Table 3.3 *Predicted and attested language types for the pro-drop parameter*

| Language types | | | | Predictions and attestations | | |
|---|---|---|---|---|---|---|
| Null thematic subjects | Null nonthematic subjects | Subject inversion | *that*-trace filter violations | Predicted | Number in Gilligan's 100-language sample | Additional Number in literature |
| + | + | + | + | Rizzi, Safir | 3 | 4 |
| + | + | + | − | no | 1 | 3 |
| + | + | − | + | no | 2 | 4 |
| + | + | − | − | Safir | 2 | 0 |
| − | + | + | + | Rizzi, Safir | 1 | 0 |
| − | + | − | + | no | 1 | 1 |
| − | + | − | − | no | 0 | 1 |
| − | − | + | + | Safir | 0 | 0 |
| − | − | − | + | no | 0 | 3 |
| − | − | − | − | Rizzi, Safir | 0 | 3 |

*Notes*: Language types that are neither predicted nor attested are not listed in the table. Attested languages include only those languages with data for all four syntactic properties.
*Source:* from Gilligan 1987:131–33, 148–49

Gilligan also examines the pro-drop correlations pairwise, which tests the specific correlations predicted by the theories of Rizzi and Taraldsen (for the theoretical details, see Gilligan 1987:78–96; Gilligan did not test Safir's predictions). Table 3.4 shows the hypothesized universals, the strongest valid universals generalizable from Gilligan's sample, and the number of languages for which data for the universal was available.

None of the biconditional predictions are borne out by the data, but the one simple implicational universal is, with many languages confirming the implicational universal that the existence of null thematic subjects implies the existence of nonthematic null subjects. Gilligan finds simple conditionals instead of the three biconditional universals proposed by Rizzi/Taraldsen; but Gilligan's conditionals are all problematic. Gilligan argues that exceptions in the literature to SI ⊃ THAT and THAT ⊃ EXE are superficial, but admits that there is a genuine exception to SI ⊃ EXE. Since SI ⊃ EXE is a logical deduction from SI ⊃ THAT and THAT ⊃ EXE, it may be that lack of data in Gilligan's sample (particularly for *that*-trace violations) is hiding more exceptions. It is quite possible that further investigation may demonstrate that SI ⊃ THAT and THAT ⊃ EXE are due to chance and exceptions to SI ⊃ EXE may be more numerous.

Gilligan's analysis makes it appear that the main generative accounts make wrong predictions for even the data found in the literature. However, alternative



Table 3.4 *Universals and evidence for universals pairs of pro-drop properties*

| Source | Prediction | Strongest universal | Languages supporting | Exceptions [source] |
|---|---|---|---|---|
| Rizzi, Taraldsen | pro ⊃ EXE | pro ⊃ EXE | 41 | none |
| Rizzi | EXE ↔ SI | SI ⊃ EXE | 41 | 1 [sample] |
| Rizzi | SI ↔ THAT | SI ⊃ THAT | 10 | 2 [literature] |
| Taraldsen, Rizzi* | EXE ↔ THAT | THAT ⊃ EXE | 11 | 2 [literature] |

*Notes*: *by logical deduction from Rizzi's EXE ↔ SI and SI ↔ THAT; Abbreviations: pro = null thematic subject; SI = subject inversion; EXE = null nonthematic subject; THAT = *that*-trace filter violations. 'Languages Supporting' represents the number of languages in Gilligan's 100-language sample with information on the two properties linked by the universal in question.
*Source:* from Gilligan 1987:136–53

syntactic analyses can be made to eliminate the counterexamples; and the superficial anomalies are said to mask the 'deep' universals. Regarding the problematic cases of Brazilian Portuguese and Mandarin, Gilligan writes, 'perhaps the Rizzi hypothesis is correct but its effects are obscured in these languages because of some as yet unanalyzed aspect of these languages' (Gilligan 1987:90).

However, to test such an analysis empirically, one must identify the additional syntactic factor and then test *its* correlation with the pro-drop properties cross-linguistically. But if that correlation fails, then other syntactic factors can be proposed by the generative analyst, which must then be tested cross-linguistically, and so on: 'as is frequently stated in generative grammar, it is impossible to prove an analysis incorrect; rather, it is only possible to improve upon an existent analysis' (Gilligan 1987:92; a similar point is made by Matthews 1993:249–52). For example, it is essentially impossible to compare the head-ordering word order parameter in generative grammar (or the roughly equivalent directionality of theta-marking parameter), which is superficially invalid, to the typological word order analyses presented in §§3.2–3.4, for this reason. (Nevertheless, the pro-drop parameter has been abandoned by at least some generative grammarians, partly as a result of Gilligan's typological study; Haider 1994:372–73.)

We may make some general observations about comparing typological universals and parameter-setting accounts. From a typological perspective, the main problem appears to be that not enough variation is accommodated by generative analyses. Counterexamples are too easy to find cross-linguistically, even when additional parameters are proposed to allow more variation. For example, the data collected by Gilligan suggests that although the empirical connection between

*thematic and nonthematic null subjects is strong, the connection between those and the other two properties is tenuous at best. The appearance of spurious connections is precisely the statistical effect that one would expect from the small biased sample that usually emerges from studies in the generative literature. A small sample means that it is highly likely that other possible types exist outside the sample. Also, the additional syntactic parameters proposed to accommodate the types inside the sample are highly unlikely to correctly capture the range of variants attested in a truly representative sample. For example, for pro-drop, a heavily-studied phenomenon, 'of the twenty-two languages which have been analyzed for Pro-drop within the generative framework [as of 1987]... fifteen are Indo-European, four more are Afroasiatic, and only three fall outside Europe or northern Africa' (Gilligan 1987:97).

Another important observation is that biconditional universals fare more poorly than simple conditionals, as can be seen in Table 3.3. The predominance of implicational universals over biconditional universals is widely found in typological research: few biconditional universals survive the examination of a large, balanced sample.

Formal approaches have incorporated competing motivations into a recent theory, Optimality Theory (OT; Prince and Smolensky 1993; Kager 1999). In OT an input (underlying) phonological or syntactic structure is allowed to generate an indefinite number of output (surface) structures, i.e. actual phonological word forms or syntactic constructions in the language, through any sort of formal derivational process. The output structures are compared to the input structures in terms of a range of potentially competing principles or constraints, analogous to competing motivations in typological analyses. The constraints are ranked in a specific order in a language, but the order can vary from language to language. The correct output structure is predicted to be the one that violates the fewest and lowest-ranked constraints. Cross-linguistic variation is the result of the different rankings of the same, universal constraints.

A simple phonological example of an OT analysis contrasts the expression of /bɛd/ 'bed' in English as [bɛd] and in Dutch as [bɛt] (Kager 1999:14–17). Kager employs two universal constraints, given in 18:

(18a) *Voiced-Coda: obstruents must not be voiced in coda position.
(18b) Ident-IO: The specification for the feature [voice] of an input segment must be preserved in its output correspondent.

Two relevant outputs are generated for both Dutch and English, [bɛd] and [bɛt]. (In fact, all possible output structures are generated, but only these two are relevant for the constraints in 18.) In Dutch, *Voiced-Coda outranks Ident-IO, so the output /bɛt/ is valued more highly than output /bɛd/. In English on the other hand, Ident-IO outranks *Voiced-Coda, so the output /bɛd/ is valued more highly than



output /bɛt/. Thus, the difference in the phonological systems of the two languages is attributed to the difference in the language-specific ranking of the two universal constraints.

OT introduces competing motivations into generative grammar. However, the model of grammatical structure, and the way competing constraints operate in OT is quite different from competing motivations in typology. In OT the constraints relate an underlying input phonological or syntactic structure with an output phonological or syntactic structure. Formal derivational processes (subsumed under a general operation called *Gen*) derive the output structure from the input structure. In typology, the motivations relate the external functional or phonetic structure to the internal morphosyntactic or phonological structure. No derivational processes are found in typological analyses, only a direct mapping between linguistic form and external function or phonetic substance.

In OT the constraints are ranked, and the ranking varies from language to language. The ranking determines which forms actually occur in the language. Thus, in OT the ranking makes the constraints part of the grammatical conventions of the language. In typology, the motivations are not ranked, although they may be weighted. Motivation has only an indirect relationship to grammatical convention. The motivations are functional in origin, and hence are present to an equal degree for all speakers at all times; there is no difference in ranking of motivations from one language to another. Actually occurring forms are conventionally specified in the language, and cross-linguistic variation represents the range of at least partially motivated structures. Convention is partially arbitrary as well as partially motivated.

The typological model allows for greater cross-linguistic variation than the OT model. However, the OT model is forced to accommodate more variation than its apparently restrictive model allows. It does so by adding further complexity to the ranking relationship: allowing different ranking of constraints depending on which features or segments they apply to (Kager 1999:18); allowing equally-ranked constraints (p.406); allowing degrees of violations of constraints (p.41); allowing conjunctions of constraints that are ranked separately from the individual constraints (Local Conjunction; pp.392–400). Also, there are no restrictions on how to formulate constraints: this leads to overlapping constraint definitions for individual derivations. For example, Kager gives a more detailed analysis of Dutch [bɛt] using *Voiced-Coda, as in 18a, and an overlapping constraint VOP, 'no obstruent must be voiced' (p.40), which are independently ranked in the same derivation.

The typological model makes an additional prediction: language types that satisfy more competing motivations (or more heavily weighted competing motivations) will be cross-linguistically more frequent (e.g. Hawkins' EIC predictions). OT, at least in the form described in Kager (1999), cannot make such predictions, because grammatical structures are determined by a language-specific ranking of

constraints, and not a universal procedure of counting (or weighting) constraints. Hence, OT in its present form does not account for the skewed distribution of structural types in the world's languages.

## 3.6 Conclusion

The concept of an implicational universal has had its greatest impact in the area of word order. Although broader theoretical concepts have been invoked to account for typological patterns of word order, implicational universals remain a basic unit of typological analysis. Implicational universals of word order illustrate the basic elements of the typological method in their simplest form. The first step is the enumeration of logically possible language types by the structural parameters involved, illustrated by the tetrachoric table. The second step is the discovery of the empirical distribution of attested and unattested types, illustrated by the pattern of gaps in a tetrachoric (or larger) table. The third step is developing a generalization that (1) restricts variation in language types without eliminating it – i.e. allows for the various attested types while excluding the unattested types – and (2) reveals a relationship between otherwise logically independent grammatical parameters, in this case the implicational relationship.

Typologists from Greenberg onward have observed more far-reaching relationships between the word order parameters, such as harmony and dominance, than could be captured by simple implicational universals. The final step in the analysis is to seek a deeper (possibly external) explanation for the relationship. Here a central element of typological theory are competing motivation analyses. Competing motivations are deeper factors that motivate grammatical structures but which compete with each other. Much cross-linguistic variation is the result of competing motivations. Competing motivations can explain not only the distribution of attested and unattested types across the world's languages, but also the proportional distribution of different attested types, as well as the relatively rare exceptions to the typological universals.

# 4

# Grammatical categories: typological markedness, economy and iconicity

The concept of markedness was first developed in the Prague School of linguistic theory. The notion of marked and unmarked values of a category was first developed for phonological systems by Trubetzkoy (1931; 1939/1969) and first applied to morphosyntactic categories and semantics by Jakobson (1932/1984; 1939/1984; see Greenberg 1966b:11). Markedness has since been adopted by both the generative and the typological approaches to linguistic theory, not surprisingly in rather different ways. As a consequence, markedness in generative grammar is considerably different from markedness in typology (compare Battistella 1996). In fact, in adapting the concept of markedness to cross-linguistic universals, Greenberg (1966b) introduces significant theoretical innovations to markedness (Croft 1996). For this reason, we will use the rather cumbersome locution **typological markedness** in this book.

Like implicational universals, typological markedness is a fundamental concept underlying much contemporary work in typology, even though it is not overtly referred to very often. Much current typological work is supported by typological markedness (see chapters 5–7). Also, the phenomena described as typological markedness represent an important manifestation of the interplay between two major competing motivations, economy and iconicity, in linguistic expressions. Finally, typological markedness plays a significant role in an influential model of morphological representation, that of Bybee and her associates, which in turn is closely associated with recent developments in syntactic representation, particularly construction grammar (see, for example, Bybee and Thompson 1997; Croft 2001).

## 4.1 Typological markedness

The essential notion behind typological markedness is the fact of asymmetrical or unequal grammatical properties of otherwise equal linguistic elements: inflections, words in word classes and even paradigms of syntactic constructions. Typological markedness is a network of apparent causal relationships among a