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Hengeveld, K.; Rijkhoff, J.N.M.; Siewierska, A.M.

DOI

[10.1017/S0022226704002762](https://doi.org/10.1017/S0022226704002762)

Publication date

2004

Document Version

Author accepted manuscript

Published in

Journal of Linguistics

[Link to publication](#)

Citation for published version (APA):

Hengeveld, K., Rijkhoff, J. N. M., & Siewierska, A. M. (2004). Parts-of-speech systems and word order. *Journal of Linguistics*, 40(3), 527-570.
<https://doi.org/10.1017/S0022226704002762>

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PARTS-OF-SPEECH SYSTEMS AND WORD ORDER

Kees Hengeveld

Department of Theoretical Linguistics

University of Amsterdam

Jan Rijkhoff

Department of Linguistics

University of Aarhus

Anna Siewierska

Department of Linguistics and Modern English Language

University of Lancaster

Author's addresses:

Kees Hengeveld

Dept of Theoretical Linguistics, University of Amsterdam

Spuistraat 210, NL-1012 VT Amsterdam, The Netherlands

Email: p.c.hengeveld@uva.nl

Tel.: +31.20.5253854

Fax: +31.20.5253021

Jan Rijkhoff

Dept of Linguistics, University of Aarhus

Jens Chr. Skous Vej 7 (467-517), DK-8000 Aarhus C, Denmark

Email: linjr@hum.au.dk

Tel.: +45 8942 6550

Fax: +45 8942 6570

Anna Siewierska

Dept of Linguistics and Modern English Language, University of Lancaster

Bowland College, Lancaster University, Lancaster LA1 4YT, UK

Email: a.siewierska@lancaster.ac.uk

Tel.: +44 (0)1524 594473

Fax: +44 (0)1524 843085

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ABSTRACT

This paper argues that the word order possibilities of a language are partly determined by the parts-of-speech system of that language. In languages in which lexical items are specialized for certain functionally defined syntactic slots (e.g. the modifier slot within a noun phrase), the identifiability of these slots is ensured by the nature of the lexical items (e.g. adjectives) themselves. As a result, word order possibilities are relatively unrestricted in these languages. In languages in which lexical items are not specialized for certain syntactic slots, in that these items combine the functions of two or more of the traditional word classes, other strategies have to be invoked to enhance identifiability. In these languages word order constraints are used to make syntactic slots identifiable on the basis of their position within the clause or phrase. Hence the word order possibilities are rather restricted in these languages. Counterexamples to the latter claim all involve cases in which identifiability is ensured by morphological rather than syntactic means. This shows that there is a balanced trade-off between the syntactic, morphological, and lexical structure of a language.

1. INTRODUCTION

Most typological studies concentrate on syntactic and, to a lesser extent, morphological properties of languages. The structure of the lexicon and its consequences for the language system have received much less attention, a point first made explicit in Lehmann (1990), despite the fact that an increasingly important role is assigned to the lexicon in both formal and functional theories of language². This paper is an attempt to fill part of this gap by investigating the correlations between the parts-of-speech system of a language and some of its morpho-syntactic properties. We thus aim at supplementing the insights provided by syntactic and morphological typology with those provided by lexical typology.³

The paper is organized as follows: §2 presents the language sample on which the research is based. In §3 we summarize the classification of parts-of-speech systems presented in Hengeveld (1992a) and show how the sample languages fit into this classification. Our definitions of the relevant word order parameters and the classification of the sample languages in terms of these parameters are given in §4. After these preliminary sections, we are in a position to formulate, in §5, a number of hypotheses concerning the correlations between parts-of-speech systems and word order properties, which we then systematically test on the languages of the sample. The discussion of our results in §6 concentrates on the question how our results

throw new light on various findings in the earlier typological literature on word order. More specifically, we claim that a number of well-known word order correlations can be restricted to sets of languages sharing the same parts-of-speech system.

2. THE SAMPLE

The sample on which the research is based is given in Table 1. The languages listed there have been selected in such a way that the sample represents the highest possible degree of genetic, geographic and typological diversity.

In order to meet the genetic criterion, the languages in the sample were selected using the method presented in Rijkhoff et al. (1993). This method aims at creating maximal genetic diversity in the sample and - in this case - has been applied to Ruhlen's (1991)⁴ classification of the world's languages.

Within the restrictions of the genetic criterion the sample also represents maximal geographic diversity. Where possible, we have selected languages that are spoken in non-contiguous areas.

The sample represents maximal typological diversity as well. Given our specific research question we made sure that among the languages selected there are representatives of all major parts-of-speech systems as distinguished in §3. In one case the typological criterion forced us to slightly violate the

genetic criterion: instead of choosing another language from a Formosan branch of Austric, we included Tagalog, which now represents the Western branch of the large Malayo-Polynesian family.

The applicability of the criteria mentioned above is dependent upon the availability of adequate language descriptions. For three out of the 53 languages that were selected according to the genetic criterion data are insufficient or lacking. The languages concerned are the three isolates Etruscan, Meroitic, and Nahali. The actual sample thus contains 50 languages.

INSERT TABLE 1 ABOUT HERE

3. PARTS-OF-SPEECH

3.1. *The syntactic approach*

Hengeveld (1992a, 1992b) presents a classification of parts-of-speech systems and demonstrates the predictive value of this classification for the typology of systems of non-verbal predication. The classification is syntactically based, that is, lexeme classes are defined in terms of the syntactic slots they may occupy.

The four syntactic slots investigated are head and modifier of a referential

phrase (i.e. noun phrase), and head and modifier of a predicate phrase. Heads are obligatory slots and modifiers are optional slots within phrases. The distinguishing uses of classes of lexemes may be represented as in Figure 1.

INSERT FIGURE 1 ABOUT HERE

The four categories of lexemes in Figure 1 may be defined as follows: a VERB (V) is a lexeme that can be used as the head of a predicate phrase only; a NOUN (N) is a lexeme that can be used as the head of a referential phrase; an ADJECTIVE (A) is a lexeme that can be used as a modifier within a referential phrase; and a MANNER ADVERB (MAdv) is a lexeme that can be used as a modifier within a predicate phrase. Note that within the class of adverbs we restrict ourselves to manner adverbs. We exclude other classes of adverbs, such as temporal and spatial ones, which do not modify the head of the predicate phrase, but rather modify the sentence as a whole.

In contrast with many earlier approaches, Bhat (1994) being a clear exception, lexemes are thus defined primarily in terms of their non-predicative uses. Verbs are characterized by the fact that they have no non-predicative uses, i.e. they can be used predicatively only. Non-verbal lexemes, on the other hand, may have additional, predicative uses, but their defining use is a non-predicative one.

3.2. Differentiated, flexible and rigid systems

Some languages have separate lexeme classes, i.e. noun, adjective, verb, and manner adverb, to fill each of the syntactic slots under investigation. English⁵ is a case in point:

(1) The little_A girl_N danced_V beautifully_{MAdv}

A language such as English can be said to have a DIFFERENTIATED PARTS-OF-SPEECH SYSTEM.

Other languages do not have separate lexical classes for each of the syntactic slots. These languages are of two types, as illustrated in (2)-(4):

Warao (Romero-Figeroa 1997: 49-50)

(2) (a) **yakera**

beauty

'beauty'

(b) Hiaka **yakera** auka saba tai nisa-n-a-e.

garment beauty daughter for she buy-SG-PUNCT-PAST

'She bought a beautiful dress for her daughter.'

Garo (Burling 1961: 27, 33)

(3) (a) **Da'r**-aŋ-gen.

big-IT-FUT

`It will get big.'

(b) **da'r**-gipa mande

big-REL man

`the big man'

(4) (a) **Ca'**-gen-ma.

eat-FUT-INT

`Will you eat?'

(b) **ca'**-gipa mande

eat-REL man

`the man who eats'

In Warao the translational equivalents of English adjectives and nouns can be used both as heads of referential phrases and as modifiers within referential phrases. An example is the lexeme *yakera* 'beauty' in (2), which is used as the head of a referential phrase in (2a) and as a modifier within a referential phrase in (2b). In Garo, on the other hand, the translational equivalents of English adjectives and verbs, e.g. *da'r* 'big' in (3) and *ca'* 'eat' in (4), at first sight seem to be used both as heads of predicate phrases, as in (3a) and (4a) and as modifiers within referential phrases, as in (3b) and (4b).

Facts like these have led many authors (Schachter 1985, Wetzler 1996, Stassen 1997) to conclude that there are 'adjectival-noun' languages, such as Warao, and 'adjectival-verb' languages, such as Garo, as if these were two equivalent options. This approach overlooks an important difference between the two types of language. In Warao there is indeed one class of lexemes which may occur as head and as modifier within a referential phrase, i.e. members of this class may occupy two different syntactic slots. But in Garo this is not the case. In order to use the lexemes involved as modifiers within a referential phrase, they have to be relativized, which shows that the modifier slot is not occupied by a lexical but by a syntactic unit, in this case a relative clause. Within this clause the lexeme functions as the head of a predicate phrase, i.e. as a verb, just as it does in main clauses.

Thus, Warao has one class of lexemes which may occupy the syntactic slots of head and modifier within a referential phrase, whereas Garo lacks a class of lexical elements which may occupy the modifier slot in a referential phrase, and therefore this language has to resort to alternative, non-lexical strategies. A language such as Warao can be said to have a FLEXIBLE PARTS-OF-SPEECH SYSTEM, whereas a language such as Garo can be said to have a RIGID PARTS-OF-SPEECH SYSTEM.

This difference extends to the class of manner adverbs as well. Consider the following examples:

Warao (Romero-Figeroa 1997: 119)

- (5) Oko kuana yaota-te arone **yakera** nahoro-te ...
 we hardness work-NPAST although beauty eat-NPAST
 'Although we work hard and eat well,'

Garo (Burling 1961: 29)

- (6) (a) **Rak-e** dok-aha
 strong-SUB hit-PAST
 'He hit hard.'
- (b) Bia **gar-e** kat-an-aha
 3.SG throw-SUB run-IT-PAST
 'Throwing, he ran away.'

In Warao the modifier slot in a predicate phrase may be occupied by lexical elements which also occur as heads and modifiers within referential phrases, as is evident from a comparison of (5) with (2). In Garo the manner expression is a verb provided with the suffix *-e*, which is a subordinating suffix with a manner meaning that can be added to any kind of verb, as (6) shows. So again Warao shows flexibility in its parts-of-speech system, whereas Garo shows rigidity.

The differences between Warao, English, and Garo are represented in Figure 2. This figure shows that Warao there has a class of lexical elements,

NON-VERBS, which combines the functions that nouns, adjectives and manner adverbs have in languages with a differentiated parts-of-speech system, whereas in Garo lexical elements which fulfil the functions of adjectives and manner adverbs are simply lacking.

INSERT FIGURE 2 ABOUT HERE

3.3. *The parts-of-speech hierarchy*

The degree of flexibility/rigidity displayed within a parts-of-speech system differs from language to language. Interestingly, the combinations of syntactic possibilities for a single lexical class in flexible languages, and the lack of lexical classes for certain syntactic slots in rigid languages, is not random. The variation can be described in terms of the hierarchy in (7):

(7) PARTS-OF-SPEECH HIERARCHY

Head of	>	Head of	>	Modifier of	>	Modifier of
predicate		referential		referential		predicate
phrase		phrase		phrase		phrase

The parts-of-speech hierarchy should be interpreted in the following way: the

more to the left a certain syntactic slot is positioned in the hierarchy, the more likely it is for a language to have a separate class of lexemes for that syntactic slot.⁶ This means that if a rigid language lacks a class of lexemes that may be used as modifiers within a referential phrase, i.e. adjectives, it will also lack a class of lexemes that may be used as modifiers within predicate phrases, i.e. manner adverbs. And if a flexible language has a class of lexemes that may be used as heads and modifiers in referential phrases, these lexemes will also be used as modifiers within predicate phrases, i.e. this language has a class of non-verbs. A number of parts-of-speech systems are predicted by this hierarchy, the differences between them depending on the degree of flexibility/rigidity displayed.

A lower degree of flexibility than that observed in Warao can be found in Ngiti, and a lower degree of rigidity than that observed in Garo can be found in Wambon:

Ngiti (Kutsch Lojenga 1993: 338)

- (8) (a) Ngbángba nítdù **isó** ànò.
 child 3.carry.PF.PRS light load
 `The child carried a light load.'
- (b) **Isó** ngbángba nítdù ànò.
 light child 3.carry.PF.PRS load
 `The child carried the load easily.'

Wambon (de Vries & de Vries-Wiersma 1992: 19, 90)

(9) (a) Jakhov-e **matet-mo** ka-lembo?

they-CONN good-VR.SS go-3.PL.PAST

'Did they travel well?'

(b) Nggerkaji-ke-levambo-n-o ko-khe-n-o

saw-VR-1.PL.PAST-TR-CO go-3.SG.PRS-TR-CO

kutip-ke-lo **nda-tulo** la-levambo.

night-VR-SS come-ascend.SS sleep-1.PL.PAST

'We continued sawing until the night fell and we went up and slept'.

In Ngiti the word *isɔ* 'light, easily' can be used as a modifier within a referential phrase, as in (8a), and as a modifier within a predicate phrase, as in (8b). Wambon, on the other hand, lacks a class of manner adverbs. It uses medial verb constructions to create manner expressions. This can be seen in (9a), where the verb form *matetmo*, a verbalized form of the adjective *matet* 'good', is the head of the predicate phrase of the medial verb construction, which itself modifies the main verb. The medial verb construction is a cosubordinating strategy widely used in the language, as illustrated in (9b). Thus, Ngiti combines the functions of adjectives and manner adverbs in a single class of lexical elements, MODIFIERS, whereas Wambon lacks a class of manner adverbs and compensates for this absence by means of a syntactic

solution. The differences between Ngiti and Wambon are shown in Figure 3.

INSERT FIGURE 3 ABOUT HERE

A higher degree of flexibility than that observed in Warao and a higher degree of rigidity than that observed in Garo can also be found. The flexible extreme defined by the parts-of-speech hierarchy is a language with no lexical specialization at all. An example in our sample is Samoan. In this language any lexical item can basically be used in any syntactic slot, the only restriction being semantic compatibility. The following examples illustrate the flexibility of lexical items in Samoan in three different ways. Firstly, a particularly striking property of Samoan is that the translational equivalents of an English noun can not only be used as the head of a referential phrase but also as the head of a predicate phrase (10), whereas the translational equivalent of an English verb can not only be used as the head of a predicate phrase but also as the head of a referential phrase (11):

Samoan (Mosel & Hovdhaugen 1992: 80, 73, 74)

- (10)(a) `Ua malosi le la.
 PERF strong ART sun
 `The sun is strong.'
 "The sun strongs."

(b) `Ua **la** le aso.

PERF sun ART day

`The day is sunny.'

"The day suns."

(11)(a) E **alu** le pasi i Apia

GENR go ART bus DIR Apia

`The bus goes to Apia.'

(b) le **alu** o le pasi i Apia

ART go POSS ART bus DIR Apia

`the going of the bus to Apia'

Secondly, the translational equivalent of an English noun can be used as a modifier within a referential phrase (12) or as a modifier within a predicate phrase (13). Note that the absence of an article with the modifying lexeme shows that the lexeme is used in a non-referential slot.

Samoan (Mosel & Hovdhaugen 1992: 305, 394)

(12) le fale **ta'avale**

ART house car

`the garage'

"the car house"

(13) 'Ua ma'i **misela** le tama.

PERF sick measles ART boy

`The boy has got the measles.'

"The boy sicks measleswise."

Thirdly, the translational equivalent of an English verb can be used as a modifier within a referential phrase (14) and as a modifier within a predicate phrase (15). Here the absence of a tense-aspect particle with the modifying lexeme shows that the lexeme is used non-predicatively.

Samoan (Mosel & Hovdhaugen 1992: 294, 397)

(14) le mea **ta'alo**

ART thing play

`the toy'

"the play thing"

(15) 'olo'o moe **taagulu** ai Vesi

.... PROGR sleep snore ANAPH Vesi

`... where Vesi was sleeping snoring.'

The rigid extreme defined by the hierarchy in (7) would be a language that has verbs only. Such a language is not attested in our sample, but a sample language that helps to understand what an extremely rigid language might look

like is Tuscarora.⁷ This language does have a class of morphological nouns (see Mithun 2000). In many cases, however, in this language one has to use a full predication in order to render the meaning of an English noun. Examples (16) and (17) illustrate this phenomenon:

Tuscarora (Mithun 1976: 35, 30)

(16) ra-kwatihs

M-young

'boy'

"He is young."

(17) ka-teskr-ahs

NHUM-stink-ASP

'goat'

"It stinks."

So, many lexemes in Tuscarora have a predicative use only and should therefore be classified as verbs. As a consequence, what in many other languages would be a single predication may in Tuscarora show up as a set of appositional predications, as shown in (18):

Tuscarora (Mithun 1976: 32)

- (18) ra-kwatihs wa-hr-atkahto-? ka-teskr-ahs
 M-young PAST-M-look.at-ASP NHUM-stink-ASP
 'The boy looked at the goat.'
 "He is young, he looked at it, it stinks."

In a similar way appositional predications are used instead of adjectival and adverbial modifiers, as shown in (19)-(20):

Tuscarora (Mithun 1976: 234, 256)

- (19) tá:ko:? yaw-vhey-v?
 cat NHUM.OBJ-die-PF
 'the dead cat'
 "the cat, it has died/is dead" or:
 'The cat has died/is dead.'
- (20) yo-hstore? wa-hr-o-horvh-?
 NHUM.OBJ-fast.PF PAST-M-OBJ-grow-ASP
 'He grew fast.'
 "It is fast, he grew."

Thus, Tuscarora lacks adjectives and manner adverbs and often uses verbs rather than nouns, whereas Samoan combines the functions of verbs, nouns,

adjectives and manner adverbs in a single class of lexemes. Figure 4 shows the differences between a purely flexible language such as Samoan and an unattested purely rigid language.

INSERT FIGURE 4 ABOUT HERE

3.4. *Parts-of-speech systems*

The combination of the threefold distinction between flexible, differentiated, and rigid languages with the parts-of-speech hierarchy, results in the classification of parts-of-speech systems presented in Figure 5.

INSERT FIGURE 5 ABOUT HERE

In interpreting this classification the following points have to be taken into account:

(i) In classifying languages in terms of the parts-of-speech hierarchy in (7) we have taken both basic and derived lexemes into consideration. Thus, English is classified as a language with a class of manner adverbs, despite the fact that virtually all these adverbs are derived.

(ii) In order for a language to qualify as flexible, it has to show

SYSTEMATIC flexibility, both semantically and syntactically, for an entire class of lexemes. Thus, English is not classified as a flexible language, despite the fact that in this language there are many cases of zero conversion between the classes of noun and verb.⁸

(iii) The use of lexemes in syntactic slots can only be evaluated to the extent that languages actually have these slots available. For instance, Himmelmann (fc.a) shows that Tagalog does not have a slot for manner modifiers. Instead, it uses a complement-taking predicate describing the manner in which the event described in the subordinate clause takes place. In cases like these, the parts-of-speech system of a language has to be determined on the basis of the behaviour of lexeme classes with respect to their distribution across the remaining slots.

3.5. *Intermediate systems*

Some languages do not fit into the basic classification of parts-of-speech systems given in Figure 5. All these languages occupy intermediate positions between contiguous types in Figure 5. They can thus be said to have INTERMEDIATE PARTS-OF-SPEECH SYSTEMS. The criteria for classifying a language as having an intermediate parts-of-speech system are different for flexible and rigid languages.

In order for a flexible language to qualify as having an intermediate parts-of-speech system, its lexeme classes should be compatible with two contiguous systems within the hierarchy at the same time. This situation may obtain, for instance, when derived lexemes have fewer functional possibilities than basic lexemes within a language. Thus, Mundari is a fully flexible type 1 language if its basic lexemes are taken into consideration, but it also has a derivational process that produces lexemes that can be used in all slots apart from the predicate slot, a type 2 feature. In order to account for these facts Mundari is classified as a type 1/2 language. Another example of a language with an intermediate system is Lango, which displays a lower degree of flexibility than Mundari. In this language there is a large open class of lexemes that may be used as modifiers within referential phrases and as modifiers within predicate phrases. On the basis of this fact it should be classified as a type 3 language. But in addition it has a large open class of manner adverbs, a feature of a type 4 language. Therefore, Lango is classified as a type 3/4 language.

A rigid language is classified as having an intermediate parts-of-speech system when the last class of lexemes on the hierarchy that is relevant for that language is a small closed class of items. Thus, Pipil is a language that has an open class of adjectives but a restricted set of manner adverbs borrowed from Spanish, and is therefore classified as a type 4/5 language. Tamil, a language with a higher degree of rigidity, has no manner adverbs. It does have

adjectives, but only a very limited number of them in a small closed class. For this reason, it is classified as a type 5/6 language.

3.6. Classification of sample languages

Including the intermediate types discussed in the previous paragraph, languages may be assigned to one of 13 types. Our sample languages fit into these types in the way indicated in Table 2. In this table the languages are ordered from extremely flexible (Type 1) to extremely rigid (Type 7).

INSERT TABLE 2 ABOUT HERE

3.7. The semantics of flexible items

At this point it might be appropriate to briefly discuss the semantics of flexible lexemes (contentives, non-verbs, modifiers), since this appears to have led to confusion among some of the reviewers of our typology of parts-of-speech systems. For example, both Evans (2000: 729) and Croft (2001: 70-75) use terms such as 'polysemy' and 'semantic shift' when they discuss the semantics of flexible lexemes, which they interpret as having distinct but related senses.

In our analysis, however, flexible lexemes are SEMANTICALLY VAGUE, i.e. they are monosemous.

A well-known example of semantic vagueness is English 'cousin', which is vague with respect to the distinction 'male cousin' and 'female cousin', or, as Cruse (1986: 51) puts it: "..., the two meanings 'male cousin' and 'female cousin' are both associated with the same lexical unit cousin, whose meaning is more general than either; they therefore do not represent distinct senses of cousin." This can be demonstrated with a test which involves anaphoric reference with *so* (Saeed 2003: 61):

(21) Sarah is my cousin, and so is Peter.

If a noun has a vague meaning, as in the case of *cousin* in (21), its sense allows for different specifications in the case of anaphoric reference with *so*. In this article we are concerned with a more fundamental and abstract kind of vagueness: categorial vagueness, which holds across distinct lexical categories (verbs, nouns, etc.) and is therefore more difficult to identify.

The idea that flexible lexemes are semantically vague rather than polysemous finds initial support in what is being written about the semantic nature of flexible lexemes in the grammars of the languages in question. Thus, Mosel and Hovdhaugen (1992: 73) write about Samoan that 'categorization of full words is not given a priori in the lexicon. It is only their actual occurrence

in a particular environment which gives them the status of a verb or a noun'. In a similar vein, Hoffman (1903: xxxii) notes the 'functional elasticity' of Mundari lexemes.

From a typological perspective, semantic vagueness (also known as 'underspecification', 'non-determinedness', 'indeterminacy', 'generality') is not an uncommon phenomenon. For example, nouns in many (perhaps even most) languages across the globe are transnumeral in that the same (unmarked) noun may be used to refer to a single individual or to a plurality of entities (Rijkhoff 2002: chapters 2 and 5). Vagueness is also attested in members of other words classes, such as verbs. For example, McGregor (2002: 54–87) shows that in Australian languages from the Northwest many uninflecting verbs ('preverbs') are essentially vague with respect to certain Aktionsart distinctions, valency, and reflexivity; Bisang (1996: 520) mentions the high degree of indeterminateness of nouns and verbs in the languages of East and Mainland South East Asia.

Wilkins' (2000) account of noun semantics in Arrernte is particularly instructive in the present context. In Arrernte and other Australian languages NPs consist of a specific noun preceded by a generic noun.⁹ Together these nouns constitute what Wilkins calls 'classifier constructions' and he argues that these constructions serve to determine which properties of an entity are relevant from the perspective of the current discourse context (Wilkins 2000: 148). Consider the following examples:

(22) *Arrernte* (Wilkins 2000: 179-200)

a	<i>yerre</i>	<i>arlkerke</i>
	ant	meat-ant
b	<i>awelye</i>	<i>arlkerke</i>
	traditional medicine	meat-ant
c	<i>apmere</i>	<i>arlkerke</i>
	socially.relevant.place	meat-ant

Wilkins (2000: 179–200) provides detailed, monosemous definitions of both the specific noun *arlkerke* 'meat-ant' and the three generic nouns *yerre* 'ant', *awelye* 'medicines', and *apmere* 'socially relevant places' and then goes on to argue that each combination of a generic noun (*yerre*, *awelye*, *apmere*) and the specific noun *arlkerke* 'meat-ant' highlights a different set of culture specific knowledge structures associated with *arlkerke* and that as a consequence the other knowledge structures associated with *arlkerke* are downplayed and backgrounded. For example, according to Wilkins (2000: 192) the semantic effect of the combination *awelye arlkerke* in (22)b could be paraphrased as follows: "In using the classifier construction *awelye arlkerke* 'traditional medicine meat-ant' in a noun phrase, the speaker wants the addressee to think about the referent of the noun phrase from the point of view of its having the properties of an *arlkerke* 'meat-ant' but whose discourse

properties at the current point in the discourse are its properties as an *awelye* 'traditional medicine'."

We propose a similar approach to the meaning and function of flexible lexemes: each flexible lexeme has a single (vague) sense. By placing the flexible lexeme in a particular syntactic slot or by providing it with certain morphological markers the speaker highlights those meaning components of the flexible lexeme that are relevant for a certain lexical (verbal, nominal, etc.) function. Thus we contend that the meaning of a flexible lexeme always remains the same, and that morpho-syntactic and other contextual clues signal to the addressee how to interpret this lexeme in an actual utterance. In other words, it is the use of a vague lexeme in a certain context (an actual linguistic expression) that brings out certain parts of its meaning, giving the category neutral lexeme a particular categorial (verbal, nominal, etc.) flavour.

Note, finally, that even though a flexible lexeme is not semantically ambiguous, the employment of a flexible lexemes may lead to functional ambiguity as when the context does not provide sufficient clues regarding the way it is used in the actual linguistic expression. We will return to the issue of functional ambiguity in section 5.1 below.

4. WORD ORDER AND MORPHOLOGICAL MARKERS

4.1. *Introduction*

Ever since Greenberg (1963) the domain of word order has constituted one of the major testing grounds for the predictive power of potential typological parameters. We too will document the merits of our classification of parts-of-speech systems by showing how it interacts with word order phenomena and how it helps to refine some of the word order correlations established by Greenberg and others. In §5 several word order predictions stemming from our classification of parts-of-speech systems will be presented. These predictions will involve the basic and variable orders of the predicate and its arguments, of the head and modifier in the referential phrase and of the head and modifier in the predicate phrase. But first some comments on our classification of these linearization patterns and their distribution among the languages in the sample are in order.

4.2. *Clausal order and morphological marking*

Given the existence of languages without a true class of verbs, we classify clausal word order in terms of the location of predicates, rather than of verbs, relative to their arguments. Though main, positive, declarative clauses with two overt referential phrases are not necessarily highly frequent

in languages, as in most typological classifications of clausal word order, we base our classification on the order obtaining in such clauses. However, rather than using the traditional Greenbergian six-way typology of SVO, SOV, VSO, VOS, OVS and OSV, we use a three-way typology of predicate initial, predicate medial, and predicate final clausal orders. This three-way typology based on the position of the predicate has two major advantages over the six-way typology. First of all, since languages exhibit more variation in the location of the transitive arguments relative to each other than in the location of the predicate phrase relative to both of the arguments (see e.g. Steele (1978) and Siewierska (1998)), it is easier to assign a basic order to languages in terms of the three-way typology than in terms of the six-way typology. And, secondly, of the three logically possible locations of the predicate phrase in transitive clauses, the predicate initial and final positions are directly applicable to the classification of clause ordering in intransitive clauses. Consequently, the predicate based typology allows one to capture any consistencies in the ordering of transitive and intransitive predicates that may obtain in a transparent manner.

Our major criterion for assigning a basic order is statistical frequency. In languages exhibiting considerable word order variation we assign a unique basic order only if one of the word order patterns is at least twice as common as any other order, following Dryer (1997). If there is no such distribution, no basic order is assigned.

A complete overview of our word order data is given in Table 3. In this table a blank indicates that the parameter under investigation is irrelevant to the language concerned, in view of the absence of one or more of the parts of speech under investigation. The distribution of basic (BWO) clausal orders among the languages in our sample is shown in column 1, in which 1 = predicate initial order, 2 = predicate medial order, and 3 = predicate final order. The languages with double classifications, either 1/2 or 2/3, are languages in which the order is dependent on tense/aspect (e.g. Gude, Kisi, Krongo, Ngiti) or languages which display two patterns with a comparable degree of frequency due to pragmatic factors (e.g. Hungarian¹⁰, Georgian¹¹). Those with a triple classification are the languages which lack a basic order.

INSERT TABLE 3 ABOUT HERE

The percentage of predicate initial languages (13.4%)¹² in our sample is lower and that of predicate final languages (51.3%) higher than in other samples of comparable size such as those of Steele (1978), or of Gilligan or Perkins discussed in Hawkins & Gilligan (1988), while the percentage of predicate medial languages (35.3%) is roughly the same.¹³ The differences are partly due to our assignment of double orders for languages in which order is dependent on tense/aspect or on pragmatic factors. Otherwise, the distribution of clausal orders in our sample is in line with what previous

studies would lead one to expect: predicate final languages clearly outnumber predicate medial ones, and these in turn outnumber predicate initial languages.

In addition to basic clausal order, Table 3 also lists variation in the ordering of the referential phrase in subject function and the predicate phrase. For the purposes of this article the subject of an intransitive sentence is the single argument occurring within that sentence; and the subject of a transitive sentence is the constituent that shows the same syntactic behaviour as that of the single argument of an intransitive sentence. In considering whether a language exhibits any variation in the ordering of subject and predicate phrase again only main, positive declarative clauses are taken into account. Only variations in the ordering of subject and predicate phrase independent of the complexity of the subject and also independent of the necessary presence of constituents other than the predicate and its arguments are listed. The data on the variation in the ordering of subject (S) and predicate (P) are given in column 2 in Table 3. In this column a + indicates that there is a fixed order of S and P with respect to each other, i.e. the subject either always precedes or always follows the predicate. A – indicates that there is variation in the ordering of S and P.

Since we are interested in the interaction between syntax and morphology as two potentially competing disambiguating strategies in

flexible languages, we indicate in column 3 whether there is a special morphological procedure which identifies changes in the basic order of subject and predicate. In this column a + indicates that there is such a morphological procedure, a – that there isn't.

4.3. *Order and morphological markers in the referential phrase*

At the level of the referential phrase we consider the order of heads (H) and lexical modifiers (M) only. Note that we deliberately do not use the terms 'noun' and 'adjective' here, since these were shown in §3 to be non-universal categories. Depending on the nature of the parts-of-speech system, the head slot of the referential phrase may be filled with CONTENTIVES (in types 1-1/2)¹⁴, NON-VERBS (in types 1/2-2/3), or NOUNS (in types 2/3-6/7). The lexical modifier slot of the referential phrase may be filled with CONTENTIVES (in types 1-1/2), NON-VERBS (in types 1/2-2/3), MODIFIERS (in types 2/3-3/4), or ADJECTIVES (in types 3/4-5/6).

As in the case of clausal order, we assign a basic order for heads and modifiers in referential phrases on the basis of frequency. Both basic orders are assigned to languages in which none of the orders can be said to be more frequent than the other. Languages in which both orders are possible but for which the information available did not allow us to take a decision on

frequency were included in the latter category. The data are listed in column 4 in Table 3, where HM = head-modifier basic order, MH = modifier-head basic order, and MHM = both basic orders.

We also list possible variation in the order of head and modifier with respect to each other. In column 5 in Table 3 a + indicates that there is a fixed order of H and M with respect to each other, i.e. the modifier either always precedes or always follows the head. A – indicates that there is variation in the ordering of head and modifier. Of course all languages which have been assigned two basic orders in column 4 are identified as languages with variable order in column 5.

Column 6 indicates whether the language involved uses morphological markers that identify a modifier within a term phrase, such as an attributive particle, or an agreement marker that is exclusively used with attributive modifiers.¹⁵ In this column a + indicates that there is such a morphological marker, a – that there isn't.

4.4. Order and morphological markers in the predicate phrase

The data on order in the predicate phrase are comparable to that on order in the referential phrase. Column 7 in Table 3 lists the basic order of heads (H) and lexical modifiers (M) within predicate phrases. Here we avoid the terms

'verb' and 'adverb', since, depending on the parts-of-speech system, the head slot of the predicate phrase may be filled with CONTENTIVES (in types 1-1/2) or VERBS (in types 1/2-7), and the lexical modifier slot of the predicate phrase may be filled with CONTENTIVES (in types 1-1/2), NON-VERBS (in types 1/2-2/3), MODIFIERS (in types 2/3-3/4), or MANNER ADVERBS (in types 3/4-4/5). The basic orders listed are again based on relative frequency. Variation in the order of head and modifier with respect to each other is indicated in column 8 in Table 3.

Column 9 indicates whether the language involved uses morphological markers that identify a modifier within a predicate phrase, such as a particle used to mark manner modifiers. In this column a + indicates that there is such a morphological marker, a – that there isn't.

5. HYPOTHESES AND RESULTS

5.1. *General hypothesis*

After these preliminary introductions to our classification of parts-of-speech systems and of word order phenomena, we now turn to the relation between parts-of-speech systems and word order. The distinction between flexible, differentiated, and rigid languages, that is central to our classification of parts-

of-speech systems, provides the basis for the general hypothesis in (23):

- (23) The existence of a specialized lexical class in a language, i.e. one that is tied to one syntactic slot, makes it less necessary for this language to mark this slot and the phrase within which this slot occurs syntactically or morphologically; conversely, the existence of a flexible lexical class in a language, i.e. one that may occur in various syntactic slots, makes it more necessary for this language to mark these slots and the phrases within which these slots occur syntactically or morphologically.

The central idea behind this hypothesis is that lexical specialization is an important factor contributing to disambiguation in the processing of constituents. Where lexical specialization is absent, additional disambiguating strategies will have to be invoked, i.e. there is a trade-off between lexical type on the one hand and syntactic and morphological structure on the other.

Ambiguity has been a central issue in psycholinguistic research since the 1960s, mainly in investigating to what extent language processing is guided by syntactic or semantic strategies.¹⁶ Traditionally two kinds of (temporary) ambiguity are distinguished: lexical and syntactic ambiguity; for example (from Clark & Clark 1977: 81):

LEXICAL AMBIGUITY

(24) After taking the **right** turn at the intersection, I ...

SYNTACTIC AMBIGUITY

(25) Knowing that **visiting relatives** could be bothersome, I ...

In the case of flexible lexemes, however, we are not dealing with lexical or syntactic ambiguity (recall that flexible lexemes are semantically vague, i.e. they are not polysemous; see §3.7 above), but rather with FUNCTIONAL AMBIGUITY. When a flexible lexeme is being processed, the hearer has to determine how this lexeme is used, e.g. whether it serves as the head of a referential phrase (nominal function) or as a modifier of the head of the referential phrase (adjectival function).

In accordance with current psycholinguistic views on language processing (cf. Whitney 1998: 207, 222), we assume that (i) people utilize a strategy of 'Immediacy of Interpretation', which means that they try to interpret each word as completely as possible as soon as the word is received; (ii) sentence processing is guided by multiple kinds of information (syntactic, semantic, pragmatic, visual, prosodic, etc.); and (iii) ambiguity obstructs rapid and efficient language processing; in such cases the hearer will look for contextual and other clues to direct sentence comprehension.

Since flexible lexemes are potentially ambiguous in that there is no lexically coded information as to the precise function of the lexeme in the actual linguistic expression, we hypothesize that languages with flexible

lexemes will have certain morphosyntactic strategies at their disposal that provide the hearer with clues as to the correct interpretation of the flexible lexeme.

Morphosyntactically, there are basically two possibilities to guide the hearer as regards the intended function of a flexible lexeme in the actual linguistic expression: (i) morphological markers¹⁷ in the immediate linguistic context; and (ii) syntactic patterning.¹⁸ We here take the second strategy as our point of departure, but we will come across languages in which morphological marking has the same disambiguating function that word order has in others.

The nature of the potential functional ambiguity in flexible languages depends on the degree of flexibility of their parts-of-speech system. The absence of a verb/non-verb distinction leads to other potential functional ambiguities than the absence of an adjective/adverb distinction. The following sections present more concrete partial hypotheses starting with languages with the most flexible PoS system (types 1 and 1/2) in §5.2., Then we will also include in our predictions languages with a PoS of types 1 - 2/3) in §5.3, and finally we will be concerned with all languages that have a flexible word class in their PoS systems (types 1 - 3/4) in §5.4.

5.2. The verb/non-verb distinction

5.2.1. *Basic word order at the clause level*

In languages without a distinct class of verbs, i.e. type 1 and 1/2 in Table 2, lexical information is insufficient to arrive at the identification of the predicate phrase and the referential phrases within a sentence, given that there are no separate lexical classes that are used to fill the head slots of predicate phrases and referential phrases. Since the number of referential phrases in argument function in a sentence may vary, we are here particularly concerned with the position of the main predicate. We predict that in these languages the main predicate should occupy a uniquely identifiable position under all circumstances. Since only an initial and a final position in the sentence are uniquely identifiable,¹⁹ languages of types 1 and 1/2 are not expected to have predicate medial basic word order, unless the problem of identifying the constituents of the clause is solved by morphological means.

In Table 4 (in which the data from Table 3 are reshuffled in such a way that the languages are ordered on the basis of their parts-of-speech system from most flexible to most rigid), the upper part of column 1 shows that this expectation is confirmed. In fact, the data show that the hypothesized correlation holds for a larger group of languages than predicted. Predicate medial basic order is not only absent in languages of types 1 and 1/2, but also in languages of types 2 and 2/3.²⁰ We will present a possible explanation for this fact after discussing word order variation at the sentence

level.

INSERT TABLE 4 ABOUT HERE

5.2.2. *Word order variation at the clause level*

A second way of looking at word order at the clause level in view of the absence of a verb/non-verb distinction concerns the question to what extent languages display deviant ordering patterns. The expectation is that flexible languages of types 1-1/2 will be more reluctant to allow such deviation, because any deviation from the basic pattern can lead to functional ambiguity as regards the identification of predicate and referential phrases. Since the number of referential phrases in argument position may differ, we here consider only the deviations in order between subject and predicate phrase.

The upper part of column 2 in Table 4 shows us that two out of the three languages of type 1 and 1/2 actually do allow variation in the ordering of subject and predicate phrase. But column 3 shows that, as predicted by our general hypothesis (see §5.1), these languages solve the problem of the potential functional ambiguity arising from an alternative order by inserting special morphological markers in the non-basic ordering patterns, rather than by the ordering patterns themselves.

In Samoan, a predicate-initial language with a parts-of-speech system of type 1, placement of any referential phrase in sentence initial position, before the predicate phrase, is accompanied by the addition of the presentative particle 'o, as illustrated in (27). The basic order is illustrated in (26).

Samoan (Mosel & Hovdhaugen 1992: 52, 56)

(26) `Ua o tamaiti i Apia

PERF go children LD Apia

'The children have gone to Apia'

(27) `O le maile sa fasi e le teine

PRES ART dog PAST hit ERG ART girl

'The dog was hit by the girl'

In Tagalog, another predicate-initial language of type 1, it is the predicate rather than the preposed constituent that is obligatorily marked in cases of inversion. Example (29) shows the use of the predicate marker (PM) *ay*, which is absent when the predicate is in initial position (28):

Tagalog (Himmelman fc.b)

(28) Ma-saráp ang pag-kain

STAT-satisfaction SPEC GER-eating

'The food was good.'

- (29) Silá mag-iná ay na-ulog na
 3.PL RCP-mother PM REALSTAT-sleep now
 'The mother and her daughter fell asleep.'

We may contrast the situation obtaining in Samoan and Tagalog with the placement of the subject before the predicate phrase in Pipil, a predicate initial language with a parts-of-speech system of type 4/5. In this language the subject may be emphasized by placing it in sentence-initial position. As a comparison of (30) and (31) shows, preposing of the subject does not require any additional morphological marking in Pipil:

Pipil (Campbell 1985: 103, 104)

- (30) ø-ki-miktih ne wa:kax ne ta:ka-t.
 3.SG.SBJ-3.SG.OBJ-kill DEF cow DEF man
 'The man killed the cow.'

- (31) Ne i-siwa:-w ø-ki-mihtih
 ART 3.SG.POSS-wife-POSS 3.SG.SBJ-3.SG.OBJ-kill
 ne chumpipi.
 DEF turkey
 'His wife killed the turkey.'

In the previous section we showed that our predictions concerning basic word

order in languages of type 1 and 1/2 in fact hold for languages up to and including type 3/4. The same seems to be true for our predictions concerning word order variation. The upper part of column 2 in Table 4 shows that the remaining languages of these types do not allow word order variation, with the exception of Imbabura Quechua. This language, however, applies a morphological disambiguating strategy too. In Imbabura Quechua, a predicate-final language with a parts-of-speech system of type 2, placement of the subject after the predicate phrase is accompanied by the obligatory addition of the topic marker *-ka*, as shown in (33). The basic order is shown in (32).

Imbabura Quechua (Cole 1982: 70, 71)

(32) Juan chagra-ta trabaja-ju-n

Juan field-ACC work-PROGR-3

'Juan is working in the field.'

(33) Jatun wasi-ta chari-n Marya-**ka**/*Marya

big house-ACC have-3 Maria-TOP/Maria

'Maria has a big house.'

This may be compared to the placement of the subject after the predicate phrase in Basque, another predicate final language, but one with a parts-of-speech system of type 4. Basic order in Basque is illustrated in (34). Example (35) shows that no additional morphological marking is needed when the

subject is postposed²¹:

Basque (Saltarelli 1988: 67)

- (34) Aita-k ama-ri gona gorri-a
 father-SG.ERG mother-SG.DAT skirt red-SG.ABS
 erosi d-∅-io-∅.
 buy 3.ABS-PRS.AUX-3.SG.DAT-3.SG.ERG

'Father has bought a red skirt for mother.'

- (35) Gona gorria erosi d-∅-io-∅
 skirt red-SG.ABS buy 3.ABS-PRS.AUX-3.SG.DAT-3.SG.ERG
 ama-ri aita-k .
 mother-SG.DAT father-SG.ERG

'Father has bought a red skirt for mother.'

These examples reveal that flexible languages which do not use word order to unambiguously signal the position of the predicate phrase within the sentence, use morphological means to fulfil the same disambiguating function. This is strong confirmation for our general hypothesis, which claims that the absence of lexical specialization requires syntactic or morphological marking of syntactic slots. In the presence of lexical specialization these syntactic slots would have been identifiable on the basis of lexical information. The data in Table 4, combined with the observations on the initial counterexamples

Samoan, Tagalog, and Quechua, lead us to the generalization that languages with parts-of-speech systems 1-3/4 do not allow variation in the ordering of subject and predicate phrase, unless the deviation of the basic word order pattern is marked by morphological means. This is in sharp contrast with the situation obtaining in languages of types 4-6/7: 22 out of the 38 languages of these types do allow word order variation between subject and predicate without marking the deviation of the basic word order pattern by morphological means.

Note that our hypothesis does not predict the reverse, i.e. it does not exclude the existence of languages which do not have a flexible parts-of-speech system, but which do have a basic clause-initial or clause-final order and a fixed order of subject and predicate, or a morphological marker of a deviant order. For instance, Bambara, which has a parts-of-speech system of type 4, is predicate-final and does not allow alternations in the order of subject and predicate; Paiwan, which has a parts-of-speech system of type 4/5, is predicate-initial and uses a morphological marker when the order of subject and predicate deviates from the basic pattern.

It is noteworthy that, as in the case of basic word order at the clause level, our generalization with respect to word order variation extends over a wider range of languages (1-3/4) than predicted (1-1/2). An explanation for these facts is that we define our generalizations in terms of the position of the predicate, irrespective of the lexical class of the predicate. Earlier research

(Hengeveld 1992b) has revealed, however, that the more flexible the parts-of-speech system of a language is, the higher the extent to which various classes of lexemes may be used predicatively, often without the intervention of a copula. Consider in this respect the following Turkish examples:

Turkish (Lewis 1967)

(36) Yol uzun.

road long

'The road is long.'

(37) uzun yol

long road

'the long road'

Turkish has a parts-of-speech system of type 2/3. In Turkish, as in most languages of types 1-3/4, bare nominal stems may be used predicatively, which introduces a further potential functional ambiguity in the grammar as regards the identification of predicate phrases and referential phrases. Fixed word order patterns and/or morphological marking by means of e.g. copulas help to solve this problem of functional ambiguity.

5.3. The noun/modifier distinction: word order variation within referential

phrases

In flexible languages without a separate class of nouns (types 1-2/3), the potential functional ambiguity arising from the nature of their parts-of-speech system concerns the interpretation of a lexical element as a head or a modifier within a referential phrase, since the interpretation of a non-verb as the head or a modifier of a referential phrase may interfere with its potential interpretation as the head or the modifier of the same or a contiguous referential phrase. We therefore predict that the order of head and modifier in referential phrases is fixed, unless there is a special morphological procedure which uniquely identifies the head-modifier relation within the referential phrase.

The upper parts of the columns 4 and 5 in Table 4 show that one out of the seven languages of types 1-2/3, Tagalog, actually does allow variation in the ordering of head and modifier within the referential phrase. But as predicted by our general hypothesis, the problem of functional ambiguity is solved in this language by morphological means, as shown in column 6. Since head and modifier of referential phrases are linked to each other through a special morphological marker, it is always clear which elements go together within a referential phrase. Compare the following examples:

Tagalog (Himmelman fc.a: 5)

(38) ulól na unggó

foolish LNK monkey

'foolish monkey'

(39) unggó=ng ulól

monkey=LNK foolish

'foolish monkey'

Given that Tagalog is a language with a parts-of-speech system of type 1, and therefore does not make a distinction between nouns on the one hand and modifiers or adjectives on the other, it is hard to say whether example (38) should be glossed either as 'foolish monkey' or as 'monkey fool', and the same goes for (39). But whatever the analysis, the fact that the linker *na/ng*²² always occurs in between head and modifier ensures that the two are interpreted as being part of the same referential phrase.

It is noteworthy that the generalization has a somewhat wider scope again: it applies to languages with a parts-of-speech system up to type 3/4. None of these languages allows word order freedom within the noun phrase without morphological marking. This may be contrasted with the situation in, for instance, Itelmen. In this language with a parts-of-speech system of type 4, modifiers may occur on both sides of the head, as in Tagalog. However, it may do so in the absence of additional morphological procedures, witness the following examples:

Itelmen (Georg & Volodin 1999: 108-9)

(40) qeʔm °plah

mine big

'big mine'

(41) °plah massu

big bear

'big bear'

In fact, whereas variation in the order of head and modifier within referential phrases without morphological marking is not found in languages of types 1-3/4, it is abundant in languages of types 4-5/6: in 13 of the 32 languages belonging to these types the modifier does not have a fixed position while not employing a morphological strategy. All 13 furthermore fall within types 4-5, i.e. they are languages with an open class of true adjectives. If we restrict ourselves to these types, then the number of languages rises to 50%: 13 out of the 26 languages of types 4-5 do show flexibility in the order of heads and modifiers within referential phrases, and do not use additional morphological strategies. We will return to this remarkable fact in §6.4.

Note that, conversely, our hypothesis does not predict that there should not be languages that do not have a flexible parts-of-speech system, but which do use a morphological marker of attribution even in the absence of word order freedom within the referential phrase. In our sample, Lango, Bambara

and Kisi are cases in point.

5.4. *The adjective/manner adverb distinction*

5.4.1. *Basic word order in the predicate phrase*

In languages without a specialized class of adverbs (1-3/4), the interpretation of a lexical element as a modifier of the predicate phrase may interfere either with its potential interpretation as the head of that same predicate phrase, or with its interpretation as a lexical modifier of a contiguous referential phrase. The latter issue will be discussed in §5.4.2. We first discuss potential functional ambiguity within the predicate phrase here.

In §5.2.2. we observed that the ordering possibilities in languages with parts-of-speech systems of types 1-3/4 are restricted by the fact that all classes of lexemes may be used predicatively. As a result, in this type of language, the lexical modifier of a predicate should preferably not occur in a position in which it might be interpreted as the head of the predicate phrase. Thus, we arrive at the following predictions: (i) In predicate-final languages with HM order in predicate phrases the modifier of the predicate phrase ends up in a position in which it might be interpreted as the main predicate. Since this leads to potential functional ambiguity in languages with parts-of-speech systems 1-

3/4, HM-order in predicate phrases is not expected to occur in these languages, unless the potential ambiguity is solved by morphological means; (ii) In predicate-initial languages with MH order in predicate phrases the modifier of the predicate phrase ends up in a position in which it might be interpreted as the predicate. Since this leads to potential functional ambiguity in languages with parts-of-speech systems 1-3/4, MH-order in predicate phrases is not expected to occur in these languages, unless the potential ambiguity is solved by morphological means; (iii) In predicate-medial languages the modifier of the predicate phrase may always end up in a position in which it might be interpreted as the predicate, irrespective of the order of head and modifier in predicate phrases. HM-order, MH-order, or both orders may therefore be expected to occur in predicate-medial languages, including those with parts-of-speech systems 1-3/4. Columns 7 and 8 in Table 4 show that this is correct for all languages of types 1-3/4 in the sample.

The problem of potential functional ambiguity in predicate-medial languages is generally solved by morphological means other than the uniquely identifying ones that we have concentrated on so far. Thus, Lango inflects potential modifiers when used predicatively, Ngiti makes use of an obligatory copula, and Miao and Tidore use some TMA and/or person markers with potential modifiers used predicatively. Since in the case of the latter two languages these markers are not obligatorily present, these languages seem to allow for some functional ambiguity, as in the following example from Miao:

Miao (Harriehausen 1990: 147-148)

(42) daim tiab dawb

CL skirt white

'the white skirt' or 'The skirt is white.'

It might be that in this case prosodic differences help disambiguate the two readings (see note 17).

5.4.2. *Basic word order in referential phrases*

In flexible languages that do not make a distinction between adjectives and manner adverbs (types 1-3/4), a further potential functional ambiguity arising from their parts-of-speech system concerns the fact that the interpretation of a lexical element as a modifier within a referential phrase may interfere with its potential interpretation as a modifier within a predicate phrase. Since, as we showed in the previous section, the position of the modifier is, at least partly, determined by the fact that it may be mistaken for the predicate, the question now is what the consequences of this are for the position of the modifier within the referential phrase.

The difficulty of distinguishing between the use of a lexical element as a

modifier of the referential phrase or of the predicate phrase in languages of types 1-3/4 leads to a number of predictions concerning basic word order at the level of the referential phrase. With respect to these orders the following predictions may be formulated:

(i) In predicate-final languages with HM-order in referential phrases the modifier of the referential phrase ends up in a position contiguous to the modifier slot of the (MH) predicate phrase. Since this leads to potential functional ambiguity in languages with parts-of-speech systems 1-3/4, HM-order in referential phrases is not expected to occur in these languages. This is represented schematically and illustrated by means of pseudo-English examples in (43):

Predicate-final languages

(43) (a) (**M_{RefPhr}** H_{RefPhr}) (**M_{PrPhr}** H_{PrPhr})
 (beautiful girl) (dance)

'The beautiful girl danced.'

(b) *(H_{RefPhr} **M_{RefPhr}**) (**M_{PrPhr}** H_{PrPhr})
 (girl beautiful) (dance)

'The beautiful girl danced.'

(girl) (beautiful dance)

'The girl danced beautifully.'

(ii) Similarly, in predicate-initial languages with MH-order in referential phrases the modifier of the referential phrase ends up in a position contiguous to the modifier slot of the (HM) predicate phrase. Since this, again, leads to potential functional ambiguity in languages with parts-of-speech systems 1-3/4, MH-order in referential phrases is not expected to occur in these languages. This is illustrated in (44):

Predicate-initial languages

(44) (a) (H_{PrPhr} M_{PrPhr}) (H_{RefPhr} M_{RefPhr})
 (dance) (girl beautiful)

'The beautiful girl danced.'

(b) *(H_{PrPhr} M_{PrPhr}) (M_{RefPhr} H_{RefPhr})
 (dance beautiful) (girl)

'The girl danced beautifully.'

(dance) (beautiful girl)

'The beautiful girl danced.'

(iii) In predicate-medial languages the modifier of the referential phrase ends up in a position contiguous to the modifier slot when the order of head and modifier within referential phrases is the inverse of the order of head and modifier within predicate phrases. Since this, again, leads to potential functional ambiguity in languages with parts-of-speech systems 1-3/4, the

ordering of head and modifier within referential and predicate phrases is expected to be identical in these languages. This is illustrated in (45):

Predicate-medial languages

(45) (a) (H_{RefPhr} M_{RefPhr}) (H_{PrPhr} M_{PrPhr}) (H_{RefPhr} M_{RefPhr})
 (girl beautiful) (sing) (song nice)
 'The beautiful girl sang a nice song.'

(b) $*(M_{\text{RefPhr}}$ H_{RefPhr}) (H_{PrPhr} M_{PrPhr}) (M_{RefPhr} H_{RefPhr})
 (beautiful girl) (sing nice) (song)
 'The beautiful girl sang a song nicely.'
 (beautiful girl) (sing) (nice song)
 'The beautiful girl sang a nice song.'

(46) (a) (M_{RefPhr} H_{RefPhr}) (M_{PrPhr} H_{PrPhr}) (M_{RefPhr} H_{RefPhr})
 (beautiful girl) (sing) (nice song)
 'The beautiful girl sang a nice song.'

(b) $*(H_{\text{RefPhr}}$ M_{RefPhr}) (M_{PrPhr} H_{PrPhr}) (H_{RefPhr} M_{RefPhr})
 (girl beautiful) (sing) (song nice)
 'The beautiful girl sang a nice song.'
 (girl) (beautiful sing) (song nice)
 'The girl sang a nice song beautifully.'

Summarizing the predictions, we expect that within the group of languages

of types 1-3/4, MH order in referential phrases is strongly preferred in predicate-final languages, HM order in predicate-initial languages, and consistent MH or HM ordering across referential and predicate phrases in predicate-medial languages. The data in the upper part of the column 4 in Table 4 show that there are three apparent counterexamples to these expectations: Tagalog, Warao and Ngiti.

Tagalog is not a real counterexample, since as stated in 3.4, this language lacks a modifier slot within the predicate phrase, so that there never is potential functional ambiguity with the modifier of referential phrases.

Warao is a predicate-final language with a parts-of-speech system of type 2, which nevertheless has HM order in referential phrases²³, as shown in (47) and (48):

Warao (Vaquero 1965: 143, 50)

(47) Arubuko ine obono-ya.

bread I want-PRS

'I want bread.'

(48) noboto sanuka

child small

'small child'

However, as indicated in column 9 in Table 4, in Warao the problem of

distinguishing between the interpretation of a lexical element as a modifier of the referential phrase or as a modifier of the predicate phrase is solved by the possibility of turning the lexical element in its manner reading into the head of a noun phrase provided with the postposition *tane* 'manner', thus resolving the problem of functional ambiguity raised by its ordering patterns. Compare (49) and (50):

Warao (Romero-Figeroa 1997: 119, 71)

(49) Oko kuana yaota-te arone **yakera** nahoro-te ...
 we hardness work-NPAST although beauty eat-NPAST
 'Although we work hard and eat well, ...'

(50) Ma-ha eku ine **yakera tane** uba-te.
 1.SG-POSS inside I beauty MANNER sleep-NPAST
 'I sleep very well in my hammock.'

If this morphological solution to the problem of solving functional ambiguity is taken into account, *Warao* is not an exception to our generalization.

Ngiti has both predicate-medial and predicate-final order. In this language the manner constituent occupies a special sentence-initial or sentence-final position that is used for adjuncts and adpositional phrases in general. Thus the manner constituent does not necessarily form a single contiguous phrase with the main predicate, as in the other languages considered so far. These two

special positions at the sentence margins offer sufficient possibilities to avoid functional ambiguity, particularly since the order of head and lexical modifier within the referential phrase is fixed.

By contrast, as can be seen in Table 4, in languages with parts-of-speech systems 4 and 4/5, i.e. the remaining languages with lexical modifiers at the level of both the referential and the predicate phrase, the word-order combinations avoided in languages of types 1-3/4 are in fact more numerous than the other combinations. Within the large group of predicate-final languages with parts-of-speech systems 4 and 4/5 Abkhaz, Basque, Hittite, Koasati, Nasioi, and Sumerian all have HM as their basic word order or as one of their basic word orders in referential phrases without any additional morphological marking, whereas only Burushaski, Japanese, and Nama have MH basic word order in referential phrases. The only predicate-initial language with a parts-of-speech system of types 4-4/5, Pipil, uses MH order in referential phrases, which again is the order that would be avoided in a language with parts-of-speech systems 1-3/4. Two out of the three predicate-medial languages with a parts-of-speech system of types 4-4/5, Arapesh and Polish, do not have a consistent identical ordering of heads and modifiers in referential and predicate phrases, whereas only one, Babungo, does.

All these facts are strong confirmation for our hypothesis that the ordering of heads and modifiers within referential and predicate phrases is strongly determined by the parts-of speech systems of the languages involved.

5.5. *Summary*

The preceding sections have demonstrated that there is a clear connection between the parts-of-speech system of a language and restrictions on word order within that language. Our general hypothesis that languages need syntactic and morphological means to mark syntactic slots in those cases in which disambiguation through lexical specialization is absent, is confirmed. Flexible languages exhibit severe restrictions on their word order possibilities. In those cases in which these restrictions seem to be violated, morphological marking fulfils the same disambiguating function. This suggests that lexical typology may fruitfully supplement the results achieved in syntactic and morphological typology. In the next section we will elaborate this point one step further by showing how our results throw new light on various findings in the earlier typological literature, concentrating again on word order.

6. EARLIER TYPOLOGICAL WORK

6.1. *Introduction*

Our findings supplement earlier typological work on word order in that they help to refine existing universals, disprove some earlier claims and lead to alternative explanations for linguistic phenomena. We will illustrate this by looking at the relation between verb-object and noun-adjective order in §6.2, the distribution of basic word orders in §6.3, and adjective doubling in §6.4.

6.2. The relation between verb-object and noun-adjective order

A number of the word order universals suggested by Greenberg (1966) subsequently gave rise to the notion of consistent ordering (also referred to as Natural Serialization and The Head Parameter) i.e. a preference for languages to display either head > modifier or modifier > head order across all head/modifier pairs. The basic diagnostic of head > modifier or modifier > head status of a language was taken to be the location of the object relative to the verb. Although originally adjectives were assumed to pattern like other modifiers favoring AN order in OV languages and NA order in VO, Dryer (1988:191; 1992:95) laid waste to this assumption by showing that there is no correlation between the location of the object relative to the verb and the adjective relative to the noun. Our data suggest that Dryer's refutation of the correlation in question may not be fully justified. While overall the location of the object relative to the verb is not a good predictor of the location of the lexical modifier relative to the head in referential phrases, there is a subset of

languages for which a clear correlation between the two can be discerned. In languages with parts of speech systems 1-3/4, predicate-initial order strongly correlates with HM order and predicate-final order with MH in referential phrases with a lexical modifier. Significantly predicate-medial languages are not involved in this correlation, which vindicates Greenberg's original universal formulated with respect to SOV and VSO languages and not OV as opposed to VO ones. Thus our parts-of speech typology rehabilitates a correlation, be it in a somewhat modified form.

6.3. *The distribution of basic word orders*

On the basis of a sample that contained over a thousand languages, Tomlin (1986) found that languages were distributed over the six possible orderings of verb (V)²⁴, subject (S), and object (O) in the following way:

(51)	SOV	SVO	VSO	VOS	OVS	OSV
	44.78	41.79	9.20	2.99	1.24	0.00

Tomlin argues that the difference in distribution reflects the interaction of three general ordering principles: (i) the Theme (read: subject) First Principle, (ii) Verb-Object Bonding (..OV.. or ..VO..), and (iii) the Animated First Principle.

Since SOV languages adhere to all three principles, they are most frequent. Conversely, OSV languages violate the three principles and are for that reason extremely rare (see e.g. Derbyshire & Pullum (1981)) and in Tomlin's sample unattested. Hawkins (1994: 331-339), in turn, attributes the above distribution of basic orders to relative ease of processing. The algorithm which he has devised for calculating processing ease, the Early Immediate Constituent recognition algorithm (EIC), identifies SOV as the most optimal order in terms of processing efficiency for an OV language, and SVO order as the most optimal for a VO language. Further, it predicts that the two orders should be grammaticalized, in the unmarked case, "at the expense of all other orders" (Hawkins 1994:337). As Tomlin's data show, while this prediction fares rather well in relation to the remaining two OV orders, it is somewhat less successful in regard to the remaining two VO ones. Although languages with verb-initial order are undoubtedly less frequent than the ones with verb-final order, they definitely do occur, and in some areas of the world even with high frequency. What then is the motivation for the grammaticalization of either of the two verb-initial orders? Hawkins' EIC has no explanation to offer in this connection. The EIC identifies VSO as the only viable alternative to SVO in terms of ease of processing. Nonetheless, as SVO is always more efficient, it remains a mystery why VSO should ever be selected. Our investigation suggests that one of the factors underlying this choice is the parts-of-speech system of a language.

We have shown that languages with highly flexible parts-of-speech systems do not have verb-medial order, which in our sample means either OVS (Hixkaryana) or SVO. Our explanation for the absence of such order in flexible parts-of-speech system languages is that in verb-medial languages the predicate is not uniquely identifiable in terms of its location: in intransitive clauses it is final, in transitive medial, and in pro-drop languages often initial. Consequently order cannot be employed to determine whether a given lexeme is or is not being used as a predicate. As this cannot be established on the basis of the lexeme itself, the burden of doing so would fall on morphological marking. However, subjects in SVO languages are rather unlikely to be morphologically marked. First of all, SVO languages lack nominal case marking more often than, for example, SOV languages (see e.g. Siewierska 1996 and the references therein). And secondly, in those that do display case marking, it is generally the object rather than the subject which has an overt marker. Therefore, unless the predicate bears special marking, which of the lexemes is the S and which the predicate will not be immediately clear. Basic verb-initial order avoids these problems of identification; the predicate is uniquely identifiable in terms of its initial location.

In the light of the above, the question arises why all languages with a flexible parts-of-speech system are not predicate initial. If predicate initial order is such a successful strategy for identifying the function of a lexically underspecified lexeme, might we not expect it to be favored over predicate

final order? The answer is no. As a predicate identifying strategy, predicate final order is just as good as predicate initial. What is at issue is consistency. If the predicate is always clause final, there is no reason why an unmarked clause initial lexeme should be misinterpreted as a predicate. In transitive clauses, however, there is a potential danger of interpreting the O as the (intransitive) predicate. We would therefore expect predicate final languages with a flexible parts-of-speech system to be particularly likely to display overt morphological case marking of the O, or verbal agreement marking, or both. All the relevant languages in the sample do so.

It needs to be mentioned that the fact that predicate initial and predicate final orders are equally good identifying predicate strategies as far as flexible parts-of-speech system languages are concerned finds indirect support from Hawkins' (2002) more recent work on the relationship between dependency strength and linear precedence. Hawkins argues that the dependency relations between a dependent and independent category may differ in strength, as a function of both the formal and semantic properties that are assigned by the independent category to the dependent one. The strongest dependency relations involve filler-gap dependencies, as in *wh* questions or zero marked relative clauses. These he calls full addition dependencies. Slightly weaker are partial addition dependencies such as those obtaining between a reflexive pronoun and its clausal antecedent. Weaker still are dependencies involving the reduction in the semantic or syntactic range of a dependent category by the

independent one, called range reduction. Included among such dependencies are case marking and semantic role assignment and, crucially for us, polysemy and ambiguity reduction in functional categories and parts of speech.

According to Hawkins, strong dependencies favour placing the independent category before the dependent one. Weaker dependencies or more symmetrical dependencies allow for either order. In languages with a flexible parts-of-speech system, like in any other language, it is the predicate which determines the semantic role and (to a certain extent) the case marking of its arguments. However the predicate is also dependent on the non-predicate lexemes in regard to its predicate status. Thus flexible lexemes enter into symmetrical dependency relations (with respect to different properties) with each other, even more so than in non-flexible languages. As the dependencies go in both directions, and involve range reduction, they are weak, in the sense defined above. Therefore, there should be no preference for positioning the more independent category before the more dependent one. Given the overall cross-linguistic dominance of predicate-final orders, the fact that among the few flexible languages there are predicate initial ones as well as predicate final ones bears out this prediction.

6.4. *Doubling*

Doubling refers to the placement of lexical modifiers in referential phrases both before and after the head. Although doubling is widely attested, it has proved to be very difficult to formulate valid generalizations with respect to the circumstances in which it tends to occur. An early observation by Greenberg (1966) with respect to the doubling of adjectives is his universal 19:

- (52) *Universal 19*: When the general rule is that the descriptive adjective follows, there may be a minority of adjectives which usually precede, but when the general rule is that descriptive adjectives precede, there are no exceptions.

In his study on word order universals Hawkins (1983) tried to explain doubling in terms of his Doubling Hypothesis, which says that doubling only occurs in adjacent subtypes as defined by his Prepositional and Postpositional Noun Modifier Hierarchy. For example, the Prepositional Noun Modifier Hierarchy (PrNMH) in (53) permits the cooccurrences in (54) (Hawkins 1983: 75-76):

- (53) $\text{Prep} \supset ((\text{NDem} \supset \text{NNum} \supset \text{NA}) \& (\text{NA} \supset \text{NG}) \& (\text{NG} \supset \text{NRel}))$

- (54) (a) $\text{Prep} \& \text{NDem} \& \text{NNum} \& \text{NA} \& \text{NG} \& \text{NRel}$

- (b1) $\text{Prep} \& \text{DemN} \& \text{NNum} \& \text{NA} \& \text{NG} \& \text{NRel}$

- (b2) $\text{Prep} \& \text{NDem} \& \text{NumN} \& \text{NA} \& \text{NG} \& \text{NRel}$

- (c) **Prep & DemN & NumN & NA & NG & NRel**
- (d) **Prep & DemN & NumN & AN & NG & NRel**
- (e) Prep & DemN & NumN & AN & GN & NRel
- (f) Prep & DemN & NumN & AN & GN & RelN

The PrNMH predicts that doubling of adjectives only occurs in languages of subtypes c. and d. in the co-occurrences listed in (54).²⁵ However, Hawkins (1983: 76-77, 87) also encountered various exceptions to the Doubling Hypothesis in his sample, some of which he attributed to historic processes in that he claimed that certain occurrences of nonadjacent doubling are the result of "various idiosyncratic and language particular factors [which] can retard the loss of some word order".

As we have shown in §5.3, doubling is dispreferred in flexible languages in which the adjective is not a clearly differentiated part of speech, i.e. in languages of types 1-3/4. In these languages doubling of lexical modifiers in referential phrases, i.e. the occurrence of lexical modifiers both before and after the head, is impossible. The only exception is Tagalog, for the reasons given in §3.4 and §5.4.2. Thus, we are now in a position to offer an alternative explanation: doubling is only allowed in those languages in which the adjective is a clearly differentiated part-of-speech, i.e. languages with parts-of-speech systems 4-5/6. Table 4 clearly shows this to be the case.

7. CONCLUSION

In this article we have shown that the nature of the parts-of-speech system of a language imposes restrictions on the syntactic properties of that language, which can be explained in terms of their disambiguating function. We have also shown that in those cases in which languages display unpredicted syntactic properties, they apply morphological solutions with the same disambiguating effect. Our findings furthermore allowed us to propose a number of improvements of existing work in word order typology. The results thus show that lexical typology is a necessary addition to existing work on syntactic and morphological typology.

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	<i>head</i>	<i>modifier</i>
<i>predicate phrase</i>	verb	manner adverb
<i>referential phrase</i>	noun	adjective

Figure 1

Lexemes and syntactic slots

<i>language</i>	<i>head of pred. phrase</i>	<i>head of ref. phrase</i>	<i>modifier of ref. phrase</i>	<i>modifier of pred. phrase</i>
Warao	verb	non-verb		
English	verb	noun	adjective	manner adverb
Garo	verb	noun	–	–

Figure 2

Flexible, differentiated, and rigid languages 1.

<i>language</i>	<i>head of pred. phrase</i>	<i>head of ref. phrase</i>	<i>modifier of ref. phrase</i>	<i>modifier of pred. phrase</i>
Ngiti	verb	noun	modifier	
English	verb	noun	adjective	manner adverb
Wambon	verb	noun	adjective	–

Figure 3

Flexible, differentiated, and rigid languages 2.

<i>language</i>	<i>head of pred. phrase</i>	<i>head of ref. phrase</i>	<i>modifier of ref. phrase</i>	<i>modifier of pred. phrase</i>
Samoan	contentive			
English	verb	noun	adjective	manner adverb
(unattested)	verb	–	–	–

Figure 4

Flexible, differentiated, and rigid languages 3.

<i>PoS system</i>		<i>head of pred. phrase</i>	<i>head of ref. phrase</i>	<i>modifier of ref. phrase</i>	<i>modifier of pred. phrase</i>
<i>Flexible</i>	1	contentive			
	2	verb	non-verb		
	3	verb	noun	modifier	
<i>Differentiated</i>	4	verb	noun	adjective	manner adverb
<i>Rigid</i>	5	verb	noun	adjective	–
	6	verb	noun	–	–
	7	verb	–	–	–

Figure 5
Parts-of-speech systems

Afro-Asiatic (2)	Chadic (1) Cushitic (1)				Gude Oromo, Boraana Turkish Tuscarora Koasati Quechua, Imbabura Guaraní Hixkaryana Pipil Warao Ngalakan Kayardild Nunggubuyu Nung
Altaic (1)					Tagalog
Amerind (7)	Northern (2)	Almosan-Keresiouan (1) Penutian (1)			Samoa Paiwan Mundari Miao Basque Burushaski, Hunza Abkhaz Itelmen Tamil West Greenlandic (Etruscan) Nivkh Hurrian Polish Hittite Wambon Alamblak Nasioi Tidore Arapesh, Mountain Georgian Ket Nama Hottentot Japanese (Meroitic) Navaho (Nahali) Babungo Kisi Bambara Krongo Lango Ngiti Berbice Dutch Mandarin Chinese Garo Sumerian Hungarian
	Andean (1) Equatorial-Tucanoan (1) Ge-Pano-Carib (1) Central Amerind (1) Chibchan-Paezan (1)				
Australian (3)	Gunwinyguan (1) Pama-Nyungan (1) Nunggubuyu (1)				
Austriac (6)	Austro-Tai (4)	Daic (1) Austronesian (3)	Malayo-Pol. (2)	Western (1) Centr.-E. (1)	
			Paiwanic (1)		
	Austroasiatic (1) Miao-Yao (1)				
Basque (1)					
Burushaski (1)					
Caucasian (1)					
Chukchi-Kamchatkan (1)					
Elamo-Dravidian (1)					
Eskimo-Aleut (1)					
Etruscan (1)					
Nivkh (1)					
Hurrian (1)					
Indo-Hittite (2)	Indo-European (1) Anatolian (1)				
Indo-Pacific (5)	Trans New Guinea (1) Sepik-Ramu (1) East Papuan (1) West Papuan (1) Torricelli (1)				
Kartvelian (1)					
Ket (1)					
Khoisan (1)					
Korean-Japanese-Ainu (1)					
Meroitic (1)					
Na-Dene (1)					
Nahali (1)					
Niger-Kordofanian (4)	Niger-Congo (3)	N.-C. Proper (2)	Central N.-C. (1) West Atlantic (1)		
		Mande (1)			
	Kordofanian (1) East Sudanic (1) Central Sudanic (1)				
Nilo-Saharan (2)					
Pidgins and Creoles (1)					
Sino-Tibetan (2)	Sinitic (1) Tibeto-Karen (1)				
Sumerian (1)					
Uralic-Yukaghir (1)					

Table 1 The sample

PoS	Languages
1	Samoan, Tagalog
1/2	Mundari
2	Hurrian, Quechua, Warao
2/3	Turkish
3	Ket, Miao, Ngiti, Tidore
3/4	Lango
4	Abkhaz, Arapesh, Babungo, Bambara, Basque, Burushaski, Georgian, Hittite, Hungarian, Itelmen, Japanese, Nama, Ngalakan, Polish
4/5	Koasati, Nasioi, Paiwan, Pipil, Sumerian
5	Alamblak, Berbice Dutch, Guaraní, Kayardild, Kisi, Oromo, Wambon
5/6	Garo, Gude, Mandarin Chinese, Nung, Tamil, West- Greenlandic
6	Hixkaryana, Krongo, Navaho, Nivkh, Nunggubuyu
6/7	Tuscarora
7	–

Table 2 Parts-of-speech systems of sample languages

Language	Clause			Ref. Phrase			Pred. Phrase		
	1 <i>BWO</i>	2 <i>Fix</i>	3 <i>Morph</i>	4 <i>BWO</i>	5 <i>Fix</i>	6 <i>Morph</i>	7 <i>BWO</i>	8 <i>Fix</i>	9 <i>Morph</i>
Abkhaz	3	-	-	HM	-	-	MH	+	-
Alamblak	3	-	-	MHM	-	-	irr	irr	irr
Arapesh	2	+	irr	MHM	-	-	MHM	-	-
Babungo	2	+	irr	HM	+	-	HM	+	-
Bambara	3	+	irr	HM	+	+	HM	+	-
Basque	3	-	-	HM	-	-	MH	+	-
Berbice Dutch	2	+	irr	MH	+	-	irr	irr	irr
Burushaski	3	-	-	MH	-	-	MH	-	-
Garo	3	+	irr	HM	+	-	irr	irr	irr
Georgian	2/3	-	-	MH	+	-	MH	+	-
Guaraní	2	-	-	HM	+	-	irr	irr	irr
Gude	1/2	-	-	MH	+	-	irr	irr	irr
Hittite	3	+	irr	MHM	-	-	MH	+	-
Hixkaryana	2	-	-	irr	irr	irr	irr	irr	irr
Hungarian	2/3	-	-	MH	+	-	MH	+	-
Hurrian	3	+	irr	MH	+	-	MH	+	-
Itelmen	2/3	+	irr	MHM	-	-	MH	+	-
Japanese	3	+	irr	MH	+	-	MH	+	-
Kayardild	1/2/3	-	-	MH	-	-	irr	irr	irr
Ket	3	+	irr	MH	+	-	MH	+	-
Kisi	2/3	+	irr	HM	+	+	irr	irr	irr
Koasati	3	-	-	HM	+	-	MHM	-	-
Krongo	1/2	-	-	irr	irr	irr	irr	irr	irr
Lango	2	+	irr	HM	+	+	HM	+	+
Mandarin Chinese	2	+	irr	MH	+	-	irr	irr	irr
Miao	2	+	irr	HM	+	-	HM	+	-
Mundari	3	+	irr	MH	+	-	MH	+	-
Nama	3	-	-	MH	+	-	MH	+	-
Nasioi	3	-	-	HM	-	-	MH	+	-
Navaho	3	+	irr	irr	irr	irr	irr	irr	irr
Ngalakan	1/2	-	-	HM	-	-	MH	+	-
Ngiti	2/3	+	irr	MH	+	-	MHM	-	-
Nivkh	3	+	irr	irr	irr	irr	irr	irr	irr
Nung	2	-	-	HM	+	-	irr	irr	irr
Nunggubuyu	1/2/3	-	-	irr	irr	irr	irr	irr	irr
Oromo	3	+	irr	HM	+	-	irr	irr	irr
Paiwan	1	-	+	HM	-	+	HM	+	+
Pipil	1	-	-	MH	-	-	MH	-	-
Polish	2	-	-	MHM	-	-	MHM	-	-
Quechua	3	-	+	MH	+	-	MH	+	-
Samoan	1	-	+	HM	+	-	HM	+	-
Sumerian	3	+	irr	HM	-	-	MH	+	-
Tagalog	1	-	+	MHM	-	+	irr	irr	irr
Tamil	3	-	-	MH	+	-	irr	irr	irr
Tidore	2	+	irr	HM	+	-	HM	+	-
Turkish	3	+	irr	MH	+	-	MH	+	-
Tuscarora	2	-	-	irr	irr	irr	irr	irr	irr
Wambon	3	+	irr	HM	+	-	irr	irr	irr
Warao	3	+	irr	HM	+	-	irr	irr	irr
West Greenlandic	3	-	-	HM	+	-	MH	+	+

Table 3 Word order data

Language	PoS	Clause			Referential Phrase			Predicate Phrase		
		1 BWO	2 FixSP	3 Morph	4 BWO	5 Fix	6 Morph	7 BWO	8 Fix	9 Morph
Samoan	1	1	-	+	HM	+	-	HM	+	-
Tagalog	1	1	-	+	MHM	-	+			
Mundari	1/2	3	+	irr	MH	+	-	MH	+	-
Hurian	2	3	+	irr	MH	+	-	MH	+	-
Quechua, Imbabura	2	3	-	+	MH	+	-	MH	+	-
Warao	2	3	+	irr	HM	+	-	MH	+	+
Turkish	2/3	3	+	irr	MH	+	-	MH	+	-
Ket	3	3	+	irr	MH	+	-	MH	+	-
Miao	3	2	+	irr	HM	+	-	HM	+	-
Ngiti	3	2/3	+	irr	MH	+	-	MHM	-	-
Tidore	3	2	+	irr	HM	+	-	HM	+	-
Lango	3/4	2	+	irr	HM	+	+	HM	+	+
Abkhaz	4	3	-	-	HM	-	-	MH	+	-
Arapesh	4	2	+	irr	MHM	-	-	MHM	-	-
Babungo	4	2	+	irr	HM	+	-	HM	+	-
Bambara	4	3	+	irr	HM	+	+	HM	+	-
Basque	4	3	-	-	HM	-	-	MH	+	-
Burushaski	4	3	-	-	MH	-	-	MH	-	-
Georgian	4	2/3	-	-	MH	+	-	MH	+	-
Hittite	4	3	+	irr	MHM	-	-	MH	+	-
Hungarian	4	2/3	-	-	MH	+	-	MH	+	-
Itelmen	4	2/3	+	irr	MHM	-	-	MH	+	-
Japanese	4	3	+	irr	MH	+	-	MH	+	-
Nama	4	3	-	-	MH	+	-	MH	+	-
Ngalakan	4	1/2	-	-	HM	-	-	MH	+	-
Polish	4	2	-	-	MHM	-	-	MHM	-	-
Koasati	4/5	3	-	-	HM	+	-	MHM	-	-
Nasioi	4/5	3	-	-	HM	-	-	MH	+	-
Paiwan	4/5	1	-	+	HM	-	+	HM	+	+
Pipil	4/5	1	-	-	MH	-	-	MH	-	-
Sumerian	4/5	3	+	irr	HM	-	-	MH	+	-
Alamblak	5	3	-	-	MHM	-	-	irr	irr	irr
Berbice Dutch	5	2	+	irr	MH	+	-	irr	irr	irr
Guaraní	5	2	-	-	HM	+	-	irr	irr	irr
Kayardild	5	1/2/3	-	-	MH	-	-	irr	irr	irr
Kisi	5	2/3	+	irr	HM	+	+	irr	irr	irr
Oromo	5	3	+	irr	HM	+	-	irr	irr	irr
Wambon	5	3	+	irr	HM	+	-	irr	irr	irr
Mandarin Chinese	5/6	2	+	irr	MH	+	-	irr	irr	irr
Garó	5/6	3	+	irr	HM	+	-	irr	irr	irr
Gude	5/6	1/2	-	-	MH	+	-	irr	irr	irr
Nung	5/6	2	-	-	HM	+	-	irr	irr	irr
Tamil	5/6	3	-	-	MH	+	-	irr	irr	irr
West Greenlandic	5/6	3	-	-	HM	+	-	irr	irr	irr
Hixkaryana	6	2	-	-	irr	irr	irr	irr	irr	irr
Krongo	6	1/2	-	-	irr	irr	irr	irr	irr	irr
Navaho	6	3	+	irr	irr	irr	irr	irr	irr	irr
Nivkh	6	3	+	irr	irr	irr	irr	irr	irr	irr
Nunggubuyu	6	1/2/3	-	-	irr	irr	irr	irr	irr	irr
Tuscarora	6/7	2	-	-	irr	irr	irr	irr	irr	irr

Table 4 Parts-of-speech systems and word order

NOTES

¹ We are grateful to Edith Moravcsik and two anonymous referees of JoL for their comments on an earlier version of this paper. Abbreviations used in morpheme glosses: 1 = first person, 2 = second person, 3 = third person, ABS = absolutive, ACC = accusative, ANAPH = anaphoric, ART = article, ASP = aspect, AUX = auxiliary, CL = classifier, CO = coordinator, CONN = connector, DAT = dative, DIR = direction, ERG = ergative, FUT = future, GENR = general tense, GER = gerund, INT = interrogative, IT = iterative, LD = locative-directional, LNK = linker, M = masculine, NHUM = non-human, NPAST = non-past, OBJ = object, PAST = past, PERF = perfect, PF = perfective, PL = plural, PM = predicate marker, POSS = possessor, PRES = presentative, PROGR = progressive, PRS = present, PUNCT = punctual, RCP = reciprocal, REAL = realis, REL = relativizer, SBJ = subject, SG = singular, SPEC = specific, SS = same subject, STAT = stative, SUB = subordinator, TOP = topic, TR = transitive, VR = verbalizer.

² For example, in Chomsky's minimalist program, which concentrates on invariant ('narrow') syntax, all apparent differences among languages are deemed to be lexical in nature. Thus it would seem that, although the syntactic component as such is trimmed down, more and more information is now delegated to the lexicon.

³ For an overview of earlier attempts at integration see Plank (1998).

⁴ In this second edition of Ruhlen's classification two major language families, Korean-Japanese-Ainu and Kartvelian, are distinguished that were considered subbranches of larger phyla (Altaic and Caucasian, respectively) in the first edition of this work. Note that our using Ruhlen's classification does not necessarily commit us to all the details of his classification, which has been criticized particularly for postulating very large language families for which the evidence is weak. Since the sampling method used here mitigates the effects on the sample of the postulation of large phyla, this criticism hardly affects the constitution of our sample.

⁵ In English there are of course many cases of zero conversion between the classes of noun and verb. These cases will be discussed in 3.3.

⁶ Each of the steps in the hierarchy correlates with a number of other features of a language. See e.g. Rijkhoff (2002: 141-145; 2003), who proposes necessary conditions for the occurrence of distinct classes of verbs, nouns, and adjectives in a language.

⁷ An extensive and insightful discussion of the verbal orientation of Iroquoian languages may be found in Sasse (1988).

⁸ See Vogel (2000) on the classification of English in terms of the typology of parts-of-speech systems used in this article.

⁹ See on this construction also e.g. Dixon 1980: 102–103

¹⁰ See Behrens (1982: 161).

¹¹ See Vogt (1971: 220-224)

¹² Languages exhibiting more than one basic order are assigned proportionally to the relevant types.

¹³ The figures are as follows:

<i>Word Order Type</i>	<i>3</i>	<i>2</i>	<i>1</i>	<i>All</i>
This article				
no. languages	27,17	16,66	6,17	50
%	54.33%	33.33%	12.33%	100%
Hawkins & Gilligan (1987)				
no. languages	19	20	11	50
%	38%	40%	22%	100%
Steele (1977)				
no. languages	30	20	13	63
%	48%	32%	21%	100%

¹⁴ We use notations such as '1-2/3' to refer to the segment of the hierarchy from type 1 to type 2/3, and thus including types 1/2 and 2.

¹⁵ When a language uses agreement with both attributively and predicatively used lexemes, agreement does not uniquely identify the modifier, and is therefore not listed.

¹⁶ More recently research on ambiguity has focused on the question whether language processing is modular or interactive (for an overview, see e.g. Whitney 1998: chapter 7). In the modular view, sentence comprehension occurs in a series of distinct and independent stages. According to the

integrative view, on the other hand, sentence processing is guided by various subprocesses which are in close communication with each other. Recent psycholinguistic research has produced strong support for the integrative view (Whitney 1998: 231).

¹⁷ Note that we use the term 'morphological marker' to refer to segmental grammatical means of expression, whether free grammatical words (particles) or bound morphemes.

¹⁸ A third desambiguating strategy is the use of prosodic means. For lack of data we cannot systematically discuss this strategy in this paper.

¹⁹ Even a rigid V2 position is not uniquely identifiable, since the number of words that make up the first constituent may vary.

²⁰ In connection with the observed correlation it is noteworthy that the two language families showing the largest number of languages with an extremely flexible parts-of-speech system, Polynesian and Salish, are consistently predicate-initial.

²¹ Note that Basque is morphologically ergative but syntactically accusative (Saltarelli 1988: xiii).

²² The different forms of the linker are phonologically conditioned.

²³ Interestingly, Warao is also the only language within the group of flexible languages in which the object precedes the subject.

²⁴ Note that we use the term 'verb' rather than 'predicate', the term which we would prefer, in accordance with the terminology used in the sources we are discussing here.

²⁵ Note that type (47d) would be excluded by Greenberg's Universal 19.