Indexing and flagging, and head and dependent marking

Martin Haspelmath
Max Planck Institute for the Science of Human History, Linguistic and Cultural Evolution (Jena)

Indexing and flagging, and head and dependent marking

Martin Haspelmath

Abstract

This paper compares the concept pair *indexing/flagging* with the well-known concept pair *head/dependent marking* that is widely used in typology. It shows that a general concept of flagging (comprising case and adpositional marking) is needed, and it sketches the advantages of the indexing concept over the older idea of "person agreement". It then points out that the notions of head and dependent are hard to define (apart from the two basic domains of clauses and nominals), and that the head/dependent marking typology does not take the function of syntactic relation markers into account. On a functional view, both flags and indexes can be seen as role-identifiers, as opposed to concordants (attributive agreement markers). After discussing three further issues with the head/dependent marking typology, involving construct markers, concordants, and cross-indexes, I conclude that the concept pair *indexing/flagging* is more suitable for typological purposes than *head/dependent marking*.

Keywords

argument indexing, flagging, head marking, dependent marking, case marking, adpositions, language typology

1 Comparative concepts for cross-linguistic grammatical comparison

Over the last few decades, we have come to understand the extent of the grammatical differences between languages much better, due in large measure to our ability to compare language structures through comparative concepts. We have been able to identify a substantial number of grammatical universals in the wake of Greenberg (1963), and the increasingly shared vocabulary for highly similar grammatical phenomena in languages from around the world makes it more and more useful for researchers working on different continents to communicate with each other and to compare the patterns of their languages.

But quite a few conceptual unclarities remain, and this paper addresses one core area of grammar where I think that more work on terminological and conceptual

clarification is useful: argument marking via PERSON INDEXES and via FLAGS (case-markers and adpositions), as well as the well-known terms *head marking* and *dependent marking*. My ultimate interest is in identifying potential universals and how they might be explained, though better comparisons are also likely to lead to better descriptions of individual languages, often by adopting terms that are well-known from research on universals and cross-linguistic patterns. Since the concepts of head marking and dependent marking were originally proposed by Nichols (1986; 1992) in the context of claims about universal tendencies, and these concepts have become widely known, I think that they deserve careful critical examination.[1]

But in a sense, the main purpose of this paper is to introduce and discuss the relatively new terms *index* and *flag*. Apart from *head marking* and *dependent marking*, the literature also often uses the term pair *agreement* and *case* in a very similar sense (e.g. Siewierska & Bakker, 2009; Baker, 2013), so I will also explain how flagging and indexing relate to these terms.

The main argumentative thrust of the paper is the contention that the concepts (and terms) *indexing* and *flagging* are better suited for typological comparison than Nichols's head/dependent marking, for a variety of reasons. But I do not want to say that head and dependent marking are entirely useless. If defined clearly, this term pair may well continue to play an important role. In general, there are many different comparative concepts that can be useful, and once they are all defined clearly, they can coexist happily and be used side by side.

The current paper will say more about flagging than about indexing because indexing has been dealt with in some detail in an earlier paper (Haspelmath, 2013).

2 Some examples of argument marking by flagging and indexing

Let us begin with some straightforward examples. In many languages, A-arguments and/or P-arguments of verbs are coded by case-markers or adpositions occurring on the argument nominals, and S-arguments are also occasionally coded by flags. Some examples are given in (1a-c), where the flags are boldfaced.

(1) a. Czech
         *Dívk-**a**   vidĕla   babičk-**u**.*
         girl-NOM   saw   grandma-ACC
         'The girl saw grandma.'

     b. Lezgian
         *Ruš-**a**   gada-**diz**   cük-**Ø**   ga-na.*
         girl-ERG   boy-DAT   flower   give-PST
         'The girl gave a flower to the boy.'

     c. Creek
         *ifá-**t**   pó:si   lást-i:-**n**   á:ssi:c-ís*
         dog-NOM   cat   black-DUR-OBL   chase-IND
         'The dog is chasing the black cat.' (Martin, 2011, p. 22)

Adnominal possessors (adpossessors) are also often flagged, as in (2a-b).

(2)   a.   English
           the centre [***of the town***]

      b.   Mandarin Chinese
           [*nóngmín **de***]   *fángzi*
           farmer   GEN   house
           'the farmer's house'

Indexing of arguments is just as common in the world's languages. In particular, we find indexing of S- and A-arguments of verbs (cf. 3a-b), but also indexing of P-arguments (4a-c).

(3)   a.   Mauwake (Trans-New Guinea)
           umi-nen   'I will die'
           umi-nan   'you will die'
           umi-non   's/he will die'   (Berghäll, 2015, p. 150)

      b.   Pite Saami (Uralic)
           buold-av   'I burn'
           buold-a   'you burn'
           bualld-a   's/he burns'   (Wilburm 2014, p. 162)

(4)   a.   French
           je te vois   'I see you'
           je le vois   'I see him'
           je les vois   'I see them'

      b.   Kham (Tibeto-Burman)
           səres-na-ke-o   'he recognized me (*-na*)'
           səres-ni-ke-o   'he recognized you (*-ni*)'
           ya-səres-ke-o   'he recognized them (*ya-)*' (Watters, 2002, p. 79)

      c.   Manam (Oceanic) (Lichtenberk, 1983, pp. 124-125)
           dí-te-a
           3PL.SBJ.RL-see-1SG.OBJ   'they saw me'

           i-te-ʔamíŋ
           3SG.SBJ.RL-see-2PL.OBJ   'he saw you (PL)'

           i-ʔínt-a
           3SG.SBJ.RL-pinch-1SG.OBJ   'he pinched me'

           u-ʔínt-i
           1SG.SBJ.RL-pinch-3SG.OBJ   'I pinched him'

Similarly, adpossessors are often indexed on their possessed nouns, as in (5a-c).

(5)   a.   Yucatec Maya
           a k'àaba'   'your name'

      u k'àaba'   'his name' (Lehmann, 2002, pp. 32-33)
   b.   Standard Arabic
      kitaab-ii   'my book'
      kitaabu-ka   'your book'
      kitaabu-hu   'his book'

   c.   Toqabaqita (Oceanic)
      thata-ku   'my name'
      thata-mu   'your name'
      thata-na   'his/her name' (Lichtenberk, 2008, p. 388)

With these examples in mind, we can consider the definitions of the comparative concepts FLAG and PERSON INDEX:

(6)   flag
     A flag is a bound form that occurs on a nominal and that indicates the semantic or syntactic role of the nominal with respect to a verb (in a clause) or with respect to a possessed noun (in a complex nominal).

(7)   person index (=bound person marker)
     A person index is a bound form denoting a speech role or a highly accessible third person referent that occurs on a verb (or in second position) to indicate a verb's argument, or on a noun to indicate its possessor.

The terms *flagging* and *(person) indexing* (or *indexation*) can be used collectively, to refer to the set of flags and indexes that a language uses, just as the term *case-marking* can be used to refer to the set of case-markers, or *tense-marking* can be used to the set of tense-markers. But they can also be used for the corresponding grammatical processes (e.g. "flagging happens through monosyllabic prefixes"). The verbs *to flag* and *to index* can be used in the senses 'to mark by a flag' and 'to mark by a person index', respectively. For example, one can say that the subject is nominative-flagged in Czech (cf. 1a), or that the object is indexed by person proclitics in French (cf. 4a). The next section will give further motivation for the relatively new term *flag*.

Together, flagging and indexing can be called *argument marking* (or *argument coding),* as in the heading of this section. An argument may be marked on the verb (or an adpossessor on the possessed noun) by an index, or an argument nominal may be marked by a flag occurring on it. A flag may also be used to mark a modifier (e.g. a locational or a temporal expression), but indexes are generally restricted to arguments.

3 Flags: Case-markers and/or adpositions

In the typological literature, it is quite common to find the complex disjunctive term "case-markers and/or adpositions" to refer to a range of markers that play very similar roles and that are hard to keep apart.

(8)   a.   ... the ways in which core argument noun phrases are marked – by means of morphological case or adpositions – to indicate which particular core argument position they occupy. (Comrie, 2005, p. 398)

   b.   There are three basic ways of marking the function of a core argument. (i) By choice from a system of case affixes or clitics, or by an adposition ... (Dixon, 2010, p. 125)

   c.   The distinction between various forms of dependent marking (adpositions, clitics and affixes) is irrelevant for present purposes (Lestrade, 2015, p. 105).

The term *flag* is much more convenient for markers of this kind than the complex expression "case-marker and/or adposition",[2] at least in a world-wide context. Of course, in Indo-European languages such as Greek or Czech, cases and prepositions are quite distinct classes of markers, and in these languages, the traditional terms *case* and *preposition* can of course be used as before. It is primarily in a typological context that *flagging* is more convenient (and will also turn out to be more suitable than *dependent-marking*, in sections 6-10 below).

But my argument goes beyond terminological convenience. "Case-markers" and "adpositions" are not only very similar, but it is also very unclear how they could be distinguished consistently as comparative concepts.[3] A practical way to make the distinction would be through the spelling: Case-markers are forms that are written jointly with their hosts, while adpositions are written separately. But this will not satisfy most linguists, because spelling conventions are generally regarded as being independent of the spoken language system. Moreover, some adpositions are sometimes written together with part of their host, and sometimes separately (e.g. Italian *alla donna* 'to the woman', *a Paola* [appaˈola] 'to Paola'). Another way to distinguish them would be to say that case-markers are AFFIXES (or stem-changing operations), while adpositions are SEPARATE WORDS. But this does not solve the problem, because there is no consistent way in which words and morphological formatives (= affixes) can be distinguished across languages (Haspelmath, 2011). In many cases, different criteria give different results, and no set of necessary and jointly sufficient criteria for wordhood has been found (whether for grammatical wordhood or for phonological wordhood). That case-markers and adpositions are hard to distinguish has been the general view in typology for quite some time, as seen in the quotations in (9).

(9)   a.   The distinction between case-marking and other adpositions seems to be a somewhat arbitrary one. (Schachter, 1985, p. 36)

       b.   Although one can easily separate different layers of case marking in a particular language, as in Hindi for instance, it can be difficult to determine whether a single layer of case marking in a particular language is affixal or adpositional. (Blake, 1994, p. 11)

       c.   In the search for typological generalizations concerning spatial cases in the narrow sense of this term, one must always keep in mind that there is some degree of arbitrariness in the distinction between cases affixes and adpositions
             (Creissels, 2009b, p. 611)

The conclusion to give up the distinction was formulated clearly by Zwicky (1992, p. 370): "Everything you can do with adpositions you can do with case inflections, and vice versa". Thus, we clearly need a general term, and *flag* is the obvious choice.[4]

However, at this point I should mention two research traditions in which case and adpositions have been explicitly distinguished, or at least an attempt has been made to distinguish them. First, in mainstream generative syntax, many authors have tried to use language-particular criteria for distinguishing case-markers from adpositions. Thus, Baker & Kramer (2014) argue that Amharic preposed flags like *kä-* 'from', *lä-* 'to', *wäda* 'to', which are cognate with Arabic Prepositions, are in fact case markers rather than adpositions.[5] They observe that these forms behave like the accusative case marker *-n*, and unlike postposed adpositions (like *sir* 'under'), in that (i) they show some phonological interaction with their host, (ii) they cannot have scope over two conjoined nominals, and (iii) they can occur on more than one pre-nominal adjective. This argumentation is potentially convincing if one assumes (as Baker & Kramer evidently do) that the categories "adposition" and "case marker" exist in advance of language acquisition and analysis (as natural kinds, belonging to the innate universal grammar), so that it makes sense to use different symptoms in different languages to identify the categories (cf. Haspelmath, 2015). Once one drops this assumption (cf. Haspelmath, 2007), it is no longer legitimate to consider different diagnostics in different languages. Cross-linguistic concepts need to be identified in the same way in all languages.

Second, a number of authors (most notably Andrew Spencer) have argued that case should be primarily regarded as a feature (in the sense of Corbett, 2012), not a type of formative. In languages with inflection classes requiring different case-markers for different classes of nouns, there is no single form associated with a case function. For example, the Dative case of Russian nouns has quite diverse realizations, as seen in (10), but all these forms share the same Dative function. This situation cannot be easily described by means of a notion of "case-marker" (because the formatives are different for different nouns) unless one accepts great complications, and one clearly needs a more abstract feature that is realized by different forms for the different feature values (Corbett, 2012, section 1.1).

(10)   Russian Nominative and Dative case forms
      a.   *mal'čik*   *mal'čik-u*   'boy'
      b.   *devušk-a*   *devušk-e*   'girl'
      c.   *novost'*   *novost-i*   'news'
      d.   *mal'čik-i*   *mal'čik-am*   'boys'
      e.   *ja*   *mne*   'I'

Andrew Spencer has suggested (e.g. Spencer & Otoguro, 2005; Spencer, 2008; 2009) that in languages where a case exponent always has the same shape and does not cumulate with other information, as in Hungarian and Japanese, one should not speak of case, but rather of "clitic adpositions" (Spencer, 2009, p. 186). This is an interesting suggestion, but de facto, the term "case" is very widely used for suffixes (formatives written jointly) that do not vary in shape, as in Iggesen (2005), cited approvingly by Corbett (2012, section 5.5).[6] I do not know of any counts of languages with a case feature according to Spencer's and Corbett's criteria for recognizing features, but it appears that such languages are quite rare, and are prominent primarily because they are well-known from Indo-European languages. Spencer's proposal for distinguishing between case features and adpositions is at variance with the usual terminological

practice, and it may be taken as underscoring the need for a general term that encompasses all kinds of flags (of the case-feature type, of the affixal Hungarian type, and of the adpositional type).

Before concluding this section, let me say a few more words on the terms "bound", "marker", "nominal", "occur on", and "syntactic role" which appear in the definition in (6), and which may not be immediately clear.

- A bound form is a form that cannot occur in isolation (cf. Haspelmath, 2013, pp. 212-213). For adpositions expressing fairly concrete meanings such as 'above' or 'against', one may wonder whether they should count as expressing grammatical meaning. I know of no good way of distinguishing between grammatical and lexical meaning, so I use the boundness criterion: If a form can occur isolation, it does not count as a flag according to (6).
- A nominal is an expression that can serve as a verbal argument and that can occur on its own, i.e. what is also commonly called a "noun phrase" (including independent personal pronouns, but not bound person forms).
- "Occurring on a nominal" means that the flag's host is the entire nominal or (at least) one of its parts, e.g. the noun (as with some flags that are generally called "cases"), or the first element of the nominal.[7] A flag may also occur on multiple parts of a nominal ("case agreement").
- A syntactic role is a set of arguments that are coded (= flagged and indexed) in the same way, with a semantic role at their core (e.g. "(direct) object", which has the semantic role of patient as its core).

4 Indexing: Bound person markers

Bound person forms like those in (3)-(5) roughly correspond to head-marking in Nichols's typology, but they are also often called "agreement markers" in the literature. For example, in the Spanish forms in (11), the subject indexes *-o*, *-es, -e* are said to exhibit "agreement".

(11) *quier-o*   'I love' (or 'I want')
      quier-es   'you love'
      quier-e   'she loves'

But there is no overt agreement controller, so this would be a kind of VIRTUAL AGREEMENT, with a zero pronominal subject. There is no evidence that such a zero element is present, and it seems that this kind of description is primarily motivated by the analogy with languages like German, which indeed have obligatory personal pronoun subjects and person indexes on the verb.

(12) *ich lieb-e*   'I love'
      du lieb-st   'you love'
      sie lieb-t   'she loves'

But Spanish is not German, and it is much more straightforward to say that the person indexes *-o*, *-es*, *-e* are themselves the arguments. It is true that a person index can cooccur with a conominal (*la mujer quier-e* 'the woman loves'), and the conominal may be a personal pronoun (*tú quier-es* 'YOU love'), but even when the index is first or

second person, the conominal may be a full nominal (e.g. *las mujeres quer-emos justicia* [the women want-1PL justice] 'we women want justice'). Thus, saying that the verb virtually agrees with a zero personal pronoun is very strange.

A well-known alternative is that the bound person forms are themselves the arguments (the BOUND-ARGUMENT view, e.g. Van Valin, 2013).[8] However, there is no general agreement about the status of the conominal, and it is strange to simply say (as is commonly done) that it is "in apposition". In Haspelmath (2013, section 5), I noted serious problems with the traditional virtual-agreement view and the more recent bound-argument view, and I suggested that a third view fares best: the subject argument is DOUBLY EXPRESSED when there is a conominal (as in *la **mujer** quier-**e***, where the two forms expressing the subject are boldfaced).

Following Lazard (1998), I proposed the term *person index* (plural: *person indexes*) for bound person markers, regardless of their status with respect to the issue of virtual agreement or bound arguments.[9] One can distinguish between three types of indexes: CROSS-INDEXES, which may but need not cooccur with a conominal (like Spanish *-es* in 13a), GRAMM-INDEXES, which must cooccur with a conominal (like German *-st* in 13b), and PRO-INDEXES, which cannot cooccur with a conominal (like Standard French *tu* in 13c).[10]

(13) a. Spanish
          *(tú)   quier-**es***
          I   want-2SG
          'you want' (or 'YOU want')

(14) b. German
          *du   will-**st** / *willst*
          you   want-2SG
          'you want'

(12) c. French
          ***tu**=   veux   /   *toi tu veux*[11]
          2SG=   want
          'you want'

Of these three types, the first (cross-indexes) is by far the most common with subjects and objects. Gramm-indexes as in German are very rare in the world's languages, and are attested only for subject indexes (Siewierska, 1999). In adpossessive constructions, both cross-indexes (14a) and pro-indexes (14b) are found as well (I am not aware of possessive gramm-indexes).

(14) a. Welsh (King, 1993, p. 81)
          ***ei**=phlant   (hi)
          3SG.F.POSS=children   she
          'her children'

(14) b. Arabic
          *kitaabu-**hu***   /   *kitaabu-hu huwa*
          book-3SG.POSS
          'his book'

As Siewierska (1999, pp. 228-230) notes, there are quite a few person indexes that cannot be readily put into any of these classes, so we really need the general term *person index*. For example, the Toqabaqita person indexes cannot be conominated by independent personal pronouns (cf. 15a), but their conominal can be a full nominal (cf. 15b). They are thus intermediate between pro-indexes and cross-indexes.

(15) Toqabaqita (Lichtenberk, 2008, pp. 380-381)

> a. *gwau-ku*   *(*nau)*
>   head-1SG.POSS   1SG.NOM
>   'my head'

> (15) b. *nuu-na*   *teqe*   *wane*
>   picture-3SG.POSS   one   man
>   'picture of a man'

5 Head and dependent marking

Before comparing indexing and flagging with head and dependent marking, I need to describe these latter notions briefly. Nichols & Bickel (2005c, p. 106) characterize head and dependent marking (or MARKING LOCUS) as follows:

> In any kind of phrase, overt morphosyntactic marking reflecting the syntactic relations within the phrase may be located on the head of the phrase, on a non-head (i.e. on a dependent), on both, or on neither. In possessive phrases, the possessed noun is head and the possessor is dependent. ... In clauses, the arguments are dependents and the verb is the head.

In one way, this definition is somewhat broader than the original definition in Nichols (1986, pp. 56-57), where the marking was said to be *morphological*. By "morphosyntactic marking", Nichols & Bickel apparently want to include non-affixal bound markers as well (though they do not specify that the markers need to be bound; they explicitly include markers which are "separate words" in Nichols & Bickel, 2005a, p. 102). I am not aware of any justification for this broadening, but it is quite likely that Nichols & Bickel adopted the broader definition because "affixes" and "non-affixes" are very hard to distinguish, and they wanted to include adpositions as well.

In another way, the characterization from 2005 is narrower, because it includes only verb-argument and noun-possessor relations. Nichols (1986, p. 57) included the six relations in Table 1 in her discussion.

Table 1. Head-dependent constructions with different marking patterns (Nichols, 1986)

level	head	dependent	
phrase	possessed noun	possessor	(a)
	noun	modifying adjective	(b)
	adposition	complement of adposition	(c)
clause	predicate	arguments and adjuncts	(d)

	auxiliary verb	main verb	(e)
sentence	main-clause predicate	subordinate clause	(f)

Nichols & Bickel (2005a-c) do not say that they exclude the other four, but they only discuss (a) and part of (d) (predicate and arguments) in their *WALS* chapters. Clearly, in the 2005 version, head marking has become fairly similar to indexing, and dependent marking has become very similar to flagging.

In the following sections, I will compare the two concept pairs *head/dependent marking* and *indexing/flagging*, and I will give some reasons for preferring indexing and flagging for language typology.

6 Indexing/flagging does not require the abstract categories "head" and "dependent"

The head/dependent marking typology first of all relies on the notions of head and dependent. Nichols (1986, p. 57) thought that "linguists of divergent theoretical persuasions are in almost complete agreement as to what is the head and what is the non-head in a given construction", but this was overly optimistic even at that time. Until the 1970s (before Jackendoff's (1977) detailed proposal for a uniform description of NP, VP and AP in English), not even the term "head" was widely used by syntacticians, let alone "dependent", a term that was basically introduced by Nichols, though the notion of a dependency relation linking arguments ("actants") to verbs and modifiers ("circumstants") to nouns and verbs was of course crucial to the dependency grammar tradition since Tesnière (1959) and Hays (1964). However, while there was indeed widespread agreement that nouns had a special role in nominals ("noun phrases") and verbs had a very similar special role in clauses or "verb phrases", the agreement among linguists never went much further. How to treat verbal auxiliaries, determiners, subordinators and even adpositions was never quite clear, because the basic intuition was apparently semantic: The head word is the word that is semantically the most important word, i.e. the verb in the clause and the noun in the nominal (cf. Croft's 2001, Ch. 7 notions of "profile equivalent" and "primary information-bearing unit"). But by this criterion, the head of an adpositional phrase would be the nominal, not the adposition, and auxiliary verbs would not be heads either. Nichols (1986) mentions the criteria of government, subcategorization, and category determination, but she does not explain these further. After Zwicky (1985) and Corbett et al. (1993), there have been few general discussions of the notions of head and dependent by advocates of these notions, and no consensus has been reached.[12] Croft (1996; 2001, Ch. 7) provides a thorough discussion of syntactic headhood and concludes that it is not a coherent concept that can be applied consistently. The later history of generative grammar has of course extended the use of the "head" concept (though not the use of the "dependent" concept) enormously, by introducing a large number of functional and entirely abstract heads, a development that has muddied the waters further.

Thus, nobody knows how to identify heads and dependents in such a way that other linguists would agree, even if only agreement in broad terms is aimed for. It seems that there is no good foundation for building any larger generalizations on these notions.[13]

The advantage of the notions of flagging and indexing is thus clear: They are not based on unclear concepts, but on concepts such as "verb", "noun", "nominal", "argument", "possessor", which are clearly defined by their semantic cores. If head-

marking were confined to the notions of "head verb" in a clause and "head noun" in a nominal, as seems to be the case in more recent work by Nichols & Bickel (see section 5), then the problems with a general "head" notion would not arise, and head-marking would become more similar to indexing.

7 The function of syntactic relation markers

Another issue with the head/dependent marking typology is that it is quite unrelated to functional considerations, whereas the indexing and flagging notions are functionally grounded. As a reviewer notes, this is not a strong argument against the head/dependent-marking distinction – it could be that both concept pairs play a role in typology, the more abstract head/dependent marking and the more functionally grounded indexing/flagging. But as I noted in §1, it is not my purpose to demolish the head/dependent distinction. My primary goal is to highlight some of the differences between the two concept pairs.

As is nicely explained by Lehmann (1983; 1985), syntactic relations are best thought of as grounded in the semantic relationality of the basic elements that are combined in syntax. In expressions such as (16) and (17), there is one element that is semantically relational or incomplete (printed in boldface), and thus requires (and lets the hearer expect) another element. Verbs (see 16a) require arguments (mostly subjects and objects), and inalienable possessed nouns (see 16b) require an adpossessor (adnominal possessor).

(16) verbs and nouns taking arguments
    a. *Lia* – [ ]***chased***[ ] – *Rob*   (verbal arguments)
    b. *Pat's* – [ ]***father***   (adpossessor argument)

Adjectival modifiers (see 17a) require a noun to modify (a modificatum), and adverbial modifiers (in 17b) require a verb to modify.

(17) modifiers taking modificata
    a. ***cold***[ ] – *water*   (adjectival modifier)
    b. *run* – [ ]***quickly***   (adverbial modifier)

In (16) and (17), empty slots of relational elements are symbolized by "[ ]", and syntactic relations are shown by a dash. Nouns such as *Lia*, *Pat* and *water* and are absolute, and thus do not require anything to fill a slot. The syntactic relations come about when a relational element is combined with a non-relational element, or with an element whose slots are filled otherwise (e.g. *Pat's father chased Lia*).

Lehmann distinguishes between "government" relations, as in (16), and modification relations, as in (17). They are easy to distinguish, because the "governees" (or arguments) are nominals, while the modificata are nouns (within the same nominal) or verbs. I agree with Lehmann that these are the two basic syntactic relations, though I talk about argument relations instead of "government".[14]

With these concepts in place, we can now ask how the argument relations and modification relations are coded in grammars. One difference between argument relations and modification relations is that there may be multiple arguments of a single verb or noun, while a modifier has only a single modificatum (cf. Lehmann 1983; 1985). Hence, for arguments, it is useful to have markers that serve as ROLE-IDENTIFIERS. For modifiers, by contrast, it is sufficient if the marking shows that the

modifier and the modificatum belong together. Languages like to do this via CONCORDANTS (concord markers), i.e. grammatical elements that reflect a feature of an associated element (traditionally known as "attributive agreement markers"). Three example sentences illustrating the coding of argument and modification relations are given in (18)-(19).

(18)   a1.   Swahili: role-identifiers SBJ and OBJ (indexes)
             ni-li-ku-ona
             1SG.SBJ-PST-2SG.OBJ-see
             'I saw you.'

(18)   a2.   Latin: role-identifiers NOM and ACC (flags)
             Marc-us   *Tit-um*   *vidi-t.*
             Marcus-NOM   Titus-ACC   saw-3SG
             'Marcus saw Titus.'

(18)   b1.   Arabic: role-identifier POSS (index)
             kitaabu-hu
             book-3SG.POSS
             'his book'

(18)   b2.   Lezgian: role-identifier GEN (flag)
             Zamira-din   *k'waler*
             Zamira-GEN   house
             'Zamira's house'

(19)   German: concordant N.SG
       a.   *kalt-es*   *Wasser*
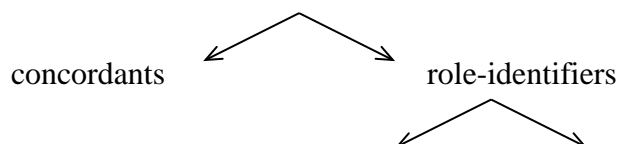   cold-N.SG   water(N).SG
            'cold water'

(19)   b.   English: concordant PL
            these   *tree-s*
            this.PL   tree-PL

Role-identifiers must occur on the arguments, because it is the arguments that can occupy diverse roles. For concordants, it is less clear where they should occur, on the modifier or on the modificatum. But we know what languages often do: They group nouns into gender classes (Corbett, 1991), which are reflected on their modifiers via concordants attached to them.[15]

From this functional point of view, the main bifurcation in grammatical marking is thus between role-identifiers and concordants, not between head-located markers and dependent-located markers. Within the group of role-identifiers, we can further distinguish between indexes and flags, as visualized in (20).

(20)   syntactic relation markers

concordants   role-identifiers

<center>indexes   flags</center>
<center>(bound person markers)   (case-markers and adpositions)</center>

A similar point has been made by Croft (1988, p. 174; 2001, section 5.4.1), who distinguishes between INDEXICAL and RELATIONAL coding of syntactic dependencies, and by Plank (1995, section 3.1), who distinguishes between RELATEDNESS-INDICATION (= indication of belonging together via a concordant on the modifier) and RELATIONSHIP-IDENTIFICATION (= role-identification).[16]

In the following two subsections (sections 8-9), we will see how these considerations help us understand significant differences between head/dependent marking and indexing/flagging.

8   Indexing does not include construct markers

In Nichols's work since 1986, construct markers in adpossessive constructions have consistently been included in head-marking. A CONSTRUCT MARKER is a grammatical marker that occurs on a possessed noun and indicates that it has an adpossessor, as illustrated in (21) (see Creissels, 2009a for general discussion). Hebrew and Anejom show a construct suffix, while construct marking happens by stem change in Mende.

(21)   construct-marking adpossessive constructions
    a.   Hebrew
       tmuna-t   *ha-yalda*   (cf. *tmuna* 'picture')
       picture-CSTR   DEF-girl
       'the girl's picture'

(21) b.   Mende
       ndopó-i   *loko-í*   (cf. *tokó* 'arm')
       child-DEF   CSTR.arm-DEF
       'the child's arm' (Creissels, 2009a, p. 80)

(21) c.   Anejom (Oceanic)
       risi-i   *di?*
       mother-CSTR   who
       'whose mother?'
             (Lynch, 2000, p. 58; discussed in Lichtenberk, 2009a, p. 256)

A construct marker is thus a kind of head-marker, but from the functional point of view (section 7), it is neither a concordant, as it does not reflect any class feature, nor a role-identifier, as it occurs on the possessed noun, which bears no particular role in the adpossessive construction. It is thus neither an index nor a flag.[17]

Construct markers indicate the possessive relation, but in a less than ideal way. It is thus not surprising that construct markers are fairly rare in the world's languages. One can of course include them in the same category of markers as indexes (role-identifying bound person markers on the possessed noun), but the two have nothing in common apart from their location on the possessed noun.

9   Flagging does not include concordants

Another kind of marker that has a somewhat unclear position in the typology is CONCORDANTS on attributive adjectives (as in German *kalt-es Wasser*, 19a above), as well as on other adnominal modifiers. Concordants were included in the category of dependent-markers by Nichols (1986, p. 60; 1992, p. 50).

However, concordants are very different from flags, which form the bulk of dependent markers. They do not occur on arguments, but on modifiers, and they do not identify the role of the adjective (or other adnominal modifier). Thus, they have nothing in common with flags, except that both are located on the "dependent", if one wants to group modifiers together with arguments as "dependents" (for which there are no really good reasons, as we saw in section 6).

Nichols (1986, p. 61; 1992, p. 51) tried to establish a parallel between adjective-noun constructions and argument-verb constructions by claiming that both can be either dependent-marked or head-marked. As head-marked adjective-noun constructions, she cites the Persian Ezafe construction (e.g. *kûh-e boland* [mountain-EZ high] 'high mountain') and a similar construction from the Salishan language Shuswap. But this construction type is extremely rare, and at least in Persian, there seems to be no syntactic evidence that the marker *-e* is in fact postposed to the noun, and not preposed to the adjective (*kûh e-boland*), because it never occurs when the adjective does not follow the noun overtly.[18] Thus, we do not even have particularly good evidence that a construct-type strategy even exists in adjective-noun constructions.

Rießler (2016, p. 41-42) claims that in addition to construct-state markers on nouns modified by adjectives, languages may have ANTI-CONSTRUCT STATE markers on attributive adjectives which do not occur on predicative adjectives (e.g. Kildin Saami *ēl'l'-es' pērrht* [tall-ATTR house] 'a tall house'). These would be dependent-markers on adjectives that are not concordants, but again they are very different from flags.

One may suspect that the important differences between concordants on modifiers and flags were recognized by Nichols herself, because adjectives and their marking are not mentioned in the 2005 *WALS* chapters by Nichols & Bickel. In this way, Nichols herself seems to have moved away from a strictly locus-based typology to something more similar to the indexing/flagging distinction.

10   The notion of indexing solves a serious problem with head marking

As I already noted in Haspelmath (2013, section 7), the concept of head-marking in constructions like (22) is sensible only if the nominals *payum* 'men' and *narmaŋ* 'women' occur overtly. In such a case, one could indeed say that "the morphological marker of the syntactic relation is attached to the head of the constituent" (Nichols 1992, p. 49), i.e. to the verb.

(22)   Yimas
     Payum   *narmaŋ*   *na-mpu-tay.*
     man.PL   woman.SG   3SG.PAT-3PL.AG-see

'The men saw the woman.' (Foley, 1991, p. 193)

But conominals need not occur in Yimas, as in the overwhelming majority of languages with person indexing of verbal arguments. The sentence in (23), without any conominal, is perfectly grammatical.

(23)   *Na-mpu-tay.*
        3SG.PAT-3PL.AG-see
        'They saw her.'

Here it would be very strange to say that the person prefixes are "morphological markers of the syntactic relation", because the person prefixes express the arguments on their own. It is the arguments themselves that occur on the head, not any "relation markers" that would be somehow distinct from the arguments.

   One might of course try to save the view that head-marking person forms are relation markers by saying that the real arguments are zero pronouns which are syntactically present but not overtly pronounced (i.e. that the arguments have been "pro-dropped", or are "null pronouns", as in the virtual-agreement view mentioned in §4 above), but the primary motivation for this would seem to be to make Yimas-type languages look more like German or English.[19] I see this as a serious flaw of the head-marking view.

   A much simpler view of cross-indexes like the Yimas prefixes in (22)-(23) is that they express the arguments, and that the nominals in (22) are conominals that jointly express the arguments, i.e. that such sentences involve double expression of arguments (Haspelmath, 2013, section 5.4). If this view is adopted, it is no longer possible to regard constructions like (22) as situations where the syntactic relation is "marked on the head", i.e. the mirror-image view of head and dependent marking breaks down.

   On the conventional view, is tempting to say that dependent-markers *express* syntactic roles, while head-markers merely *point to* the arguments by agreeing with them in person, number and gender. But this would not do justice to person indexes. As is already implicit in the taxonomy in (20), person indexes are role-identifiers as well, not merely concordants like adjectival gender markers. This can be seen in the glosses of the person indexes in (24)-(27), which are not limited to person-number combinations (3SG, 3PL, 1SG, 2SG, 3SG), but also code role information (PAT, AG, SBJ, OBJ, POSS)

(24)   Yimas
        Na-mpu-tay.
        3SG.PAT-3PL.AG-see
        'They saw her.'

(25)   Swahili
        ni-li-ku-ona
        1SG.SBJ-PST-2SG.OBJ-see
        'I saw you.' (= 18a1)

(26)   Yucatec Maya
        u   k'àaba'
        3SG.POSS   name
        'his name' (cf. 5a)

(27) Manam (Oceanic)
      dí-te-a
      3PL.SBJ.RL-see-1SG.OBJ
      'they saw me' (cf. 4c)

These examples are not in any way unusual: Much more often than not, person indexes carry information about the role of the argument (especially agent or patient, subject or object, or possessor). It is true that possessor indexes are often identical to agent or patient indexes (Siewierska, 1998), but since the possessor indexes occur on nouns, this does not lead to any problems in role identification. There are some cases where subject and object indexes are identical in shape and distinguished only by position (as is the case for most of the person prefixes in Swahili, 5a), but this is not typical.

Thus, one might even be tempted to say that role-identifying person indexes have "flagging included in them". For example, Yimas *na-* could be seen as a person form "combined with a patient-marking flag". This would not be completely wrong, and the difference between Yucatec Maya *u* 'his' (a proclitic possessive index) and Russian *ego* 'his' (a nonclitic possessive pronoun) is only that *u* is a bound element, while *ego* is a free element. However, in the framework of comparative concepts that is presented here, this is not possible, because flags occur by definition on nominals, and person indexes are not nominals (again by definition, because nominals must be free forms). One might of course choose different comparative concepts, but it seems to me that the current set gives the best match with existing terminology, while at the same time being fully coherent.[20]

11   Conclusion

In this paper I have discussed the relation between the comparative concept pair *head/dependent marking* (Nichols, 1986; 1992) and the closely related concept pair *indexing/flagging*. I have given clear definitions of the latter and pointed out some difficulties with the former. In particular, the abstract notion of "head" is not well-defined, and there does not seem to be a good reason to base one's typology on the place of the marker, rather than on the function, as argued by Lehmann (1983; 1985) and Croft (1988; 2001). By contrast, flags and indexes can be readily characterized as role-identifiers (pure role-markers on nominals, and role-markers combined with person markers, respectively), as opposed to concordants (adnominal "agreement" markers), which only serve to indicate relatedness and have no role-identifying function (section 7).

The idea that a language may holistically be characterized as "head marking" or "dependent marking" is by now fairly widespread, but in fact, given the rarity of construct markers (section 8) and the low profile of gender/number concordants (section 9) in the relevant discussions, it seems that such holistic characterizations can usually be replaced by "indexing-prominent" and "flagging-prominent", respectively.

As I noted at the beginning, my primary interest is in identifying grammatical universals. In this paper, I have not really made progress toward this goal, though I already noted in Haspelmath (2013) that the notion of indexing is a crucial ingredient to a number of universals. I would expect that due to the greater clarity of the concepts

of indexing and flagging, it will be easier to state and test universals based on these notions than to state and test universals based on head/dependent marking. I would be proven wrong if it were shown, for example, that dependent-marking in attributive adjectives (as in *kalt-es Wasser* 'cold water') correlates significantly with dependent-marking of other types. And I would be wrong if it could be shown that some universal generalizations make crucial reference to the distinction between adpositions and case-markers (however it is drawn). But this is a topic for future research.

Acknowledgement

Abbreviations (apart from those in the Leipzig Glossing Rules)

AG   agent
CSTR construct form
DUR   durative
PAT   patient
RL   realis

Notes

¹ Helmbrecht (2001) is a useful overview article, but it does not discuss possible alternatives to Nichols's typology.

² In a typological context, the term *flag* was first used in Haspelmath (2005), adopted from the Relational Grammar literature (e.g. Aissen, 1987, p. 11). Since the edited volumes Malchukov et al. (2010) and Malchukov & Comrie (2015), the terms *flagging* and *indexing* have become better known and more widely adopted. Other general terms comprising both case-markers and adpositions that were proposed earlier (but did not catch on) are *NP-marker* (Andrews, 1985, section 1.2.2) and *relator* (e.g. Dik, 1983).

³ In a language-particular context, there is often no problem because in some languages two different descriptive categories can be easily distinguished. Thus, in Czech, Prepositions always precede their complement nominal, while Case-markers always follow the host noun. (Recall that the proposals of this paper concern exclusively comparative concepts for language typology.)

⁴ Another terminological strategy that has been employed is to use the term *case-marker* (and *case-marking*) as a cover term for both case and adpositions (e.g. Siewierska (2004, p. 47): "case marking may be analytic via adpositions, synthetic via affixes or suprasegmental via tone or stress"; Croft (2001, p. 199): "Relational morphemes include case markers (including adpositions) ..."). But such non-transparent terminology is confusing and should be avoided if possible.

⁵ However, some generative grammarians have also argued for conflating cases and adpositions in a single category (e.g. Asbury et al., 2007).

⁶ Moreover, flags that are traditionally regarded as adpositions may also show complex behaviour. For example, French has a rule saying that Masculine country names take the Preposition *à* to convey a locative sense (e.g. *au Togo* 'in Togo'), while Feminine country names take the Preposition *en* (e.g. *en Chine* 'in China'). Here, a feature-based approach would seem to be required by Corbett's criteria, with an abstract value LOCATIVE that is realized by *à* or *en* depending on the morphosyntactic context.

⁷ As with second-position flags that are sometimes called *inpositions*, cf. Dryer (2005, p. 346).

⁸ See Haspelmath (2014) for some discussion of Van Valin's paper.

⁹ Note that I use *(person) index* only for person forms (when they are bound), not for other bound elements that may play a similar role. Thus, Russian has gender-number markers on past-tense verbs (e.g. *deti igra-l-i* [children play-PST-PL] 'the children played'), which are traditionally called "agreement markers", but these do not contain person information and are therefore not indexes.

¹⁰ Note that French *tu* is not an independent personal pronoun, unlike Spanish *tú* and German *du*, in that it cannot occur on its own (though it has of course the same diachronic source as Spanish *tú*). It is a preposed person index, as indicated by the clitic boundary symbol in (13c).

¹¹ The literature often mentions the fact that *toi tu veux* [you 2SG want] is quite normal in colloquial French, but in the standard language, the closest counterpart is a dislocation construction (*toi, tu veux* 'you, you want'), with an additional extraclausal element (which does not count as a conominal).

¹² The lack of consensus concerning criteria for head status is illustrated by the controversy between Palmer & Brown (2007) and Lichtenberk (2009a) about the head status in Oceanic adpossessive constructions.

¹³ Until the early 1990s, many linguists thought that head-dependent relations were relevant for explaining the Greenbergian word order correlations, but since Dryer (1992) and Hawkins (1994), it has become clear that branching direction, not head-dependent relations, offers a suitable general concept for explaining the word order correlations. Thus, the concepts of head and dependent are dispensable for typology.

¹⁴ The term *government* is more commonly used for the subset of argument relations in which the verb determines the way in which the argument is flagged, e.g. when one says that a verb governs a dative argument (cf. Lehmann, 1983, p. 351; Kibort, 2010, Section 4.2.3)

¹⁵ They do not group modifiers into modifier classes reflected on concordants attached to modified nouns – presumably because nouns come in a much greater variety than modifiers, and this variety is often very salient (especially sex-based gender, but also animacy and shape). This explanation is of course quite speculative, but I find it plausible enough to mention it in this footnote (note also that the most frequent modifiers are demonstratives and articles, not adnominal adjectives, and demonstratives come in even less variety than adjectives).

[16] Nichols (1992, pp. 48-49) similarly distinguishes between markers that INDEX features of one word on another (= concordants), and markers that CODE syntactic roles (= role-identifiers), but she does not spell out how these relate to head/dependent marking. (Note that Nichols uses the term *indexing* in a rather different sense, more like concord or agreement, not like *indexing* in (7). For "indexing" in Nichols's sense, see also Evans & Fenwick, 2013.)

[17] Nichols (1986, p. 58; 1992, p. 49) says that such markers "simply REGISTER the presence of syntactic dependency".

[18] Moreover, the Ezafe marker also occurs between a postnominal adjective and another postnominal modifier, as in *mardom e xašmgin e Tehrân* [people EZ angry EZ Tehran] 'the angry people of Tehran' (Samvelian, 2007, p. 610), i.e. it is by no means restricted to "marking the head".

[19] Nichols (1992, p. 48) seems to adopt the virtual-agreement view when she says that in a construction like Latin *am-o* [love-1SG] 'I love', the person suffix "indexes certain features of one word on another". (See Haspelmath, 2013, section 7 for further discussion).

[20] While flags thus cannot occur "inside indexes", they can occur inside other flags. In older Indo-European languages, adpositions (= a kind of flag) may require a particular case-marker (= another kind of flag), as in Latin *cum amic-is* [with friend-PL.ABL] 'with the friends', where the prepositional flag *cum* requires the Ablative flag on the complement nominal. This is not unlike the prepositional flag *because* in English, which requires the flag *of* on the complement nominal (e.g. *because of the friends*). And occasionally, indexes may occur inside flags, as in Welsh *amdan-a i* [for-1SG me] 'for me', *amdan-o fe* [for-3SG him] 'for him' (King, 1993, p. 272) (see Bakker, 2005 for the world-wide distribution of such "adpositions with person indexing"). Strictly speaking, these cases require a modification of the definitions given in (6)-(7), but since they are not prominent, I have left the definitions as they are now, for ease of comprehension.

References

Aissen, Judith L. (1987). *Tzotzil clause structure* (Studies in Natural Language and Linguistic Theory, 7). Dordrecht: Reidel.

Andrews, Avery. (1985). The major functions of the NP. In Timothy Shopen (Ed.), *Language typology and syntactic description* (vol. 1, pp. 62–154). Cambridge: Cambridge University Press.

Asbury, Anna, Gehrke, Berit, & Hegedűs, Veronika. (2007). One size fits all: Prefixes, particles, adpositions and cases as members of the category P. In Cem Keskin (ed.), *UiL OTS Yearbook 2006*, 1–17. Utrecht: Utrecht Institute of Linguistics.

Baerman, Matthew & Brown, Dunstan. (2005). Case syncretism. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures,* 118–121. Oxford: Oxford University Press.

Baker, Mark C. (2013). On agreement and its relationship to case: Some generative ideas and results. *Lingua* (SI: Syntax and Cognition: Core Ideas and Results in Syntax) *130*, 14–32. doi:10.1016/j.lingua.2012.03.010.

Baker, Mark C. & Kramer, Ruth. (2014). Rethinking Amharic prepositions as case markers inserted at PF. *Lingua 145*, 141–172.

Bakker, Dik. (2005). Person marking on adpositions. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structure*, 198–201. Oxford: Oxford University Press. (http://wals.info/chapter/48).

Berghäll, Liisa. (2015). *A grammar of Mauwake* (Studies in Diversity Linguistics). Berlin: Language Science Press. http://langsci-press.org/catalog/book/67.

Blake, Barry J. (1994). *Case*. Cambridge: Cambridge University Press.

Comrie, Bernard. (2005). Alignment of case marking. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures*, 398–405. Oxford: Oxford University Press. (http://wals.info/chapter/98).

Corbett, Greville G. (1991). *Gender*. Cambridge: Cambridge University Press.

Corbett, Greville G. (2006). *Agreement*. Cambridge: Cambridge University Press.

Corbett, Greville G. (2012). *Features*. Cambridge: Cambridge University Press.

Corbett, Greville G., Fraser, Norman M., & McGlashan, Scott (Eds.). (1993). *Heads in grammatical theory*. Cambridge: Cambridge University Press.

Creissels, Denis. (2009a). Construct forms of nouns in African languages. In David Nathan, Peter Sells, Peter K., Austin Oliver Bond & Monik Charette (Eds.), *Proceedings of Conference on Language Documentation and Linguistic Theory 2,* 73–82. London: SOAS.

Creissels, Denis. (2009b). Spatial cases. In Andrej Malchukov & Andrew Spencer (Eds.), *The Oxford handbook of case*, 609–625. Oxford: Oxford University Press.

Croft, William. (1988). Agreement vs. case marking in direct objects. In Michael Barlow & Charles A. Ferguson (Eds.), *Agreement in natural language: Approaches, theories, descriptions,* 159–180. Stanford: CSLI.

Croft, William. (1996). What's a head? In Johan Rooryck & Laurie Zaring (Eds.), *Phrase structure and the lexicon*, 35–75. Dordrecht: Kluwer.

Croft, William. (2001). *Radical construction grammar: Syntactic theory in typological perspective*. Oxford: Oxford University Press.

Dik, Simon C. (1983). Two constraints on relators and what they can do for us. In Simon C. Dik (Ed.), *Advances in Functional Grammar*, 267–298. Dordrecht: Foris.

Dixon, R. M. W. (2010). *Basic linguistic theory*. Vol. 2. Oxford: Oxford University Press.

Dryer, Matthew S. (1992). The Greenbergian word order correlations. *Language 68*(1), 81–138.

Dryer, Matthew S. (2005). Order of adposition and noun phrase. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures*, 346–349. Oxford University Press. http://wals.info/chapter/85.

Evans, Nicholas & Fenwick, Eva. (2013). Marking versus indexing: Revisiting the Nichols marking-locus typology. In Balthasar Bickel, Lenore A. Grenoble, David A. Peterson & Alan Timberlake (Eds.), *Language typology and historical contingency: In honor of Johanna Nichols*, 69–89. Amsterdam: Benjamins.

Foley, William. (1991). *The Yimas language of New Guinea*. Stanford: Stanford University Press.

Foley, William A. & Van Valin, Robert D. (1985). Information packaging in discourse. In Timothy Shopen (Ed.), *Language typology and syntactic description* (vol. 1, pp. 282–364). Cambridge: Cambridge University Press.

Greenberg, Joseph H. (1963). Some universals of grammar with particular reference to the order of meaningful elements. In Joseph H. Greenberg (Ed.), *Universals of language*, 73–113. Cambridge, MA: MIT Press.

Haspelmath, Martin. (2005). Argument marking in ditransitive alignment types. *Linguistic Discovery 3*(1), 1–21.

Haspelmath, Martin. (2007). Pre-established categories don't exist: Consequences for language description and typology. *Linguistic Typology 11*(1), 119–132.

Haspelmath, Martin. (2011). The indeterminacy of word segmentation and the nature of morphology and syntax. *Folia Linguistica 45*(1), 31–80.

Haspelmath, Martin. (2013). Argument indexing: A conceptual framework for the syntax of bound person forms. In Dik Bakker & Martin Haspelmath (Eds.), *Languages across boundaries: Studies in memory of Anna Siewierska*, 197–226. Berlin: De Gruyter Mouton.

Haspelmath, Martin. (2014). How different are head-marking constructions? *Diversity Linguistics Comment*. http://dlc.hypotheses.org/682.

Haspelmath, Martin. (2015). Defining vs. diagnosing linguistic categories: A case study of clitic phenomena. In Dorota Klimek-Jankowska & Krzysztof Migdalski Joanna Błaszczak (Eds.), *How categorical are categories? New approaches to the old questions of noun, verb and adjective,* 273–303. Berlin: De Gruyter Mouton.

Hawkins, John A. (1994). *A performance theory of order and constituency*. Cambridge: Cambridge University Press.

Hays, David G. (1964). Dependency Theory: A formalism and some observations. *Language 40*(4), 511–525. doi:10.2307/411934.

Helmbrecht, Johannes. (2001). Head-marking vs. dependent-marking languages. In Wulf Oesterreicher, Wolfgang Raible, Martin Haspelmath & Ekkehard König (Eds.), *Language typology and language universals: An international handbook* (vol. 2, pp. 1424–1432). Berlin: Mouton de Gruyter.

Iggesen, Oliver A. (2005). Number of cases. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures*, 202–205. Oxford: Oxford University Press. http://wals.info/chapter/49.

Jackendoff, Ray. (1977). *X-bar syntax: A study of phrase structure*. Cambridge, MA: MIT Press.

Kibort, Anna. (2010). Towards a typology of grammatical features. In Anna Kibort & Greville G. Corbett (Eds.), *Features: Perspectives on a key notion in linguistics,* 64–106. Oxford: Oxford University Press.

King, Gareth. (1993). *Modern Welsh: A comprehensive grammar*. London: Routledge.

Lazard, Gilbert. (1998). *Actancy*. Berlin: Mouton de Gruyter.

Lehmann, Christian. (1983). Rektion und syntaktische Relationen. *Folia Linguistica 17*(1–4), 339–378.

Lehmann, Christian. (1985). On grammatical relationality. *Folia Linguistica 19*(1–2), 67–110. doi:10.1515/flin.1985.19.1-2.67.

Lehmann, Christian. (2002). *Possession in Yucatec Maya* (ASSidUE 10). 2nd edition Erfurt: Universität Erfurt. http://www.christianlehmann.eu/publ/ASSidUE10.pdf.

Lestrade, Sander. (2015). A case of cultural evolution: The emergence of morphological case. *Linguistics in the Netherlands 32*(1), 105–115. doi:10.1075/avt.32.08les.

Lichtenberk, František. (1983). *A grammar of Manam*. Honolulu: University of Hawaii Press.

Lichtenberk, Frantisek. (2008). *A grammar of Toqabaqita*. Berlin: Mouton de Gruyter. http://site.ebrary.com/id/10256571 (15 April, 2016).

Lichtenberk, Frantisek. (2009a). Attributive possessive constructions in Oceanic. In William McGregor (Ed.), *The expression of possession*, 249–291. Mouton de Gruyter.

Lichtenberk, Frantisek. (2009b). Oceanic possessive classifiers. *Oceanic Linguistics 48*(2), 379–402. doi:10.1353/ol.0.0054.

Lynch, John. (2000). *A grammar of Anejoм̃* (Pacific Linguistics). Canberra: Australian National University. http://dx.doi.org/10.15144/PL-507.

Malchukov, Andrej L. & Comrie, Bernard (Eds.). (2015). *Valency classes in the world's languages*. 2 vols. Berlin: De Gruyter Mouton.

Malchukov, Andrej L., Haspelmath, Martin & Comrie, Bernard (Eds.). (2010). *Studies in ditransitive constructions: A comparative handbook*. Berlin: De Gruyter Mouton.

Martin, Jack B. (2011). *A grammar of Creek (Muskogee)*. Lincoln: University of Nebraska Press. (19 July, 2016).

Nichols, Johanna. (1986). Head-marking and dependent-marking grammar. *Language 62*(1), 56–119.

Nichols, Johanna. (1992). *Linguistic diversity in space and time*. Chicago: The University of Chicago Press.

Nichols, Johanna & Bickel, Balthasar. (2005a). Locus of marking in possessive noun phrases. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures*, 102–105. Oxford: Oxford University Press. http://wals.info/chapter/24.

Nichols, Johanna & Bickel, Balthasar. (2005b). Locus of marking in the clause. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures*, 98–101. Oxford: Oxford University Press. http://wals.info/chapter/23.

Nichols, Johanna & Bickel, Balthasar. (2005c). Locus of marking: Whole-language typology. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures*, 106–109. Oxford: Oxford University Press. http://wals.info/chapter/25.

Palmer, Bill & Brown, Dunstan. (2007). Heads in Oceanic indirect possession. *Oceanic Linguistics 46*(1), 199–209. doi:10.1353/ol.2007.0022.

Plank, Frans. (1995). (Re-)introducing Suffixaufnahme. In Frans Plank (Ed.), *Double case: Agreement by Suffixaufnahme,* 3–110. New York: Oxford University Press.

Rießler, Michael. (2016). *Adjective attribution* (Studies in Diversity Linguistics 2). Berlin: Language Science Press. http://langsci-press.org//catalog/book/19.

Samvelian, Pollet. (2007). A (phrasal) affix analysis of the Persian Ezafe. *Journal of Linguistics 43*, 605–645.

Schachter, Paul. (1985). Parts-of-speech systems. In Timothy Shopen (Ed.), *Language typology and syntactic description* (vol. 1, pp. 3–61). Cambridge: Cambridge University Press.

Siewierska, Anna. (1998). Nominal and verbal person marking. *Linguistic Typology 2*(1), 1–56.

Siewierska, Anna. (1999). From anaphoric pronoun to grammatical agreement marker: Why objects don't make it. *Folia Linguistica 33*(1–2), 225–252.

Siewierska, Anna. (2004). *Person*. Cambridge: Cambridge University Press.

Siewierska, Anna & Bakker, Dik. (2009). Case and alternative strategies: Word order and agreement marking. In Andrej Malchukov & Andrew Spencer (Eds.), *The Oxford handbook of case*, 290–303. Oxford: Oxford University Press.

Spencer, Andrew. (2008). Does Hungarian have a case system? In Greville Corbett & Michael Noonan (Eds.), *Case and grammatical relations: Studies in honor of Bernard Comrie*, 35–56. Amsterdam: Benjamins.

Spencer, Andrew. (2009). Case as a morphological phenomenon. In Andrej Malchukov & Andrew Spencer (Eds.), *The Oxford handbook of case*, 185–199. Oxford: Oxford University Press.

Spencer, Andrew & Otoguro, Ryo. (2005). Limits to case: A critical survey of the notion. In Mengistu Amberber & Helen de Hoop (Eds.), *Competition and variation in natural languages: The case for case*, 119–145. Oxford: Elsevier.

Tesnière, Lucien. (1959). *Eléments de syntaxe structurale*. Paris: Klincksieck.

Van Valin, Robert D. (2013). Head-marking languages and linguistic theory. In David A. Peterson, Alan Timberlake, Balthasar Bickel, Lenore A. Grenoble (Eds.), *Language typology and historical contingency: In honor of Johanna Nichols,* 91–123. Amsterdam: Benjamins.

Watters, David E. (2002). *A grammar of Kham*. Cambridge: Cambridge University Press.

Wilbur, Joshua. (2014). *A grammar of Pite Saami* (Studies in Diversity Linguistics 5). Berlin: Language Science Press. http://langsci-press.org//catalog/book/17.

Zwicky, Arnold M. (1985). Heads. *Journal of Linguistics 21*(1), 1–29.

Zwicky, Arnold M. (1992). Jottings on adpositions, case inflections, government, and agreement. In Diane K. Brentari, Gary Larson & Lynn MacLeod (Eds.), *The joy of grammar: A Festschrift in honor of James D. McCawley*, 369–383. Amsterdam: Benjamins.