78. Semantics of Inflection

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This article presents a typology of inflection and discusses recent work on the semantics of number, person, gender, case, and evidentiality. Cross-linguistic evidence is brought to bear on the relationship between inflections and lexical classes and the typology of semantic case, and motivates an analysis of number inflections as expressing associative meanings. The article addresses semantic markedness in number, person and case paradigms, and analyses of inflections at the syntax-semantics interface.

1. Inflectional categories

This article presents a typology of inflection and discusses recent work on the semantics of number, person, gender, case, and evidentiality. Separate articles in the handbook cover the semantics of other inflections, including tense (articles 57 *Tense* and 98 *Tense and aspect: Time across languages*), mood (article 50 *Verbal mood*), aspect (articles 48 *Aspectual class and Aktionsart*, 49 *Perfect and progressive* and 98 *Tense and aspect: Time across languages*), and definiteness (article 41 *Definiteness and indefiniteness*).

Inflectional morphemes assign values of functional features, whereas derivational morphemes form new lexical items. Thus, inflectional morphemes are bound functional heads (or their morphological equivalents, in lexicalist theories), while derivational morphemes are bound lexical heads. This basic distinction accounts for a characteristic cluster of properties given in Table 1 that distinguish derivation and inflection (see also article 79 *Semantics of derivational morphology*).

From a semantic perspective, inflections are a heterogeneous set. Jakobson (1985) noted that inflectional categories are intrinsically related to specific word classes (see section 2.4 below). He proposed a set of semantically defined features into which inflectional categories are decomposed. Each feature is binary and privative, i.e. has a positively characterized MARKED value and a negatively character-

Inflection	Derivation
Specifies functional features	Forms new lexical items
Endocentric (non-category-changing)	May be exocentric
Typically outside derivation	Closer to stem
Typically paradigmatic	Often non-paradigmatic
Non-recursive	May be recursive
Portmanteau morphemes occur	No portmanteau morphemes
Assigned by government and agreement	Not assigned syntactically

Table 1: Inflection versus derivation

ized UNMARKED (default) value, forming a two-point Horn (1989) scale. Jakobson (1957/1971: 136) puts semantic markedness this way:

> The general meaning of a marked category states the presence of a certain property A; the general meaning of the corresponding unmarked category states nothing about the presence of A and is used chiefly but not exclusively to indicate the absence of A.

On this view, morphological markedness is grounded in semantics, but has consequences in syntax, morphological form, and even in phonology. The most important formal reflex of markedness is that exponents of marked categories tend to be more complex and have a more restricted distribution. The convergence of

semantic and formal markedness is widely assumed in grammatical theories (cf. the Monotonicity Hypothesis, Koontz-Garboden 2007).

Jakobson's analysis has four primitives: the speech event (E^s), the speech participants (P^s), the narrated eventuality (E^n, i.e. the eventuality denoted by an utterance) and the participants of the narrated eventuality (P^n); see Emonds (1985, ch. 5) for an alternative approach. These primitives combine to define three binary features:

(1) a. PARTICIPANT-ORIENTED (involves P^n) vs. NOT PARTICIPANT-ORIENTED.

b. CONNECTOR (connects two narrated items, e.g. E^nE^n) vs. DESIGNATOR.

c. SHIFTER (or DEICTIC, P^s or E^s, refers to the speech event) vs. NON-SHIFTER.

The three features cross-classify to specify the eight verbal categories in Table 2.

	P involved		*P not involved*	
	Designator	*Connector*	*Designator*	*Connector*
Non-shifter	P^n (gender, number)	P^nE^n (voice)	E^n (status, aspect)	E^nE^n (taxis)
Shifter	P^n/P^s (person)	P^nE^n/P^s (mood)	E^n/E^s (tense)	E^nE^{ns}/E^s (evidential)

Table 2: Jakobson's (1957:136) classification of Russian verbal inflections

According to this classification, gender and number characterize an eventuality participant P^n, and person characterizes an eventuality participant P^n with respect

to a speech participant P^s. Status (affirmative, presumptive, negative, interrogative, ...) and aspect characterize an eventuality E^n, while tense characterizes an eventuality E^n with respect to the speech event E^s. Voice characterizes the relation between the eventuality E^n and its participants P^n, irrespective of E^s or P^s, while mood characterizes the relation between the eventuality E^n and its participants P^n with reference to the speech participants P^s. Taxis characterizes the relation between two eventualities E^n (dependent/relative tense, causality) and evidentiality characterizes the relation between two eventualities E^n (one a narrated speech event E^{ns}) with reference to the speech event E^s.

Not surprisingly, Jakobson's analysis requires revisions in the light of more recent findings of formal semantics, and the study of typologically diverse languages. Aspect is now often treated as a relation between the narrated event and the (contextually given) reference time (Reichenbach 1947; Kamp & Reyle 1993; Klein 1994) and evidentials encode "a speaker's (type of) *grounds* for making a speech act" (Faller 2002, 2). Inflections thought to pertain to a particular word class have been observed for others, such as tense/aspect for nouns, and number for verbs (section 2.4). Still, every one of the basic questions addressed by Jakobson remains on the agenda: Are inflectional categories universal? Which meanings do they express? How do these meanings combine, and how can they be categorized? Which inflectional categories are relevant to which word classes, and why?

Many of his answers remain appealing as well. Regarding the universality of inflectional categories, although Jakobson's structuralism privileges the obligatory inflections of a language, he recognized that unexpressed categories may play a covert role in the grammar (as evidentiality does in Russian, or definiteness in Finnish case assignment, see (**??**)). A more recent view holds that all languages specify the same functional categories, whether they are detectable in the grammar or not. Matthewson (2006), for instance, argues that tense meanings are observable in languages without overt tenses (but see e.g. Bohnemeyer 2002; Bittner 2005; Bittner 2008). This view has to be reconciled with the commonplace observation that adult language learners have considerable difficulty mastering inflectional distinctions that are not relevant in the grammar of their native language.

An attractive feature of Jakobson's theory of inflectional meanings is that it takes into account conventional meaning, the contribution made by contextual factors, and the relation between the two. Further, it makes predictions about the kinds of meanings realized by inflections. For instance, it excludes (correctly, it seems) inflections that denote a property of the speech event or a speech participant, inflections that denote a relation between two speech events, and "anti-shifters", i.e. inflections whose meaning is to characterize the speech event or a speech participant in relation to a narrated event or a participant of a narrated event.

Jakobson's approach to the classification and combinatorics of inflectional cat-

egories has also proved fruitful. For example, his natural classes predict relationship between gender and number, and in turn between these and person, a correct result as shown below. Finally, Jakobson's core formal proposal that all categories, including those usually treated as having three or more values, are built on binary features, and that these binary features are privative, has received increasing support in recent research, as outlined in section 2.2 below.

2. Person, number and gender

2.1 Semantic and structural features

The inflectional categories *person*, *number* and *gender* typically but not invariably encode semantic information about the speech act participants, the cardinality of the referent and the (biological) sex of the referent, respectively (cf. article 16 *Semantic features and primes*). In addition to semantic properties, phonological, morphological, and lexical factors also play a role in determining the inflectional class of nouns and pronouns. We therefore distinguish between semantic (or natural) and grammatical (or formal or syntactic) person, number and gender.

All gender systems are based wholly or in part on semantic categories (Aksenov 1984; Corbett 1991): the main semantic categories that determine gender are sex, animacy, humanness, and (ir)rationality. The grammatical genders of the German feminine noun *Frau* 'woman' and the masculine noun *Mann* 'man' correspond

to their respective semantic gender, i.e. to the sex of their referents, but grammatical and semantic gender do not always accord: e.g. the grammatically neuter noun *Kind* ‘child’ can refer to a female or male individual, and the masculine noun *Tisch* ‘table’ has an inanimate referent. The distribution of semantic versus grammatical agreement follows the following hierarchy (Corbett 1991, 237):

(2) attributive > predicate > relative pronoun > personal pronoun

In German, an attributive adjective agrees with its head in grammatical gender, but anaphoric reference to a grammatically neuter noun that refers to a female can be with the neuter pronoun *es* ‘it’ or with the feminine pronoun *sie* ‘she’.

(3) Ich sah das Mädchen. Es/Sie lief zur Schule.
I see.PAST the.NEUT girl.NEUT It/She went to school
‘I saw the girl. She went to school.’

Number can also be either grammatical or semantic. Pluralia tantum nouns like *scissors* and *pants* trigger plural agreement even if they refer to singular entities. Grammatically singular group designations such as *team* or names referred to teams can trigger plural agreement in British English.

(4) a. The scissors are pretty. / My pants are on fire.

b. India is/are leading by 316 runs.

Likewise, grammatical and semantic person do not always match. French *on* is grammatically third person but can refer to a first person group:

(5) On a été loyaux
pron.3 have.3 be.PART loyal
'We have been loyal'

2.2 Semantic features and markedness

2.2.1 Number and person

Traditional grammar treats number and person as orthogonal three-valued categories (singular/dual/plural number, first/second/third person), referring respectively to cardinality and speech act participation (Lyons 1968, 276; Cysouw 2003; Cysouw 2005). The following (somewhat naive) formulations capture this plausible idea up to a point.

(6) a. Singular number denotes atomic entities.

b. Dual number denotes a pair of entities.

c. Plural number denotes a groups of two or more entities (three or more if there is a dual).

(7) a. First person refers to a group which includes the speaker.

b. Second person refers to a group which includes the addressee but does not include the speaker.

c. Third person refers to a group which does not include a speech act participant.

It has long been understood that dual and plural number in pronouns have an associative interpretation (Jespersen 1924, 192; Benveniste 1966; Lyons 1968; Harley & Ritter 2002; Cysouw 2003; Cysouw 2005): First person dual and plural pronouns do not usually refer to a pair or chorus of speakers, but to a group that contains the speaker and some associates, i.e. one or more non-speakers. For example, *we* means 'I and the other people in some group' (which may be either implicit, or explicitly specified). Likewise, second person duals and plurals do not refer only to pairs or groups of addressees (regular plural) but also to groups containing at least one addressee plus other non-speaker individuals (associative plural). This much is captured by the formulations in (6) and (7), on the understanding that the cardinality of the group is determined by the number feature. Thus, first person singular *I* refers to the singleton group which includes the speaker, second person plural *you* refers to a group of more than one which includes at least one addressee but not the speaker; the associative reading is obtained when individuals other than addressees are included.

Two pieces of evidence show that this is not sufficient, that (6) and (7) are incorrect, and that a special semantics is required for the associative plural. The first piece of evidence is that the associative meaning is not restricted to pronouns. It also occurs in some languages in certain nominal duals and plurals, which denote not a set of two or more entities of the type denoted by the noun like the ordinary

dual and plural, but a group containing one such referent and something else which forms a natural or conventional pair or group with it (Cysouw 2003; Moravcsik 2003): Spanish *los reyes*, for example, means either 'the kings' or 'the king and the queen'.

(8) Hungarian associative plural *–ék* versus regular plural *–ok* (Moravcsik 2003)

a. *János-ék* 'János and associates'

b. *János-ok* 'the Jánoses' = 'people called János'

(9) Dyirbal associative dual *-gara* (Dixon 1972, 230f.).

a. burbula-gara banɨɲu
burbula-AssocDu come.PRES
'Burbula and another person are coming'

b. burbula-gara badibadi-gara banɨɲu
burbula-AssocDu badibadi-AssocDu come.PRES
'Burbula, being one of a pair, and Badibadi, being the other of the pair, are coming'

Even when the associative is not marked by a special morpheme, it may be available as an interpretation, e.g. for the Japanese plural morpheme *tati*:

(10) *sensei-tati* 'teacher-PL': (i) 'the teacher and his group', (ii) '(the) teachers'

The associative plural in nominals cannot be derived from the meaning of person in (7).

Still, associative duals/plurals occur only in nouns which are pronoun-like in that they without exception have a definite referent, and belong to a semantically restricted subclass, nearly always humans, and particularly often proper names, kin terms, or titles (Moravcsik 2003). The generalization is that the associative plural is available in a continuous segment from the top of the well-known "animacy" hierarchy (a better term would be INDIVIDUATION HIERARCHY) given in Figure 1 down to some point which varies within narrow limits from language to language.

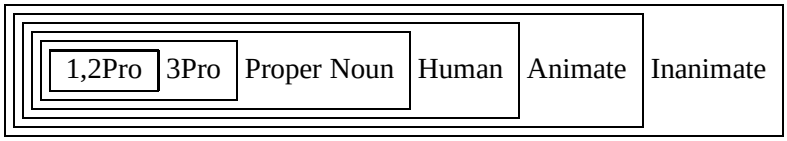

Figure 1: Individuation hierarchy

A number of other pronominal phenomena are known to spill over into high-animacy nouns in just this way. Kiparsky (2010) argues that nouns behave this way in virtue of N-to-D raising (or its lexicalist equivalent), which syntactically assigns them to the category Pronoun and semantically converts them from property-denoting to individual-denoting. A corollary is that languages in which the plural is marked *only* in pronouns (Corbett 2000, 61-66) can be characterized simply as languages that allow only an associative plural. On this assumption, the associative plural and dual apply to an expression *P* to yield maximal individuals that include the individual denoted by *P* as a part:

(11) a. $[\![plural_{assoc}(P)]\!]$ presupposes that P denotes a (possibly complex) individual. If defined, $[\![plural_{assoc}(P)]\!] = \iota y\ (y = \{[\![P]\!]\} \cup \{\ x \mid\ x \in [\![Q]\!] \wedge [\![Q]\!] \supset [\![P]\!]\})$ for some contextually given super-property Q of P

b. $[\![dual_{assoc}(P)]\!])$ presupposes that P denotes a (possibly complex) individual. If defined, $[\![dual_{assoc}(P)]\!]) = \iota y\ (y = \{[\![P]\!] + z \wedge [\![Q]\!] \supset [\![P]\!] \wedge z \in Atom([\![Q]\!] \setminus [\![P]\!]))\}$ for some contextually given super-property P of Q

(11a), when applied to a noun like *teacher* (which functions as a title when used with the associative dual/plural) denotes a group consisting of the teacher and a contextually relevant group. An expression of the form 'father-dual' denotes, according to (11b), a complex individual consisting of the father and an individual that is a member of an (immediate, contextually given) super-property Q, e.g. 'parent', resulting in the denotation 'the parents'.

Regular duals and plurals apply to *predicates* — in morphosyntactic terms to Ns rather than to DPs. One way of specifying the semantics of the plural and the dual is given in (12): the plural subtracts the atomic elements from the denotation of the (singular) predicate (which denotes a set consisting of atomic elements and all possible (non-empty) sets of atomic elements) and the dual denotes the set of sets of cardinality 2 in the denotation of P.

(12) a. $[\![plural]\!]([\![P]\!]) = [\![P]\!] \setminus Atom([\![P]\!])$

b. $[\![dual]\!]([\![P]\!]) = \{X | X \in [\![P]\!] \wedge |X| = 2\}$

The second piece of evidence for associative number comes from languages that distinguish inclusive and exclusive 'we', i.e. that have separate forms for 'I and you (and possibly others)' and 'I and a (possibly singleton) group that does not contain you', respectively. In languages that additionally have a dual/plural number contrast, the form denoting 'I and you' does not behave as an "inclusive dual" as (6) would have it, rather the form denoting 'I and you and one other' does (despite the fact that its cardinality is 3). In Weri, which is such a language, basing number on cardinality, as in Table 3, would yield no unified semantics for the ending *-ip* and would require positing a Trial number instantiated only in the inclusive:

	Singular	Dual	Trial	Plural
Inclusive	—	tepir	tëar-ip	tëar
Exclusive	ne	ten-ip	—	ten
Second	në	ar-ip	—	ar
Third	pë	pëar-ip	—	pëar

Table 3: Weri person/number paradigm (Daniel 2005:15)

Clearly *tepir* 'I and you' morphologically patterns with the *singular* pronouns, and *tëarip* 'I and you and one other' patterns with the *dual* pronouns. Since this

alignment cannot be reconciled with the cardinality-based semantics of the number categories in (6), it has been proposed that these languages have a different set of number categories: minimal, unit-augmented, and augmented, instead of singular, dual, trial, and plural. Minimal number denotes a set of minimum cardinality (two for the dual inclusive); unit-augmented number denotes a set minimally greater than that, and the augmented number denotes a set greater than unit-augmented (Greenberg 1988; Corbett 2000, 166; Daniel 2005). The resulting analysis of Weri is shown in Table 4. The ending *-ip* now has the homogeneous function of deriving unit-augmented number from augmented number.

	Minimal	Unit-augmented	Augmented
Inclusive	tepir	tëar-ip	tëar
Exclusive	ne	ten-ip	ten
Second	në	ar-ip	ar
Third	pë	pëar-ip	pëar

Table 4: Revised Weri person/number paradigm

The new number categories are unnecessary since the definitions of associative dual and plural in (11) already give the right semantics: minimal is singular (a possibly complex individual), unit-augmented is associative dual, and augmented is associative plural. The suffix *-ip* restricts the "augmentation" to a single individ-

ual. This reduction does more than just simplify the set of number categories. It also explains why the applicability of unit-augmented and augmented number is restricted to pronouns. See Wechsler (2004) for a radical reanalysis of the customary person/number paradigm as a pure person paradigm with singular and augmented categories.

To fit the inclusive/exclusive distinction into the person inventory we assume that the inclusive is a fourth person category, defined as reference to both the speaker and to the addressee (Noyer 1992). Because it bears two feature specifications, it is the most marked person. The exclusive is just first person, defined as reference to the speaker.

Person	feature specification
Inclusive	[+speaker, +addressee]
First	[+speaker]
Second	[+participant]
Third	[ ]

Table 5: Feature analysis of person

The revised features form a Horn scale (inclusive > first > second > third), which determines priority in pronominal reference and agreement, a desirable result because the hierarchy appears to be universal (Cysouw 2003; Cysouw 2005).

Being the most marked person, the inclusive blocks all other persons in the shared domain. First person blocks second person, and second person blocks third.

(13) a. Inclusive person refers to a group which includes the speaker and the addressee.

b. First person refers to a group which includes the speaker (and, when there is an inclusive person, excludes the addressee).

c. Second person refers to a group which includes a speech participant (and, when there is a first person, excludes the speaker).

d. Third person refers to any group (and, when there is a second person, excludes a speech participant).

It also follows that the inclusive is the person that is missing in reduced (three-person) systems such as that of English. Further, we get the right semantics for first person pronouns in such systems, or in those subparadigms of four-person systems that neutralize the inclusive/exclusive distinction.

2.2.2 The meanings of plural predicates

Plural expressions participate in a variety of meanings besides those illustrated above. English bare plurals receive interpretations with seemingly different quantificational forces: generic (14a), 'most' (14b) and existential (14c); cf. e.g. Carlson (1977); Chierchia (1998b); Krifka (2004) and articles 44 *Bare noun phrases* and

47 *Genericity*.

(14) a. Dogs are widespread.

b. Dogs are smart.

c. Dogs are barking.

According to Carlson, bare plurals uniformely denote names of kinds, e.g. *dogs* denotes the name of the dog-kind, and the verbal predicate that the bare plural combines with is responsible for its interpretation: Kind-level predicates such as *be widespread* apply directly to the kind denoted by the bare plural, resulting in a generic interpretation, whereas predicates such as *be smart* and *be barking* apply to (stages of) individuals that instantiate the kind. The denotation of the bare plural is semantically singular, but stage-level interpretations involve semantic plurality.

Bare plurals in the scope of a plural noun phrase may receive a 'dependent' plural interpretation (Chomsky 1975; de Mey 1981; Roberts 1991). Such interpretations are characterized by two properties: (i) the bare plural argument contributes an narrow-scope existential quantifier, and (ii) the truth of the sentence requires at least two distinct entities in the denotation of the bare plural (Zweig 2008). Thus, (15) has a dependent plural reading since (i) each unicycle has a wheel, and (ii) the truth of (15) requires there to be at least two wheels (of unicycles).

(15) Unicycles have wheels.

Dependent plurals have been analyzed as a case of cumulative readings (e.g. de Mey 1981; Roberts 1991; Beck 2000), related to the cumulative reading of examples like *Three women gave birth to five babies*, according to which the group of three women together gave birth to five babies. Since bare plurals in downward-entailing contexts do not entail semantic plurality, other authors propose that singulars entail singular reference and that plurality arises from higher-order scalar implicatures (e.g. Spector 2003; Zweig 2008).

Plural nouns also participate in collective and distributive interpretations. In (16a), the individuals denoted by *the fathers* collectively participate in the gathering, while each individual in the denotation of *the fathers* in (16b) individually has the property denoted by the verb *laughed*. See e.g. Landman (1989) and Schwarzschild (1996) for other, e.g. group and bunch, readings.

(16) a. The fathers gathered.

b. The fathers laughed.

Such plural nouns are generally analyzed as semantically plural; the two interpretations are attributed to semantic differences between the verbs: for example, in contrast to *laugh*, *gather* requires the subject to denote a semantically plural entity.

(17) a. The father laughed.

b. #The father gathered.

The two main proposals for capturing the semantic plurality of noun phrases employ sets (e.g. Hoeksema 1983; Winter 2001) and sums (e.g. Link 1983). In e.g. Winter's (2001) set-based analysis of plurals, a plural predicate denotes (the characteristic function of) the set of sets of atomic individuals in the denotation of the singular. In Link's (1983) lattice-theoretic approach, the denotation of a plural predicate is the complete join-semilattice in the universe generated by the atomic individuals in the denotation of the singular. In both proposals, the denotation of the plural includes that of the singular, in contrast to the semantics given in (12); see section 2.2.3 for discussion.

(18) In a universe consisting of two boys *a* and *b*, the denotation of *boys* is

a. $[\![boys']\!] = \{\{a\}, \{b\}, \{a, b\}\}$ in Winter's (2001) set-based approach, and

b. $[\![boys']\!] = [\![^{*}boy']\!] = \{a, b, a \sqcup b\}$ in Link's (1983) sum-based approach.

Link (1983) rejects the use of sets for representing the denotation of nouns since "inherent in the notion of a set is atomicity which is not present in the behavior of mass terms" (p.305). Other authors argue that a representation of plurals as sets can still capture the parallels between plurals and mass; see Lasersohn (1988, ch. 4); Landman (1989, 568-571); Schwarzschild (1996, ch. 2); Zweig (2008, ch. 4) and article 46 *Mass nouns and plurals*.

The semantics of the plural in (12a), together with standard Montague Grammar assumptions about interpretation, accounts for the collective interpretation of a sentence like (19), according to which a group of three students collectively carries a single piano (19a). The distributive interpretation in (19b) is derived with a distributive operator or a distinct meaning for the verbal predicate (e.g. Landman 1989; Lasersohn 1995; Winter 2001). Schwarzschild (1996) shows that context also plays a role.

(19) Three students carried a piano.

a. Collective: $\exists X \exists y(\mathit{piano}'(y) \wedge |X| = 3 \wedge X \subseteq \mathit{students}' \wedge \mathit{carry}'(X, y))$

b. Distributive: $\exists X(|X| = 3 \wedge X \subseteq \mathit{students}' \wedge \forall x(x \in X \rightarrow \exists y(\mathit{carry}'(x, y))$

The traditional distinction between collective predicates (*meet, gather, be a good team*), distributive predicates (*laugh, enter, have a baby*) and mixed predicates that allow both interpretations (*carry a piano, build a house*) is based on whether a predicate distributes over individuals denoted by the subject (e.g. *Ali and Baba entered the gate* entails *Ali entered the gate and Baba entered the gate*) and whether a predicate can occur with a singular subject (cf. (17)). Refinements and alternative clasifications have been suggested in e.g. Dowty (1987) and Winter (2001).

Cross-linguistic research points to variation in the semantics of number. Kwon & Zribi-Hertz (2004) show that Korean mass nouns can be pluralized (cf. also

Spathas 2007 for Greek) and they argue that Korean plural nouns *X-deul* means 'the various X's' (rather than 'who/whatever is X') and derive from this semantics their lack of certain readings: open kind readings, inalienable binding (e.g. body part plurals), quantificational binding, and narrow-scope readings. Similarly, Mizuguchi (2001, 532) proposes that "Japanese plurals are functions that individuate a set into atoms, while English plurals are functions that form a set from atoms". Finally, in contrast to e.g. English where the default number assigned to a noun in the absence of number morphology is singular, the default number in other languages in such cases is unpredictable and must be lexically specified for the noun. In Kiowa (Athapaskan, USA), for example, default number and number agreement divides nouns into nine classes (Watkins 1984; Harbour 2007). Depending on the class, the number assigned to a noun that bears no number marking may be nonplural (all animates, most body parts, tools), dual (many plants and artifacts), or nonsingular. The INVERSE or REVERSATIVE number morpheme *-dɔ* assigns nouns the complement of their default number, as illustrated in Table 6.

Similarly, Arabic has a class of "collective" nouns from which count nouns are derived by the "singulative" or "unit" suffix *-a* (Cowell 1964, 215,297; Erwin 1963, 165): e.g. *bá'ar* 'cattle', *bá'r-a* 'a cow', *laḥam* 'meat', *laḥm-a* 'a piece of meat', *dafur* 'kicking', *dafr-a* 'a kick'.

class	default number	inverse number
nonplural	*tógúl* ‘one or two young men’	*tógúú-dɔ* ‘three or more young men’
dual	*k!ɔ̂n* ‘two tomatoes’	*k!ɔ̂ɔ̂-dɔ* ‘one tomato or three or more tomatoes’
nonsingular	*áá* ‘two or more sticks’	*áá-dɔ* ‘one stick’

Table 6: Kiowa inverse number

2.2.3 Unmarked number

Theories of markedness maintain that semantic and formal markedness converge: the denotation of a formally more complex expression results in a more restricted (more marked) distribution than that of the formally less complex expression. The convergence of semantic and formal markedness is widely assumed in grammatical theories (cf. Koontz-Garboden 2007 for discussion) and has its roots in Roman Jakobson’s (1957) proposal that inflectional categories are decomposed into a set of semantically defined features, each of which is binary and privative, as discussed in section 1. Evidence for this position is provided e.g. by the Korean number system, where the plural marker *–tul* contributes the meaning “more than one”, while singular nouns lack such a specification, i.e. are semantically unmarked, and “may be either specifically singular, or on occasion be used when more than one object is involved” (Greenberg 1963, 73f.); see Ebert (1997) for psycholinguistic

evidence for the markedness of the plural.

The claim that the singular is the semantically unmarked member of the singular/plural opposition has been challenged on the basis of data from English and a variety of other languages in e.g. McCawley (1968), Krifka (1987), Roberts (1991), Ojeda (1995), Sauerland, Anderssen & Yatsushiro (2005) and Farkas (2006). According to these proposals, the denotation of a singular (pro)noun conveys semantic singularity whereas the corresponding plural form is less specific, i.e. subsumes the denotation of the singular.

Both types of analysis need to account for the conditions under which the semantically less marked expression can be used: while proponents of the first position need to account for why a singular form is not typically used to express semantic plurality, proponents of the second position need to account for why plural forms are not typically used with singular meaning, e.g. why *I saw cows* is not used when the speaker saw a single cow. Blocking is appealed to in e.g. Krifka (1987) and Roberts (1991), while Sauerland (2003) and Sauerland, Anderssen & Yatsushiro (2005), who assume that the plural is unmarked since only the singular introduces a presupposition (that the denotation is an atom), appeal to Heim's (1991) *Maximize Presuppositions*. Farkas (2006) assumes that the singular is the default interpretation; the plural is used to override the default and hence receives plural interpretation; cf. Spector (2007) for an account using higher-order implica-

tures.

If there was a perfect correlation between formal and semantic plurality, examples where a singular (pro)noun does not have singular semantic reference would be evidence for the first position, while examples with plural (pro)nouns that do not have plural semantic reference would be evidence for the second position. Since such a correlation does not, however, exist (cf. section 2.1), formally plural (pro)nouns that can be used with singular reference, such as German *Sie* or French *vous*, can not be taken as evidence that the denotation of the plural is unmarked with respect to the singular (contrary to e.g. Sauerland, Anderssen & Yatsushiro (2005), henceforth SAY05) but rather only shows that these grammatically plural forms can be used with singular reference, similar to pluralia tantum nouns. Wechsler (2004) shows that assuming that plural forms like *vous* are lexically unspecified for semantic plurality makes correct predictions about of the French pronoun system and also fits with the cross-linguistic semantics of person/number systems. Likewise, even if *their* in (20) can be used "even though it was just one umbrella owned by a single person that was left behind" (SAY05: 415), this only shows that the pronoun in question is only formally but not semantically plural, not that the denotation of semantically plural expressions includes singular entities.

(20) Someone left their umbrella. (SAY05)

Rullmann's (2003) example in (21) shows that it is not tenable to assume that the

plural form is used when “the gender marked singular pronouns *he/she/it* must be avoided” because “the gender of the referent is unknown” (SAY05: 416).

(21) Someone left their jockstrap in the locker room. (Rullmann 2003, 253)

Rather, *their* seems to have emerged as a gender- and number-neutral variant of the singular pronouns *he* and *she*.

Another type of evidence provided in favor of the second position involves plural noun forms that are semantically plural, and whose denotation has been argued to include atomic entities, such as (22):

(22) Every boy should invite his friends.

Since (22) can be used felicitously in a context where some of the contextually salient boys only have one or no friend, one could assume that the denotation of the plural noun phrase *his friends* includes atomic friends (cf. e.g. SAY05). An alternative analysis of (22) that allows one to maintain traditional assumptions about the relationship between formal and semantic markedness is that *his friends* in (22) is a dependent plural (cf. section 2.2.2), i.e. does not distribute below the subject universal quantifier, but rather denotes the collective group of friends of all of the contextually salient boys; a plural noun phrase is used since the group of boys invite more than one friend.

Noun phrases with the quantifier *no* such as *no chairs* in (23) are another se-

mantically plural noun phrase whose denotation has been argued to include singular entities. Winter's (2001) contrast been *No teachers are similar* and **No teacher is similar* shows that the number distinction with *no* is not merely a grammatical reflex but semantically meaningful.

(23) No chairs are available. (SAY05: 409)

SAY05 argue that the plural form does not mean 'two or more' by pointing out that (23) is not equivalent to *Two or more chairs aren't available*, which unlike (23) "implicates the availability of one chair" (p.410). While this shows that the two utterances have different sets of implications, it does not conclusively show that the denotation of *chairs* must include the atomic entities. Cf. also Schwarzschild's (1996: 5) example in (24), which he argues should be felicitous if the denotation of *men* only includes plural entities.

(24) #No men lifted the piano but John did. (Chierchia 1998a, 10)

Contrary to Schwarzschild (1996) and SAY05, Chierchia (1998a, 75) argues that such examples do not warrant the conclusion that the plural is semantically less marked that the singular: a modification of the meaning of *no* so that it adds the atomic elements to the denotation of the plural common noun ensures the infelicity of (24). A similar analysis can be given to other determiners that trigger plural agreement but result in noun phrases whose denotation is not (necessarily) plural,

e.g. *1.0 cows, zero cows* (Krifka 1987) or *fewer than four cows*; in fact, Krifka (1987) cautions against using such examples as evidence for the position that the plural is semantically unmarked.

Negation also features in examples like (25), which is claimed to be infelicitous in a context where John saw a single bear and hence taken to provide evidence that the denotation of the plural includes singular entities (Krifka 2004; SAY05; Spector 2007).

(25) John didn't see bears.

There was, however, no consensus among the native speakers of English we consulted that (25) is infelicitous in this context. This fits with the observation that (25) can be felicitously followed with *...he only saw ONE bear*. That this reading of (25) is not a case of metalinguistic negation is shown by the acceptability of the negative polarity item *ever* in *John didn't ever see bears, but he often saw single ones*.

A final set of examples provided in favor of the position that the plural is semantically unmarked involves semantically plural forms in form headings (e.g. *schools attended, children*, cf. McCawley 1968), invitations (*You're welcome to bring your children*) and questions (*Do you have children?*) (e.g. Krifka 2004; SAY05; Spector 2007; Zweig 2008). Such plurals are felicitously used even if the person filling out the form or being asked the question only has one child (i.e. can answer with

Yes, one), which is taken as evidence that the denotation of the plural includes that of the singular. But such examples are unproblematic for the other position, too, if one takes into consideration the role of context. Shared by these examples is the contextual requirement that the speaker (or writer) be maximally inclusive: form headings and invitations need to take into consideration that some people have more than one child, disregarding the fact that a particular person filling out the form or being addressed might only have one (or no) child. According to the position where the singular is semantically unmarked, use of the singular implicates the absence of a plural meaning, such that e.g. *You're welcome to bring your child* implicates that the addressee has (at most) one child, which is not acceptable in such contexts. Further evidence for this context-dependency is presented by examples like (26) and (27) which show that the plural is felicitous only in those contexts where it is plausible that the cardinality could be larger than one (cf. also Farkas 2006). If this condition is not met, as in (26a) and (27a), the singular form is used:

(26) Context: Addressing a single person.

a. Will you bring your spouse/#spouses?

b. Will you bring your child/children?

(27) a. (to a friend you are helping with a cleaning task) #Do you have brooms?

b. (to a shop keeper) Do you have brooms? (Zweig 2008, 24)

In sum, the currently available evidence does not warrant abandoning the tradi-

tional correlation between formal and semantic markedness in the singular/plural paradigm.

2.2.4 Gender

The inflectional category ‘gender’ classifies (pro)nouns. The semantic notion most commonly associated with the semantic exponents of this inflectional category is sex, although there are many conceivable ways of classifying entities, especially humans, such as animacy, humanness, and (ir)rationality (Corbett 1991). While every gender system has some (pro)nouns whose gender assignment depends on semantic gender (Corbett 1991, 63; Dahl 2000, 101), languages differ in the location of the cut-off point for the assignment of semantic gender on the animacy hierarchy in Figure 1.

In Tamil (Dravidian, India), there are separate genders for male humans and female humans, while everything else is assigned to a third gender (Corbett 1991, 9), i.e. the cut-off point is between HUMAN and ANIMAL. In many Indo-European languages, humans and some higher animals are assigned masculine and feminine gender on the basis of their sex (e.g. German *die Kuh* ‘the.FEM cow’), while inanimates and lower animals get their genders by lexeme-specific or formal criteria. Thus, the ANIMAL class does not always behave homogenously (Dahl 2000). Gender in Ket (isolate, Russia) distinguishes between male animates, female animates, and

a residue class that includes mainly inanimates (Corbett 1991, 19). Since neither of the two sex categories is more or less marked than the other, establishing semantic markedness for the inflectional category 'gender' is inconclusive.

2.3 Person, number and gender at the syntax-semantics interface

Person, number and gender are formal categories that are semantically interpreted, but also have consequences for syntax, in the form of agreement. A key question in the formal treatment of these categories is the extent to which agreement is to be treated semantically; cf. also article 82 *Syntax and semantics*. Cooper (1983) proposes a semantic account according to which agreement markers trigger presuppositions. In *A neighbor$_i$ thinks that she$_i$ saw John*, for example, the pronoun *she$_i$* triggers the presupposition that the neighbor is female; the value of **The man washes herself* is undefined since the denotation of the subject is not in the domain of the partial function denoted by the reflexive pronoun (cf. also Dowty & Jacobson 1988). For arguments that number agreement is a semantic phenomenon see e.g. Bartsch (1973), Scha (1981), Link (1983), Hoeksema (1983) and Lasersohn (1988). While some semantic analyses are restricted to non-local agreement (e.g. agreement of subjects with predicative adjectives, of pronominal anaphora with their antecedents), other analyses (e.g. Hoeksema 1983; Winter 2001) also treat local agreement semantically (e.g. subject-verb agreement, noun-adjective agree-

ment). Winter (2001, chapter 5), for example, develops an analysis of collective and distributive readings of plurals that assigns different semantic types to singular and plural predicates and thereby also accounts for local agreement. In a departure from more classical treatments of inflection (e.g. Bennett 1974; Chierchia 1998a; Schwarzschild 1996), which assume that only inflectional morphology on nouns is semantically interpreted while that on verbs simply functions as markers of agreement, Winter (2001) assumes that every overt exponent of (number) inflection is semantically interpreted (be it on nouns, verbs or adjectives). Sauerland (2003) takes a leap in the opposite direction and proposes that none of the overt exponents of inflectional morphology (in a DP) are semantically interpreted, and instead analyzes them as (uninterpreted) markers of agreement with the (interpreted) number feature that is realized (covertly) in the head of the ϕ-phrase (ϕP), a syntactic head over D.

Examples like (28), attributed to Irene Heim, illustrate the need for distinguishing between the semantic and the grammatical reflexes of person, number and gender agreement. The two interpretations of (28), given as LF1 and LF2, differ in whether *my* receives a bound variable interpretation (LF1) or not (LF2). In the former case, (28) means that nobody but me is an x such that x did x's homework.

(28) Only I did my homework.

LF1: [only I] λx x did $x's$ homework.

LF2: [only I] λx *x* did my homework.

Kratzer (1998) proposes that the first person features of the pronoun *my* are mere agreement reflexes, which need to be present at the level of phonological form (PF) but are absent at logical form (LF). Since pronouns can start out as zero pronouns, in which case they do not bear inflectional information, they do not contribute a presupposition at LF. Such pronouns receive features at PF under agreement with a suitable nominal antecedent (cf. also Rullmann 2004). An alternative proposal, von Stechow (2003), suggests that all pronouns start out with ϕ-features but that features of bound pronouns are deleted at LF.

In contrast to the above proposals, which assume that agreement involves checking features on targets that are specified on a trigger, Pollard & Sag (1988, 1994) motivate treatments of agreement as constraint satisfaction: for example, even through a ship can be referred to both as *she* and *it*, utterances such as *The ship lurched and then she rightened itself* are ruled out by requiring that the reflexive pronoun and its antecedent share the same features. Wechsler (2004) shows that it is not sufficient to treat agreement as the systematic co-variation in form. For example, Pollard and Sag's (1994:97) claim that predicative adjectives show semantic agreement while finite verbs show grammatical agreement is satisfied for e.g. the formal use of *vous* (grammatically plural, semantically singular) as in (29a,b) but fails for pluralia tantum nouns like *ciseaux* 'scissors' in (29c), which can be

semantically singular but nevertheless trigger plural agreement with predicative adjectives.

(29) a. Vous êtes loyal.
you.PL/FORMAL be.2PL loyal.SG
'You (one formal addressee) are loyal.' (Wechsler 2004, 255)

b. Vous êtes loyaux.
you.PL/FORMAL be.2PL loyal.PL
'You (multiple addressees) are loyal.' (Wechsler 2004, 255)

c. Ces ciseaux sont idéaux / *idéal pour couper le
this.PL scissors(PL) are.PL ideal.M.PL / ideal.M.SG for cut.INF the
velour.
velour
'These scissors are ideal for cutting hair.' (Wechsler 2004, 256)

Wechsler argues that assuming two plural features for French (one for grammatical number, the other for semantic number) is not empirically motivated since the language only has one plural inflection. His analysis instead holds that a plural agreement target is not semantically potent when the noun phrase it agrees with is plural-marked; otherwise, it may introduce semantic plurality. Thus, (30a) with *are* is grammatical since the subject noun phrase *these books* is semantically and grammatically plural; *are* in (30b) introduces optionally introduces semantic plurality since the subject noun phrase is only grammatically plural. The version with *is* is ungrammatical in (30a,b) since *is* requires grammatical and semantic singularity. In (30c), both *is* and *are* are acceptable: with *is* the subject noun phrase denotes

a single entity, with *are*, it is required to denote two separate entities.

(30) a. These books are / *is interesting.

b. These scissors are / *is dull.

c. His lifelong friend and the editor of his autobiography is / are at his bedside.

The need for recognizing the semantic as well as the grammatical side of person, number and gender is also apparent in coordination resolution. In many languages, the inflectional properties of a coordinate noun phrase are determined on the basis of the semantic person, number or gender values of the individual noun phrase conjuncts (see Corbett 1991; Johannessen 1998 for other resolution strategies). The Fula (Niger-Congo) verb in (31a) is marked for first person inclusive since the coordinated noun phrase subject denotes a group that includes the speaker. The French verb in (31b) is marked for masculine gender since only semantically feminine noun phrases trigger feminine agreement and the grammatically feminine conjunct *la sentinelle* 'the sentry' denotes a man. Thus, number but not person is a non-distributive feature since none of the conjuncts in (31a) bears the value of the coordinate noun phrase (Dalrymple & Kaplan 2000).

(31) a. Fula (adapted from Dalrymple & Kaplan 2000, 782)

an e Bill e min kö Afriki djodu-dèn.
you and Bill and I in Afrika live.1INCL

'You and Bill and I, we live in Afrika.'

b. French (adapted from Wechsler 2009, 572)

La sentinelle et sa femme ont été pris / *prises
the.FEM sentry.FEM and POSS wife were taken.MASC taken..FEM
en otage.
hostage

'The sentry and his wife were taken hostage.'

While Corbett's (1991) resolution rules can account for the person, number and gender of coordination constructions, their limitation to coordination constructions is problematic since plural anaphoric pronouns follow the same constraints, as pointed out in Farkas & Zec (1995): for example, the French utterance *Ils / *elles sont malheureux/*malheureuse* (they.MASC/they.FEM are unhappy.MASC/unhappy.FEM) is a felicitous continuation of (31b). Formal analyses of resolution characterize the features of individual conjuncts as sets; the feature value of the coordinate noun phrase is the intersection or union of these sets (e.g. Hoeksema 1983; Sag et al. 1985; Dalrymple & Kaplan 2000; Sadler 2006; Wechsler 2009). In contrast to person and number resolution, which are purely semantic, both grammatical and semantic gender affect gender resolution (see Farkas & Zec 1995; Sadler 2006; Wechsler 2009 for discussion).

2.4 Inflectional meanings and lexical classes

Cross-linguistically, co-occurrence with particular inflectional morphemes determines lexical categoryhood. Expressions that occur with the same set of inflec-

tions are also assumed to form a natural class semantically, under the view that the meaning of a particular inflectional category is compatible with the inherent semantic type of the core members of a given word class (e.g. Bybee 1985, 13-19; Croft 1991, 79,86). Tense, for instance, occurs with verbs since they denote temporally less stable entities (compared to nouns) that need to be temporally anchored, and definiteness is a category of nouns since these denote individualized, time-stable entities (Givón 1979; Givón 1984). These assumption have been challenged on the basis of descriptions of languages where markers of plurality and markes of tense, aspect or modality are morphologically realized and interpreted on verbs and nouns, respectively. Verbal plural markers, also called 'pluractional' markers, indicate the plurality of events and are found in a wide variety of languages (Mithun 1988; Lasersohn 1995, ch. 13, and references therein). The plurality of events can manifest itself as multiple event participants, multiple occurrences of the event over time, or occurrences of the event in different locations (Lasersohn 1995, 240). In some languages, e.g. ǂHoan (Khoisan, Botswana) as described in Collins (2001), the same plural marker is used for nouns and verbs. Formal analyses have related pluractionality to the semantics of collectivity and distributivity (e.g. Ojeda 1998 for Papago (Uto-Aztecan, USA)), verbal aspect (e.g. van Geenhoven 2005 for Greenlandic (Eskimo-Aleut, Greenland) and reciprocity (e.g. Faller 2007 for Cuzco Quechua (Quechua, Peru)). Nordlinger & Sadler (2004) present cross-

linguistic evidence that tense, aspect and mood can be cross-linguistically marked and interpreted on nouns (see also Tonhauser 2006, ch. 9 for discussion), but their claim of the existence of nominal tenses has been challenged in Tonhauser (2006, 2007, 2008) on the basis of a detailed analysis of such markers in Paraguayan Guaraní (Tupí-Guaraní, Paraguay), which are instead analyzed as aspect/modal markers. While these findings suggest that inflectional categories cannot be assumed to universally pertain to either nouns or verbs, they also demonstrate the need for rigorous formal semantic definitions of the meaning of (inflectional) categories for cross-linguistic and cross-category comparison (see Nordlinger & Sadler 2004; Nordlinger & Sadler 2008; Tonhauser 2008 for discussion).

3. Case

3.1 Semantic case features

Grammatical analysis of richly inflected languages shows that morphological cases fall into intersecting natural classes, revealed by neutralization patterns (syncretism), shared syntactic properties, and other grammatical diagnostics. Traditional grammar holds that cases have meanings and fall into natural classes on the basis of shared meanings. Formal grammar provides three main ways to model such case groupings:

1. A linear ordering, such that any set of adjacent cases is a potential natural

class (Plank 1991).

2. Cross-classifying privative semantically defined features (Jakobson 1936; Jakobson 1958; Neidle 1988).

3. An inheritance hierarchy (Przepiórkowski 1999, ch. 3) or a lattice (Grimm 2010) where cases in their syntactic function refer to coherent regions in this space.

The linear ordering method served Pāṇini well in his Sanskrit grammar, but does not generalize well to some other case systems. Jakobson's approach of decomposing cases into semantically defined features has been mainly applied to Slavic languages (but see Bierwisch 1967); it is undermined by the imprecise semantic definitions of his case features.

3.2 Structural and inherent case

Recent work distinguishes two types of case, GRAMMATICAL case and SEMANTIC case (Kuryłowicz 1964), or STRUCTURAL and INHERENT (or LEXICAL) case (Chomsky 1981), where the former have no meaning. Chomsky proposes that grammatical relations (ABSTRACT CASES) are determined by the syntactic configuration at S-structure, and SPELLOUT RULES assign morphological case to arguments that bear them. In minimalist terms, structural case is an UNINTERPRETABLE FEATURE. Inherent cases do have a meaning; they are assigned at deep (D-)structure, in some cases depending on

the governing predicate's lexical semantic properties, or in some cases idiosyncratically (QUIRKY CASE). A semantic decomposition seems more promising for them.

The richer the case system, the more compelling the case for semantic decomposition; it is inevitable for the elaborate local case systems of many richly inflected languages. Although the local cases are not necessarily morphologically complex, their semantics is like that of compound pre/prepositions, as illustrated by the subsystem of local cases in Lezgian (Haspelmath 1993) in Table 7.

	'at'	'in'	'behind'	'under'	'on'
location	adessive	inessive	postessive	subessive	superessive
source	adelative	inelative	postelative	subelative	superelative
goal	addirective	(indirective)	postdirective	subdirective	superdirective

Table 7: Lezgian local cases

In Jackendoff's (1983, 1990, 1996) analysis, locative cases are built from Path functions and Place functions:

(32) a. Path functions: AT, TO, FROM, TOWARD, AWAY-FROM, VIA

b. Place functions: UNDER, IN, BEHIND, ON...

Path functions are applied to local relations, which are formed by applying a Place function to a Thing:

(33) Lezgian Postelative

sew-re-q^h-aj

bear-ERG-POSTESSIVE-INELATIVE

'from behind the bear'

[Path FROM [Place BEHIND [Thing BEAR]]]

The same structure extends to non-local relations, though usually less transparently. Finnish treats States like Places, so cases denoting state and change-of-state pattern with the locative cases, as in Table 8.

	'at', accidental location	'in', inherent location	'as', state
state/location	adessive *-lla*	inessive *-ssa*	essive *-na*
source	ablative *-lta*	elative *-sta*	
goal	allative *-lle*	illative *-seen, -hen*	translative *-ksi*

Table 8: Finnish cases

The relation between essive (predication of state) and translative (predication of change-of-state) is quite parallel to that between inessive 'in' and illative 'into'.

(34) Se tuli iso-ksi ongelma-ksi
It (be)came big-Transl problem-Transl
'It became a big problem' ('came to as a big problem')

[Path TO [State AS [Thing BIG PROBLEM]]]

Important non-local semantic cases include the instrumental ‘with’, ‘by means of’ (Strigin 1995; McKercher 2002), and the comitative (sociative, associative) ‘with, accompanied by’ (which are often syncretic; Croft 1991; McGregor 1989; Stolz 2001a; Stolz 2001b; Stolz & Stroh 2001), and the abessive (caritive) ‘without’.

Localist theories of case (Hjelmslev 1935; Anderson 1971) and of Th-roles (Gruber 1965; Jackendoff 1987) hold that various abstract domains such as possession, emotion, desire, cognition etc. are organized in a way that is parallel to the domain of spatial relations.

An apparently hybrid intermediate class of cases pattern syntactically with the structural cases, but are semantically conditioned. These cases however depend on different semantic conditions than inherent cases do: instead of being sensitive to the thematic relation that the NP bears to the verbal predicate, they are sensitive to a subclass of functional categories, especially definiteness, animacy, quantificational properties, the aspectual or modal character of the VP, or some combination of these factors — pretheoretically characterized in the literature in terms of “affectedness” or “degree of transitivity”. Examples include the Finnish accusative, which is assigned to complements of bounded (non-gradable) verbal predicates, while other complements are assigned partitive case (Kiparsky 1998); and the Hindi accusative case, which is assigned to specific complements.

Minimalist analyses have tried to accommodate these cases to the normal type of structural case by positing case assignment or checking in various higher functional projections. For example, it has been suggested that Finnish accusative is checked in AspP, a functional projection which induces telicity, while partitive is checked in a lower projection (Borer 2005; Megerdoomian 2000; van Hout 2000; Ritter & Rosen 2000; Csirmaz 2005; Kratzer 2004; Svenonius 2002; Thomas 2003).

A further challenge for theories that separate structural and inherent case is the substantial overlap between them. All structural cases except nominative function also as inherent case. In some Indo-European languages, accusative case marks not only objects, but direction and extent of time. Ergative case is commonly identical to instrumental case down to the last allomorphic detail, as in many Australian languages. The dative often doubles as a semantic case (typically syncretic with directional locative 'to' case) in quite systematic ways (e.g. Japanese *ni*, Romance *a*). While this does not invalidate the distinction between structural and inherent case, it does invite a search for a unification of them. One such approach is outlined in the next section.

3.3 The relational semantics of structural case

Grammatical relations reflect the semantic relations between predicates and their arguments. Nearly all linguistic theories are designed to capture this relationship, usually by some notion of Theta-roles. A weakness of all traditional case theories (including Jakobson's and Chomsky's) is that they provide no principled intrinsic relationship between grammatical relations and the morphosyntactic cases that mark them. Government & Binding Theory merely masks the stipulative character of the association by a terminological and typographical artifice. The lower-case morphosyntactic category "accusative", for example, *sounds* like the capitalized abstract Case "Accusative", but the relation between them is no less arbitrary within this theory.

Kiparsky (2001) has suggested that structural cases do have a semantic basis, but it is relational rather than material. Once this is recognized, morphosyntactic case and abstract case (grammatical relations) can be unified. He proposes two relational case features, [±H(ighest) R(ole)] and [±L(Lowest) R(ole)] (see also Wunderlich 2003). Their fully specified feature combinations define the four known grammatical relations A, S, O, D, and their underspecified negative feature values define the four morphosyntactic structural cases nominative, accusative, dative, ergative. These relations can be modeled equally well by a lattice. Either way,

they yield the markedness scale nominative < accusative, ergative < dative. This correctly predicts that if a language has a dative it has either an accusative or an ergative, and that if it has case at all, it has nominative.

	Grammatical relations		Structural cases	
a.	[+HR,+LR]	S (intransitive subject)	[ ]	nominative
b.	[–HR,+LR]	O (direct object)	[–HR]	accusative
c.	[+HR,–LR]	A (transitive subject)	[–LR]	ergative
d.	[–HR,–LR]	D (indirect object)	[–HR,–LR]	dative

Table 9: Kiparsky's analysis of case

Structural case assignment is formal unification of feature matrices subject to the same principles that govern the distribution of all morphosyntactic elements. In particular, each Th-role is associated with argument bearing the most specific (most highly marked) morphosyntactic case that is compatible with (unifies with) the Th-role's abstract Case. Arbitrary spellout rules (correspondence rules, mapping rules) have no place in this approach.

Following Bierwisch (1967, 1983, 1986, 1997) and Bierwisch & Schreuder (1992), Kiparsky assumes a level of Semantic Form, an interface between conceptual knowledge and syntactic structure (see article 32 *Two-level Semantics: Conceptual Structure and Semantic Form*). A predicate is represented at Semantic

Form by a function, and the predicate's Th-roles correspond to λ-abstractors over the function's variables. The semantic role of the variable over which a λ operator abstracts determines the semantic content of the resulting Th-role, and the variable's depth of embedding in Semantic Form (the inverse of the order of λ-abstractors) determines the Th-role's rank in the structural ordering known as the hierarchy of thematic roles. For example, *show* has three Th-roles, of which the highest, the Agent, is saturated last.

(35) *show*: $\lambda z \lambda y \lambda x$ [x CAUSE [CAN [y SEE z]]]

Abstract case and morphosyntactic case are assigned as follows:

(36)

$\begin{bmatrix} \lambda x \\ [+HR] \end{bmatrix}$	$\begin{bmatrix} \lambda y \\ [\ \ ] \end{bmatrix}$	$\begin{bmatrix} \lambda z \\ [+LR] \end{bmatrix}$	Th-roles with abstract Case assigned
|	|	|	
$\begin{bmatrix} \ \ \end{bmatrix}$	$\begin{bmatrix} -LR \\ -HR \end{bmatrix}$	$\begin{bmatrix} -HR \end{bmatrix}$	morphosyntactic case selected
(NOM)	(DAT)	(ACC)	

The case features define classes of grammatical relations which play a role in syntactic constraints, such as binding, control, and parallelism in coordination. For example, the feature [+HR] picks out "A" and "S" in any language, irrespective of its case system, and thus universally defines the relation of grammatical subject. They also provide the appropriate representation on which valency-changing operations are defined (see also article 95 *Operations on argument structure*).

818 The compositional analysis brings out analogies between structural and seman-
819 tic cases (Ostler 1979). The spatial domain corresponds to the four basic structural
820 case categories.

		Structural	Spatial	Examples of locative cases
a.	[ ]	nominative	location (‘at’, ‘in’)	locative, inessive, adessive
b.	[–HR]	accusative	end point (‘to’, ‘into’)	illative, allative, terminative
c.	[–LR]	ergative	source (‘from’, out of’)	elative, ablative, exessive
d.	[–HR,–LR]	dative	goal (‘towards’)	lative, directive

Table 10: Structural and semantic case

821 These correspondences are borne out by synchronic syncretism patterns and
822 historical change.

823 4. Evidentiality

824 Evidentiality is “the grammatical encoding of the speaker’s (type of) *grounds* for
825 making a speech act [...]. For assertions, the speaker’s grounds can be identified
826 with the speaker’s source for the information conveyed by the utterance” (Faller
827 2002, 2, emphasis in original). Crosslinguistically, three main types of source of
828 information are encoded by evidentials (Willett 1988): information obtained from
829 visual, auditory or other sensory sources, information that is based on reports from

others or tales, and information attained through reasoning on the basis of logic, intuition, mental constructs or previous experience. Cuzco Quechua has separate morphemes (*–mi*, *–si* and *–chá*) for these three evidential meanings: while the examples in (37) all convey a similar content (*p*= 'It is/might be/must be raining'), they differ in the speaker's source of evidence (EV).

(37) Cuzco Quechua evidentials (data adapted from Faller 2002, 3)

a. Para-sha-n-mi.
rain-PROG-3-mi
p='It is raining.', EV=speaker sees that *p*

b. Para-sha-n-si.
rain-PROG-3-si
p='It is raining.', EV=speaker was told that *p*

c. Para-sha-n-chá.
rain-PROG-3-chá
p='It might/must be raining.', EV=speaker conjectures that *p*

Evidential systems of other languages code more evidential distinctions than Cuzco Quechua (cf. e.g. Morse & Maxwell 1999 on Cubeo (Tucanoan, Columbia)) or less; see Aikhenvald (2004) for a typology of evidential systems.

Faller (2002) formally analyzes the Cuzco Quechua evidentials as illocutionary operators (Austin 1962) which modify the sincerity conditions of the proposition that is their argument and express an evidential relation between the speaker and the proposition expressed. Evidentials of other languages, including Bulgarian

(Izvorski 1997) and St'át'imcets (Salish, Canada; Matthewson, Rullmann & Davis 2007), have been analyzed as epistemic modals (see also Palmer 1986; Kiefer 1994), i.e. as quantifiers over possible worlds: an utterance containing an evidential denotes the proposition that, in every world in the modal base (which contains e.g. worlds in which the perceived or reported evidence holds), the proposition the evidential applies to is true. While evidentials are a type of epistemic modal on this view, Faller (2002) argues that the two are separate but overlapping categories; see Chafe 1986 for the position that evidentiality subsumes modality. A set of empirical criteria for distinguishing the two types of evidentials is presented in Matthewson, Rullmann & Davis (2007). Murray's (2010) dynamic semantic analysis of evidentials in Cheyenne (Algonquian, USA) as contributing both an evidential restriction and an illocutionary relation reconciles the two types of analysis.

While the St'át'imcets evidentials are part of the modal paradigm of the language, the Cuzco Quechua evidentials in (37) are traditionally analyzed as part of the focus enclitics (Faller 2002). The language also has a past tense marker that gives rise to a non-visual evidential meaning by locating the eventuality outside the speaker's perceptual field at topic time (Faller 2004). A different type of interaction between evidentials and tense is observed in Korean, where the evidentials are part of the mood system (as in Cheyenne): while distinct evidential meanings are

often expressed in other languages by different evidential markers, the two Korean evidentials give rise to different evidential meanings in interaction with the tenses (Lee 2010). An interaction between evidentiality and aspect has been found in Bulgarian and Turkish, which express evidentiality in the form of the present perfect (Izvorski 1997; Slobin & Akşu 1982).

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