CHAPTER 23

SEMANTIC TYPOLOGY*

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Nōmina debent nātūrae rērum congruere

(St Thomas Aquinas)

Among all the countless things and classes that there are, most are miscellaneous, gerrymandered, ill-demarcated. Only an elite minority are carved at the joints, so that their boundaries are established by objective sameness and difference in nature.

(David Lewis, 1984: 227)

1. Introduction

Semantic typology is that part of linguistic typology concerned with the expression of meaning in language and languages. It is thus the systematic cross-linguistic study of how languages express meaning by way of signs.[1] Like all branches of

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[1] Cf. Lehrer's (1992: 249) definition of lexical typology as concerned with the 'characteristic ways in which language [. . .] packages semantic material into words'; indeed, some classic treatments have restricted their studies of 'semantic universals' to word meaning (e.g. Ullmann 1966: 219). But since

linguistic typology, it is concerned with exploring the deep regularities which underlie the incredible diversity in how particular languages work.

The sets of signs found in the world's 6,000 languages represent the outcomes of a vast number of natural experiments in evolving named categories for apprehending the world. Spitzer (1947: 2) points out that 'of all linguistic branches, it is in semantics that the changes due to cultural development can best be seen at work, for "meaning" is the best barometer of cultural climate', and to a far greater extent than other aspects of language, semantic systems are moulded by the diverse cultures of their speakers.

But the categories so shaped must still fit comfortably with the minds, brains, and cultures of speakers, with the ontology of the natural world, and with the complex integrative demands of communication systems. Semantic typology thus lies directly on the fault lines between psychology, neuroscience, anthropology, the natural sciences, and general linguistics.[2]

Despite its centrality to debates on what is universal and what is culturally malleable, semantic typology has had a low profile compared to the flourishing and well-theorized fields of phonological, morphological, and syntactic typology (though see Weinreich 1966). Textbooks in typology typically say little or nothing about it as a field in its own right. Conversely, most textbooks on semantics fail to allocate chapters to specifically typological questions, even when they (e.g. Frawley 1992) draw on a wide range of languages to illustrate interesting semantic distinctions. Much key work for semantic typology has been carried out under the rubric of other disciplines, most importantly by anthropologists on the comparative study of kinship terminologies (section 1.3) and on systems of colour terms (2.4), and by ethnobiologists on taxonomic classifications of natural species (2.5). At the same time, many burgeoning new linguistic approaches, such as cognitive semantics, draw on cross-linguistic data but without overtly adopting the methods of argumentation and empirical testing found elsewhere in typology. The current chapter attempts to illustrate the advantages that result from integrating these various approaches into a broad and coherent research programme.

words are only one type of sign, we consider lexical typology to be that sub-branch of semantic typology concerned with the lexicon.

[2] Talmy (2000) associates the 'conceptual approach' and more particularly 'cognitive semantics' with 'the patterns in which and the processes by which conceptual content is organized in language', and the question of 'how language structures conceptual content' (Talmy 2000: 2). Obviously, this is close to the goal I sketch here for semantic typology, but there is a difference in focus: 'cognitive semantics centers its research on conceptual organization, hence, on content experienced in consciousness. [. . .] [T]he main object of study itself is qualitative mental phenomena as they exist in awareness.' Semantic typology primarily studies the linguistic structures themselves and the meanings they express. These are social rather than individual phenomena. The relation to concepts used by individuals is a secondary though, of course, vitally important question.

1.1 The three-part sign

The most fundamental unit for semantic typology is the sign. In actual use, speakers and hearers draw on their pragmatic knowledge to enrich signs so that what is meant is more than what is said—by reasoning from what could have been said in addition, or instead, to generate meaning-enriching implicatures. For the most part, semantic typology is concerned with stable system-meaning, rather than context-specific utterance-meaning, so that pragmatic contributions are largely disregarded. We shall see in section 3.2, though, that pragmatic factors—including culturally modulated world-knowledge—need to be reckoned with, particularly in explaining patterns of polysemy and their origins.

Classical structuralist linguistics (Saussure 1922[1916]) saw signs as conventional pairings of a signifier (Fr. *signifiant*) or form, and a signified (Fr. *signifié*) or meaning. More recent scholars (Mel'čuk 1968, Pollard and Sag 1987: 51) have shown that signs really have three parts: in addition to their signifier and signified, they have a combinatorics that gives information about how they combine with other signs: the English noun and verb *kiss*, for example, have the same form and very similar meanings, but different combinatorics—the noun takes plural - *(e)s*, while the verb takes past - *ed*, participial -*ing*, etc. Semantic typology can abstract away from the signifier and combinatorics, concentrating just on the meaning (section 2), but there are also many questions where we need to take the signifier or combinatorics into account (section 3), such as in studies of iconicity, polysemy, and heterosemy. Semantic typology can also look at what is common to the meanings of signs with a common combinatorics (section 4), for example, adjectives, which are defined in particular languages by batteries of combinatoric tests.

1.2 Lexical, grammatical, and prosodic signs

All languages use at least the following three subsystems for expressing meaning: lexicon, syntax, and prosody (e.g. intonation). Most employ morphology as well, to different degrees and with different partitions between inflectional and derivational categories. In other words, signs can take the form of lexical items (*brother, eh*), morphemes (plural - *s*, negative *un*-), syntactic patterns (*John can come* for declarative, *Can John come?* for polar interrogative), or specifiable prosodic patterns (the question intonation in *John can come?*).

The division of labour between the above four systems varies substantially across languages. Interrogation can be shown intonationally; lexically, by particles like Japanese *ka*; morphologically, by special question forms of verbs (e.g. in Welsh); or syntactically, by word order inversion, as in English. Nonetheless, there are whole realms of meaning that we only find encoded in the lexicon, such as those pertaining to colour, smell, or biological species (see Allan 1977 on the fact that

colour is never a relevant semantic dimension in classifier systems). Signs may also assemble, into a single gestalt, elements from more than one subsystem—for example, the combination of subordinating conjunction plus clause-final verb position in German subordinate clauses, or negative particle plus irrealis in many languages to express negation.[3]

A central question for semantic typology is: which subsystems express which sorts of meanings? A prescient early discussion is Sapir (1921: 100–106). There is an increasing emphasis on developing an ontological inventory of meanings and linking it to computationally implemented descriptive standards (Eggers, Langendoen, and Lewis 2004). Our understanding is the least developed for prosody and the most advanced for inflectional morphology. Here, three fundamental articles (Jakobson 1971c[1957], Anderson 1985b, Mel'čuk 1991) plus a string of recent monographs have given us detailed cross-linguistic data for such topics as aspect, tense, mood/modality, and number, and developed appropriate analytic frameworks for accommodating them. Nonetheless, new categories are constantly being discovered and analyzed typologically. Consider the 'mirative', which marks sentences as containing information that is new or surprising to the hearer. After some earlier language-specific reports of the phenomenon, its first typological systematization was in DeLancey (1997). With regard to the lexicon, some areas—like kinship, colour, and ethnobiology—have been well explored, while others—like the classification of smell or of facial types—have been neglected.

The alignment of particular meanings with particular expressive subsystems means that the typical semantic domains studied by 'lexical typology' are different from those studied by typologies of inflectional meanings. But the main methodological problems are comparable across all subsystems. What is the relevant semantic field or cluster of closely linked categories? How do we establish valid cross-linguistic comparators? Can we set up implicational hierarchies that predict the order in which more specific meanings appear across languages, or semantic maps which use recurring formal similarities to establish conceptual similarity? How do we distinguish polysemy from monosemy and explain particular figurative uses? What set of cross-linguistically valid semantic components can be employed to derive language-specific meanings through different molecular configurations—or is this a quixotic task? Because these and other problems are essentially the same, whatever the subsystem, I will move back and forth between semantic subsystems in this chapter rather than having separate sections on 'lexical typology' and so forth.

[3] Work from a Construction Grammar approach (Goldberg 1995), which from one angle can be viewed as studying complex signs whose meaning cannot be deduced from that of their parts, is particularly well adapted to examining these and other types of complex signs, but ensuring cross-linguistic comparability obviously becomes significantly more difficult as the comparanda become structurally more complex.

A complex issue that has barely begun to be tackled systematically is the question of semiotic ecology: how do semantic choices made in one subsystem affect those in others? For example, it is widely believed that languages with grammatical number will not employ numeral classifiers (as in many East Asian and Mayan languages), and vice versa. It has also been argued that languages with numeral classifiers will have a 'cookie-cutter' lexicon, where lexical stems range over material/stuff/fruit/tree, with the classifier then picking out the particular manifestation (tree, fruit, leaf) by stipulating its shape. The sort of lexical diversification one finds in French, with its regular pattern of distinguishing fruit from the tree that bears it (*olive*, *olivier*; *pomme*, *pommier*, etc.), would on this argument not be found in such languages. In other words, the claim is that three features would be linked—having numeral classifiers, not having grammatical number, and not having distinct terms for trees as opposed to their fruit. Arguments like this have not yet been subjected to careful typological scrutiny, though see Koch (1999) for a more nuanced discussion of tree/fruit polysemy, and Behrens and Sasse (2003) for a sensitive analysis of the interplay between grammatical typology and lexicon with regard to one lexical item, particularly regarding genericity.

1.3 The problem of cross-linguistic comparison of meaning

Any typology requires a language-independent yardstick against which the units under comparison can be measured (see Stassen, this volume). This problem is particularly acute in semantic typology for two reasons.

First, there is a long relativist tradition, particularly within anthropological linguistics, that stresses the incommensurability of different conceptual traditions and the unsatisfactory nature of translation equivalents across languages. Within structuralist traditions, the doctrine that 'the meaning of a sign is its place in the system' suggests one cannot compare signs which belong to different systems. However, with the advent of prototype semantics (see van der Auwera and Gast, this volume), it became possible to distinguish the question of a sign's prototypical referent from that of its full denotational range (section 2.4). And it turns out that in many cases, signs belonging to quite different systems—for example, colour terms in languages with just five basic terms, as against those in languages with many more—have directly comparable prototypical referents, even though the semantic ranges of terms in the small-set system are much greater than those in the larger one. Such findings show that we can make greater progress in comparing signs cross-linguistically than was believed during the structuralist era (this is, of course, true of most areas of linguistic structure).

Secondly, the field of semantics is extremely fragmented in its approaches to representing meaning. What is the relative contribution of the relation of sign to signified, on the one hand, and of the structural relations between signs, on the

other (antonymy, synonymy, etc.)? Should meanings be represented by a logic-based metalanguage (as in studies of quantifier meanings), by diagrams (as in cognitive semantic approaches), by abstract features, by natural language paraphrases (section 2.2), or by external standards (e.g. Munsell colour chip codes, biological species names)? Semanticists remain deeply divided on these issues, and there is no integrated representational system for all types of meaning. In practice, cross-linguistic comparisons draw on all these methods, according to the investigator and the semantic domain, so that semantic typology seems fated to representational eclecticism for some time to come.

A further key issue in semantic typology concerns the relative value of etic and emic characterizations in formulating meaning.[4] An etic characterization sets out all logically distinguishable possibilities regardless of whether or not individual languages group them together, while an emic one seeks to characterize what is common to all members of a category from within the perspective of a particular language. Consider sibling terms. It is possible to factorize the 'etic grid' of logically possible sibling types into three dimensions—relative age (older vs. younger), sex of referent (male or female), and sex of 'anchor', normally the speaker (again, male or female)[5]—and then to treat the meanings of sibling terms in any language as clusters of points in this eight-value grid. According to which of the eight points receives the same term, we can then typologize systems of sibling terms into 4,140

	♂ referent		♀ referent		
	♀ speaker	♀ speaker	♀ speaker	♀ speaker	
(elder)	1	3	5	7	Maximal
(younger)	2	4	6	8	
(elder)	brother		sister		English
(younger)					
(elder)	kakak				Indonesian
(younger)	adik				
(elder)	ani		otōto		Japanese
(younger)	ane		imōto		

Figure 23.1. Some possible sibling term systems

[4] A parallel is sometimes formulated between intensional and emic, and extensional and etic, approaches. However, since sometimes both etic and emic formulations may be intensions (e.g. 'man's younger brother; woman's younger sister' vs. 'younger same-sex sibling', where the 'extension' would strictly speaking be the actual individuals being referred to), I will stick to the terms 'etic' and 'emic' here.

[5] In order to make this comparison, several analytic decisions were necessary; for example, not to include half-siblings, step-siblings ets., or types of cousin denoted by sibling terms in some languages, and not to pay attention to subdivisions between, for example, 'elder brother' and 'eldest brother'.

logical types (Nerlove and Romney 1967), of which several are illustrated in Figure 23.1. The data gathered in this way can be displayed and analysed solely with reference to a language-neutral etic grid. (An important point here is that some etic dimensions will only be forced upon the typologist once the sample reaches a certain size. With just Indonesian, Japanese, and European languages, the 'sex of speaker' dimension is unnecessary, but it is required once other languages are brought in, as we will see shortly.). By just focusing on this etic grid, Nerlove and Romney were able to achieve major findings, most importantly that only a very small fraction of the logically possible subtypes were attested across languages. Only fourteen of the 4,140 logically possible types appeared in more than one language of their 245-language sample.

But a disadvantage of concentrating on the etic is that it overlooks obvious elegances of characterization that appear once one gives emic formulations. Consider the Kayardild sibling system, which can be shown as in Figure 23.2. Focusing on *kularrind*, an etic characterization can merely note that it occurs in four cells, as shown. But this overlooks the more elegant characterization that can be given emically, namely, that it means 'opposite sex sibling' (i.e. brother of a female or sister of a male). Moreover, when we look more broadly at the Kayardild kinship system, we note that many further terminological choices depend on a distinction between same-sex and opposite-sex siblings at some point in the chain of relationship. The same-sex siblings of one's parents ('father's brother', 'mother's sister') are conflated terminologically with one's parents: *kanthathu* includes 'father' and 'father's brother'; *ngamathu* includes 'mother' and 'mother's sister'. And descending-generation terms are different according to the sex of the pivot: 'man's son' and 'woman's brother's son' are *kambinda*, while 'woman's son' and 'man's sister's son' are *kardu*. These and other facts pivot on the importance of the emically defined opposite-sex sibling concept, and suggest that typologies of kin-term systems will find correlations between choices in the sibling-term set and elsewhere in the system (parents/uncles/aunts, descending-generation terms), allowing implicational statements to generalize over sets of lexical items.

Despite these advantages to emic approaches, etically based comparisons remain more tractable and widely used in semantic typology, primarily because of the way they disaggregate the sets of real-world designata that the sign systems of different languages

	♂ referent		♀ referent	
	♂ speaker	♀ speaker	♂ speaker	♀ speaker
(elder)	thabuju	kularrind	kularrind	yakukathu
(younger)	duujind	kularrind	kularrind	duujind

Figure 23.2. The Kayardild sibling system

assemble into different emic groupings. The maximally differentiated elements that etic approaches employ can be more readily compared cross-linguistically, and in general it is possible to derive language-specific concepts later by considering what is in common to all denoted elements.

2. Typologies of the signified

2.1 Denotational range of individual signs

In comparing the denotational range of signs across languages, we encounter three main issues:

(a) granularity – how many categories are there in a given domain?
(b) boundary location – where do the boundaries between categories lie?
(c) grouping and dissection – what counts as instances of the same category? which criterial sub-elements does the category treat as important?

We illustrate these three types of issue, drawing from research on one domain where investigation of referents is straightforward—body parts—and one where it is more problematic—events.

2.1.1. Granularity

Consider the way we can divide human bodies into partonomic trees, like the following examples from Andersen (1978). In each, we follow up a partonomic path from fingernail (or equivalent smallest part) to the claimed 'root' of the tree, namely, 'body'. English sometimes makes cuts that other languages don't (e.g. between arm and hand, merged as *ruka* in Serbo-Croatian) and at other times ignores divisions that other languages make (Serbo-Croatian *noktište* 'half-moon' for part of the fingernail). Quechua *maki* illustrates a common methodological quandary: how to decide when signs are polysemous? This problem plagues partonomies, where it is frequent for the same term to be used for a part and the sub-part that remains when a distal element is removed: compare the different range of *arms* in *arms and hands* vs. *arms and legs*. Various tests can be used to distinguish multiple senses, such as the possibility of differential conjunction (*mind and body*, where *body* includes the *head*, vs. *beautiful face on an ugly body*, where *body* excludes it), differential negation (*her arm though not her hand* is OK, **her arm though not her elbow* is not), and distinctness of antonyms ($short_1$ <=> *tall*, $short_2$ <=> *long*). The need to use such tests shows that gathering data in semantic typology is not simply a matter of pinning labels to stimuli.

Granularity is equally relevant to event semantics. Event types can be analysed into smaller sub-events, and languages differ greatly in how far they bundle together a number of distinct event components into a single lexeme. English tends to lexicalize complex macro-events, whereas Highland Papuan languages break events down into their many constituent sub-events; for example, Kalam breaks 'gather (X:firewood)' into 'go hit get X come put' (Pawley 1993).

2.1.2. Boundary location

It might be thought that the universal architecture of the body, coupled with visual and functional discontinuities, would lead all cultures to place part boundaries alike. This is certainly a strong tendency, but there are exceptions (Enfield, Majid, and van Staden 2006): the Savosavo 'leg' category begins at the hip joint (and encompasses the foot), whereas Tidore *yohu*—roughly, 'leg'—cuts off three-quarters of the way up the thigh.

Instances like this are relatively rare in the realm of body-part terminology, but become much commoner when we pass to events, which as fleeting non-physical entities are much more amenable to culturally different construals. Consider events of *opening* in English and Korean, illustrated in Figure 23.4 (Bowerman and Choi 2001: 501). Here there is practically no line-up at all between the category boundaries given by English *open* and its various Korean near-equivalents. This example illustrates, again, the importance of fine-grained etic exemplars in doing typology: emic characterizations (like 'remove from tight fit' for *ppayta* vs. 'open') are too incompatible to allow direct comparison.

2.1.3 Grouping and dissection

Grouping involves determining what can be generalized over. Going back to our Serbo-Croatian example in Figure 23.3, note the terms *prst* and *nokat*, respectively, applied to 'finger' and 'fingernail'. While it is possible to draw their boundaries on a model of the hand, this would overlook the fact that they apply equally well to the corresponding parts of the feet and toenails: the translation 'digit' for *prst* can avoid

English	body	arm		hand	finger	fingernail	
Quechua	*kirpu*	*maki*	*maki* 'finger to elbow'	*maki*	*riru*	*silu*	
Serbo-Croatian	*tijelo*	*ruka* 'hand and arm'			*prst* 'digit'	*nokat* 'nail'	*noktište* 'half-moon'

Figure 23.3. Three partonomies, from fingernail to body

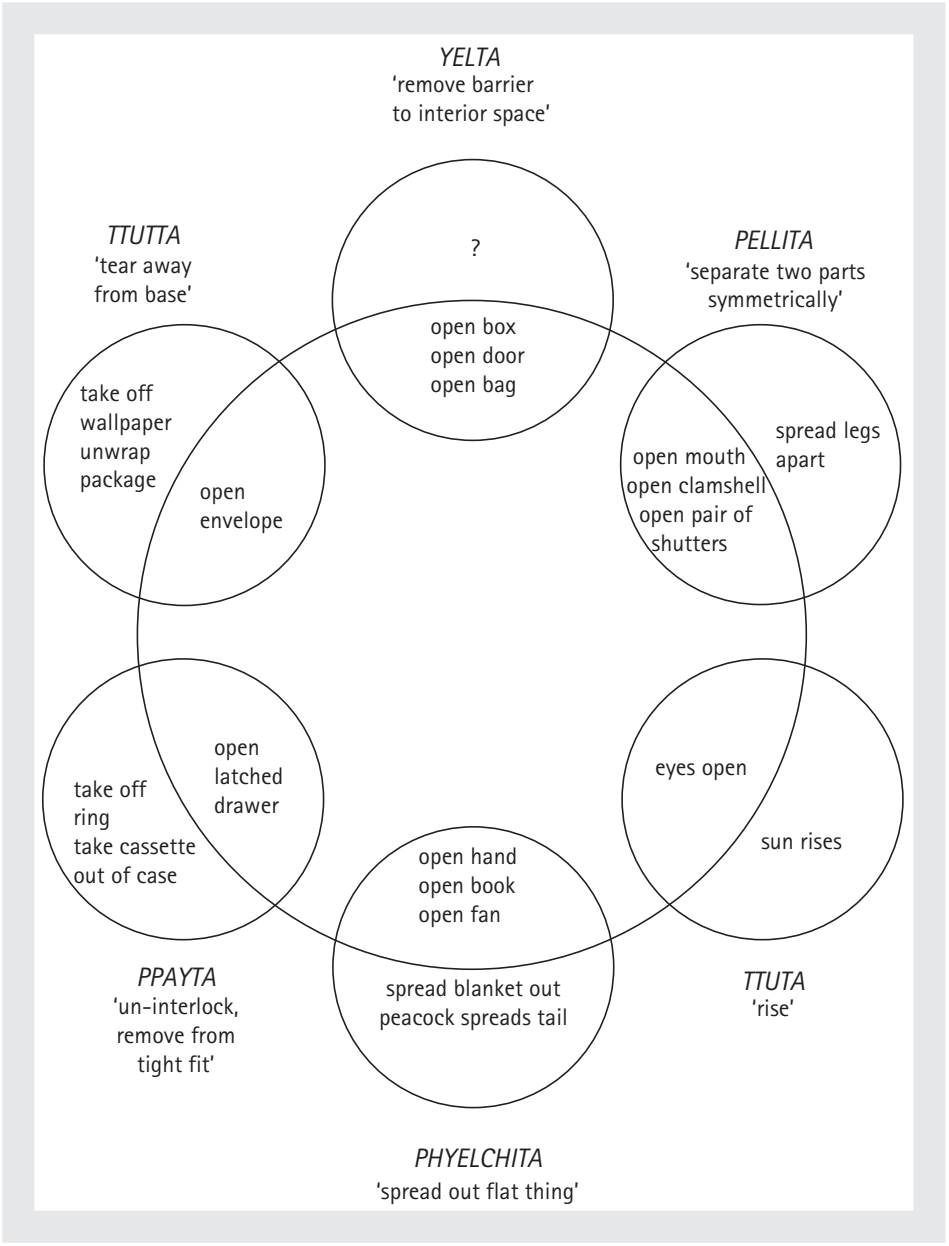

Figure 23.4. 'Open' and some Korean categories which overlap with it (Bowerman and Choi 2001)

the logical disjunction 'finger or toe' which implies a bicategorial structure we do not wish to import into Serbo-Croatian.

Groupings based on such parallel treatment of different body parts are also found elsewhere in the body. Brown (1976: 405) claimed that 'a labelled /leg (and foot)/ is never named by the same lexeme labelling /arm (and hand)/', and Andersen (1978: 352), that 'the categories HAND and FOOT [. . .] never share the same label'. But both claims have been falsified by more extensive data. Lavukaleve covers arms and legs (limbs) with a monosemous term, *tau* (Terrill 2006), part of a more general collapsing of upper and lower body-part terms, while Mawng (Hewett, Singer, Dineen, Stainsby, and Field 2005) subsumes 'foot' and 'hand' under the single term *yurnu* ('limb extremity').

The notion of grouping applies equally well to events. Most events have several identifiable phases, and languages may differ in which phase they take as type-defining. Consider the verb *xoj* in Tzotzil (De León 2001), which means 'cause an elongated object to end up encircled by a ring- or tube-shaped object': putting a ring *on* a pole, or a pole *through* a ring; putting an arm *into* a sleeve, or putting a coil of rope *over* a peg. Compared to English, this Tzotzil verb focuses on the end-state, but ignores the manner of producing it. Likewise, it ignores the question of which object needs to be moved to produce this end-state: the ring or the pole, the arm or the sleeve.

The link between grouping and dissection can be illustrated by considering holophrastic event expressions, found with ideophones or expressives in many languages. These present events as undifferentiated gestalts, like 'sound of rain on roof' or 'smell of rotten fruit fallen on ground'. Compared to English-style verbs like 'smell' or 'fall', which group event types in ways that generalize across the entities involved, expressives refrain from dissecting out the contributions of entity and event.

Dissection—the way complex phenomena are decomposed into parts—is also applicable to situations where languages make semantically consistent cuts to the fabric of possible phenomena. Since Talmy (1985), there has been extensive investigation of how languages dissect motion events into figure vs. ground, path, and manner.

Talmy showed that languages adopt consistent strategies in whether to code, by primary root, the manner (*floated into the cave*), the path (Spanish *entró a la cueva flotando*), or the figure (Atsugewi *-st'aq*'- 'runny icky material move/be located'). Now most languages can add back the other information by 'satellites', such as prepositional phrases in English (*into the cave*), gerundive phrases in Spanish (*flotando*), or directional prefixes in Atsugewi *(-ik-* 'on the ground', *-ic't-* 'into liquid'). However, the greater optionality of these expressions means that the dimensions dissected out by satellite strategy do not have equal status with the primary dimension, and are less likely to be encoded in texts or even visualized by hearers listening to narratives containing motion descriptions (Slobin 2003).

2.2 Features and primitives

As the above examples show, it is crucial to have elicitation tools that gather data in a language-independent way, but also representational methods able to state the meanings of each sign, in each language, in a way that avoids smuggling in denotational assumptions from a metropolitan language masquerading as a metalanguage. This leads semantic typology to the quest for basic units, in terms of which all meanings can be stated—what Leibniz called the 'alphabet of human thought'.

Much explicitly typological work in the 1960s and 1970s employed abstract features in componential analyses of structured semantic domains like kinship systems (see D'Andrade 1995). This approach was particularly favoured by cognitive anthropologists inspired by the use of features in phonology. The analyses of sibling-term semantics mentioned in section 1.3 are in this vein. Combinations of basic semantic components (male vs. female referent, older vs. younger, male vs. female anchor) can be used to generate an etic grid of all possible logical 'kin types'. The range of particular kin terms is then checked against this. Finally, particular kin-term meanings are characterized by configurations of features: {+ MALE REFERENT} for English *brother*, {+ ELDER} for Indonesian *kakak* 'older sibling', {+ MALE REFERENT, + ELDER} for Japanese *ani* 'older brother'. (Obviously, further features need to be added to restrict all these terms to siblings as against other kin.)

The appeal of these analyses lies in their economical use of a few components which combine to generate large numbers of terms, and their ability to give elegant, systematic accounts of semantic differences across languages. However, componential approaches have now largely been abandoned, for three main reasons:

(a) semantically uninterpreted features do not have determinable truth values without giving them a translation into some interpreted system;
(b) without a predicate-argument structure, features are unable to participate in standard logical relations, like entailment;
(c) while the components appear basic, many actually conceal complex semantic notions so that their use in defining some kin terms is circular (Wierzbicka 1986a).

Consider 'SAME GENERATION', used to pick out sibling terms from parents: this needs to be explicated in terms of generation, which brings in notions of parenthood, which must be characterized in terms of the relations 'mother' and 'father'—and 'father', in particular, is notoriously complex, since some cultures separate the roles of begetter, main male child-raiser, and wife's socially recognized partner.

An alternative approach (see Wierzbicka 1998) is to seek 'semantic primitives' (or 'semantic primes'): a meaningful subset of natural language elements which can be used to define all others. From a small set of basic undefined building-blocks, all definitions can then be crafted. This programme proceeds on two fronts:

(a) Internally to each language, successive attempts at reductive paraphrase can isolate which elements cannot be decomposed further. Selected words from the

language under study are used in definitions, on the principle that language can serve as its own metalanguage—hence the term Natural Semantic Metalanguage (NSM) for this approach—rather than diagrams, logical symbols, or featural notation. Each semantic prime must also have its own distinct combinatorics, enabling the construction of more complex expressions according to a conventionalized grammar;

(b) Cross-linguistic comparison—ideally of the elements obtained in each language by (a), but since this is such a long-term task for little-studied languages, there has been an increasing tendency to compare directly terms obtained in 'canonical contexts' with those claimed to be primitives in well-studied languages.

This approach has produced a candidate list of around 60 elements, with parallel translations in a variety of languages. These include substantives (e.g. I, YOU, SOMEONE), attributives (e.g. GOOD, BAD), mental predicates (e.g. THINK, KNOW, SEE), and various others (Wierzbicka 1998). Considerable successes have been notched up in showing how a range of more complex words, that do not have exact equivalents in all languages, can be defined in terms of these primitives and cross-linguistic differences stated between words in many varied domains. However, it faces the following problems.

The first is empirical: some languages appear to lack exponents of certain putative primes. For example, Kayardild does not have a productively combinable exponent of 'want' (Evans 1994).

The second is the logical problem of whether all languages construct complex expressions from the same primes: it could happen that all languages have some set of primes, but that in fact they make up complex expressions in different ways. Consider the realm of terms for *think*, *know*, and *mind*. For the NSM approach, the first two are primitive concepts, while the third, *mind*, is derivative (roughly, *the part of a person that they think with*). But there are languages, like Dalabon (Evans 2007a), where *think* and *know* lack specific exponents, and both (along with 'remember') derive from a root *beng* whose meaning is close to English *mind*. A derivative *bengkan*, etymologically 'keep/carry in mind', covers both 'know' and 'think', with the exact sense coloured by aspect and context. Such examples raise the possibility that languages can take different roads to the same Rome of comprehensive expressivity.

The third problem has to do with representation: is verbal definition the most appropriate way of representing all meanings, including, for example, spatial relationships? Might it not be the case that the best representational system blends verbal and other elements (diagrams, gestures)?

NSM practitioners have produced a vast body of semantic analyses across dozens of languages, and at present can lay claim to having developed the approach that has gone deepest into the possibilities of setting up a cross-linguistically valid set of

basic semantic categories in which all meanings can be stated. However, until the above problems are solved, we are still left without a generally accepted method for stating the meanings we seek to compare.

2.3 Systematic relationships between meanings

So far, we have concentrated on problems of individual signs. However, the semiotic systems of languages exhibit many sorts of structures and connections linking signs together: semantic fields of signs sharing significant parts of their meanings, taxonomic groupings, and partonomies. In seeking wordings which invite implicatural enrichment, speakers weigh up the choice of one sign not against every other sign in the language, but against a set of plausible alternatives in the same field or network. Hearers, in assessing what a speaker meant, employ similar comparisons. The structuralist dictum that the meaning of a sign is its place in the system is thus more accurately restated as: the meaning of a sign is its place in the subsystem. Some of the most important work in semantic typology has involved the study of such subsystems, such as colour (section 2.4) and ethnobiological taxonomies (2.5).

2.4 Semantic fields and implicational relationships: the case of colour terms

The most influential work on cross-linguistic regularity of lexical subsystems has been the rich vein of research on basic colour terms, initiated by Brent Berlin and Paul Kay (1969) with their World Colour Survey (WCS) and extended and debated in a large number of publications since then (see Hardin and Maffi 1997). This work targeted a domain that had once been believed to be arbitrary, with languages free to come up with any lexicalized division: 'out there' in the world, the rainbow is intergraded rather than striped, since there is a continuous spectrum of wavelengths. The discovery of strict constraints on permissible colour-term systems thus indicates the important role played by universals of human neurocognition in marking out the joints at which the world is to be carved. The main findings are that:

(a) there is a restricted universal inventory of basic colour categories; and
(b) though the size of basic colour-term inventories varies (from two to eleven), the structure of such inventories is highly constrained, with terms being added in a strict overall order, which can be characterized by an implicational hierarchy.

Methodologically, this work proceeded by using the 330 Munsell Colour Chips as the elicitation set. Speakers were asked to name each chip, but also asked to give the best exemplar chip(s) for each term, thus identifying their prototype(s). This

second step is crucial: obviously, one will not find identical denotational ranges when comparing a language with five terms and a language with ten, but it is logically possible—as Berlin and Kay found—that the prototypes remain unchanged even as the number of terms vary. Famously, even where languages merge 'blue' and 'green' into a single term ('grue'), this term features a double prototype, corresponding to the prototypes for blue and green in those languages that distinguish them, rather than having a single relocated prototype at the heart of the expanded category.

A crucial methodological step involves deciding what to include as 'basic terms'. To qualify, terms must be monolexemic (excluding 'sky blue'), used by all speakers (excluding 'magenta'), refer to a wide class of objects (excluding 'blond'), and not be a hyponym of another colour term (excluding 'scarlet' as included in 'red'). Though there has been criticism about how 'natural' the resulting systems are (especially in societies where particular colours are closely linked to particular referents), these are necessary steps if cross-linguistically comparable data are to be obtained.

Berlin and Kay found that as colour-term systems expand, they always do so in the following order (Figure 23.5), which represents only a minute fraction of the theoretically possible systems of 2–11 terms. This is, logically, a distillation of a large number of more specific implicational statements (e.g. if there is a distinct term for 'blue', there is a distinct term for 'yellow').

The patterning of possible systems has been shown to be rooted in the neurophysiology of vision (Kay and McDaniel 1978) and in particular the maximal-response wavelengths of the three sets of colour receptors organized in the opponent pairs black/white, red/green, and blue/yellow. Colour-term research thus offers a canonical example of how semantic typology can make sense of patterned cross-linguistic variation and tie it back to our shared neurological make-up.

It would be wrong, though, to give the impression that all is signed and sealed in colour-term research. Despite its ambitious sample size, the WCS only examined around 5% of the world's languages, with some skewing towards the languages of larger groups, who tend to have more complex technologies which divorce colours from particular objects. As in all typology, every claim is provisional while there are undescribed languages.

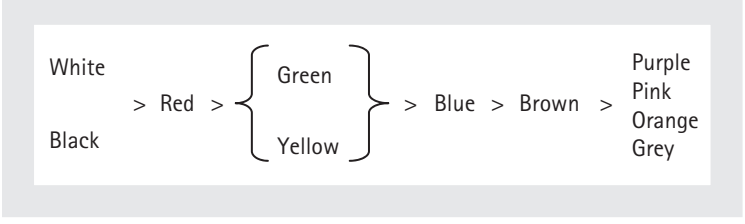

Figure 23.5. Berlin and Kay's implicational hierarchy for colour terms

First, individual studies continue to find basic terms that require some adjustment of the hierarchy: an example is Tsakhur, which possesses a basic term for turquoise (*anti:k'a*), requiring some modification of the overall theory (Davies, Sosenskaja, and Corbett 1999).

Secondly, at least one language, Yélî-Dnye (Levinson 2000b), has been argued to lack any basic colour terms at all. Even the term for 'white' is a reduplication of 'white cockatoo', so it is not a clear basic term. More damagingly, there is incomplete coverage of the Munsell space. Some patches of colour are described with reference to exemplifying objects ('dried leaves', 'parrot'), but there are substantial intervening gaps not covered by any term. This suggests that some languages simply have no basic colour-term systems at all (Kay and Maffi 1999), so the implicational statements given above must then be restricted to those languages which have developed a domain of colour terms proper, as opposed to descriptors based on colour metaphors or limited to particular objects.

2.5 Taxonomies and ethnobiology

Whereas the cross-linguistic regularities found with colour terms are attributable to what is shared in speakers' heads—in the form of a common neurological apparatus—that found when we turn to systems of biological nomenclature is attributable to the ontology of what is in the world, in the form of objectively discernible clusterings of features which lead observers from different cultures to construct parallel systems of biological terms. As Berlin (1992: 8–9) put it,

> human beings everywhere are constrained in essentially the same ways—by nature's basic plan—in their conceptual recognition of the biological diversity of their natural environment. [. . .] When human beings function as ethnobiologists [. . .] they do not construct order, they discern it [. . .]. [G]roups of plants and animals present themselves to the human observer as a series of discontinuities whose structure and content are seen by all human beings in essentially the same ways.

The recurring regularities Berlin and his collaborators found are of three main types.

First, there are remarkable parallels in the boundaries that all cultures establish in the natural world, at least at the level of generic terms like 'oak' or 'horse', and these coincide closely with the category boundaries established by scientific classifications. The parallels diminish, though, when we pass to higher-order ('life-form') groupings: just think of earlier stages of English, where whales were included as fish and bats as birds, or the Kayardild life-form categories *kunbulka* (large marine animal: sea turtle, dugong, whale) and *yarbuda* (non-marine animal: birds, reptiles, and insects).

Second, all languages organize their ethnobiological nomenclature into taxonomies, with inclusion relations holding between higher and lower nodes. In

contrast to scientific schemes, however, there are strong constraints on taxonomic depth, with a maximum of five levels: unique beginner (e.g. *plant*, *animal*), life-form (*tree*, *bird*), generic (*oak*, *parrot*), specific (*white oak*, *crimson rosella*), and varietal (*butter lima bean*). Terms at the generic level are the most numerous, and below that level, terms tend to be morphemically complex. Figure 23.6 gives a schematized taxonomy for English and Tzeltal. Note that the interpretation of the taxonomic system needs to allow for 'unaffiliated' generics, like Tzeltal *čenek'* 'bean' (which link directly to the unique beginner node, skipping a node at the life-form level). It also allows for covert categories at some levels, such as the recognition of an unnamed 'plant' category in Tzeltal on the basis that plant terms of all types can combine with the numeral classifier *-tehk* in examples like *oš-tehk teʔ* [three-plant tree] for 'three trees'.

Third, a crucial strand of ethnobiological research is to identify one level in this hierarchy as more basic, conceptually, developmentally, diachronically, and in terms of linguistic form. Work on basic-level categories, which 'are the categories that best mirror the correlational structure of the environment' (Rosch 1978: 31), has developed various experimental methods for determining basic category status

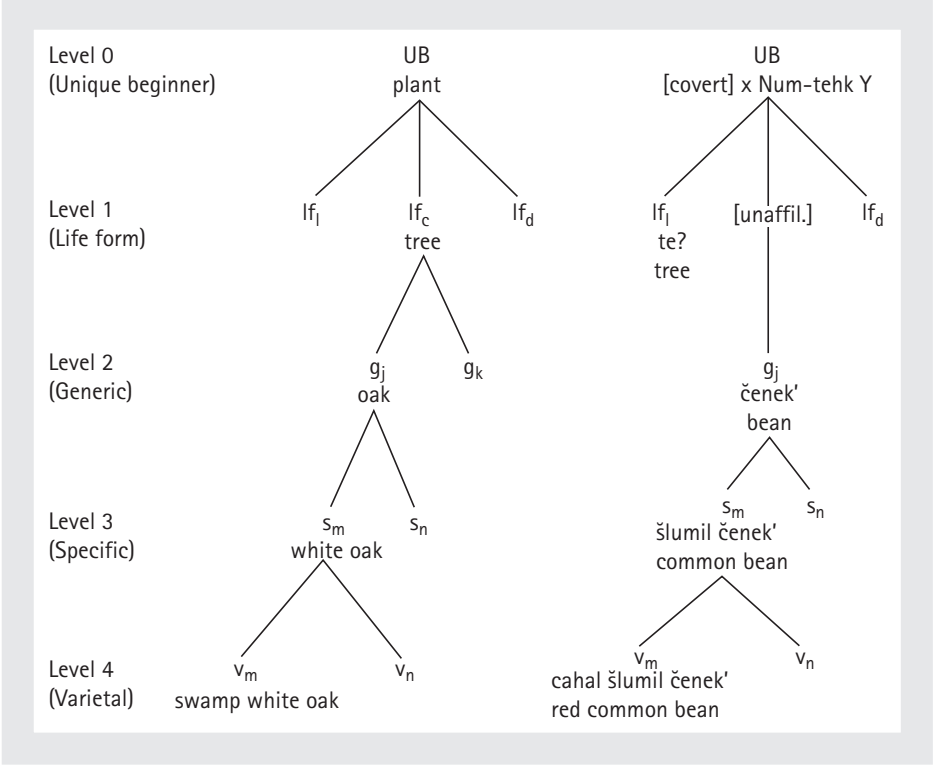

Figure 23.6. Fragments of the English and Tzeltal folk taxonomies (adapted from Berlin 1992: 16 and Berlin, Breedlove, and Raven 1973)

independently of linguistic form or meaning. In fact, these methods have produced equivocal results when used to determine basic category status in ethnobiological nomenclatures. Against the original hypothesis that basic-level categories would be at the level of the folk genus (e.g. Stross 1973), what counts as basic seems to reflect cultural familiarity and dominant lifestyle. Dougherty (1978) found that for American English speakers, their basic level of categorization is the life-form rather than the generic. But Boster (1980), examining manioc terms in Aguaruna, found differences between males, for whom the basic level is the generic, and females, for whom it is the specific or varietal, and attributed this to the fact that primary responsibility for horticultural activities lies with females. There thus appears to be significant cultural patterning in what counts as the basic level of categorization in ethnobiological taxonomies.

A fourth, more quantitative element of the findings in this research tradition is the mapping of the upper bounds of complexity for ethnobiological terminologies. For relatively complete ethnobiological descriptions, the number of named generic plant taxa ranged from 137 (Lillooet) to 956 (Hanunóo), and of generic animal taxa, from 186 (Ndumba) to 606 (Aguaruna). There were also significantly more named generic terms for traditional cultivators than for traditional non-cultivators (Berlin 1992: 98).

3. Factoring in the rest of the sign

In this section, we examine three important issues for semantic typology that go beyond the mere range of the signified, or sets thereof: iconicity, where we need to look at the relation of signified to signifier; polysemy and heterosemy, where we examine the types of semantic relation between different signs sharing a common signifier; and covert semantic categories, where the common semantic elements span classes of signs sharing the same combinatorics.

3.1 Iconicity

Iconicity concerns the degree to which there is a relation between the form and meaning of signs, whether they are simple or complex. Interest in whether this relation is motivated or arbitrary goes back to the Greeks. The structuralist emphasis on the 'arbitrariness of the sign' implied that the form of the signifier would only rarely be motivated by what it signified, but recent work has reconquered considerable territory under the banner of iconicity (see Bybee, this volume, and Haiman, this volume).

The original debate, as formulated by the Greeks, concerned how far forms of signs directly mirrored characteristics of their referents, as in onomatopoeia or sound symbolism (see Hinton, Nichols, and Ohala 1994). But contemporary work on iconicity is equally concerned with diagrammatic iconicity: the link between semantic relations and formal structures.

One important manifestation of this concerns conceptual distance. In many languages, for example, different kinds of possession are distinguished by different kinds of structure (Chappell and McGregor 1996), distinguishing between inalienable possession (*my shoulder*) and alienable possession (*my house*). Given that the first type of possession is more direct, the claim is that if the language distinguishes the two types, inalienable possessions will show less formal distance between the possessor and the possessee than alienable ones. Thus Paamese (Crowley 1982) adds pronominal suffixes directly to inalienably possessed body parts (e.g. *mete-n* [eye-3SG] 'his/her eye') but with other types of possession adds the pronominal suffix to one of a series of 'possessive classifiers' following the possessed noun: *aisin mo-n* [clothes POSS-3SG] 'his/her clothes'.

A second manifestation concerns the meanings associated with zero elements (i.e., signs whose signifier is zero): consider the fact that according to the verb involved, the unexpressed object arguments of transitive verbs will variously be interpreted as generic (*they ate [food/*themselves/*each other]*), reflexive (*they shaved [themselves/ *customers/*each other]*), or reciprocal (*they kissed [each other/*people/*themselves]*). Given that the length of linguistic expressions is subject to Zipf's law, with more frequently used expressions being shorter, this particular phenomenon has often been attributed to the effects of frequency of use, but the fact that such economic motivations exist (see Haiman, this volume) does not prevent the phenomena from being conventional and language-specific, and hence worthy of typological study, since in other languages, the effects are not found in this form.

Isomorphisms between semantic and morphosyntactic structure have also been central in formal semantic approaches (section 4).

3.2 Polysemy and heterosemy

A common departure from the idealized situation where each signified gets a distinct signifier is for signifiers to have more than one signified, as in a case like 'head' (of body, of organization, of column, etc.). Polysemy is an important tool for typologists interested in mapping semantic space, since cross-linguistically recurrent identity of form is a guide to relatedness of meaning. Consider English *must*, which can have both a deontic meaning of obligation (*you must leave now*) and an epistemic meaning of confident inference (*John must be leaving right now*); this particular semantic development is widely attested cross-linguistically (Traugott and Dasher 2002).

There is a close logical connection between synchronic studies of polysemy and diachronic studies of semantic change (see Figure 23.7), since a semantic development from *p* to *q* will always involve an intermediate stage of polysemy, with both meanings *p* and *q* available for the same sign. Synchronically, that is, we can ask which meaning pairs {*p*, *q*} constitute known cases of polysemy; diachronically, we can ask whether *p* is known ever to develop into *q* (or whether *q* ever develops from *p*). Diachronic approaches, however, have the advantage that we can examine the direction of development. Wilkins (1996), for example, draws on diachronic data from Indo-European, Bantu, Tibeto-Burman, and Dravidian to demonstrate that terms for 'visible person-parts' regularly develop into the corresponding 'visible whole', but not vice versa: thus, 'thigh', 'shin/calf', and 'foot' may each develop to mean 'leg', but never the reverse.

For many years, semantic change, in contrast to sound change, was considered to be fundamentally irregular. While there is no denying the many idiosyncratic cases shaped by specific cultural circumstances, recent typological approaches to polysemy and semantic change have revealed the presence of a great deal more order than was previously believed.

A great deal of work on polysemy has been conducted under the ambit of cognitive semantics, which sees polysemy as a key to understanding how the human mind continually adapts and extends its conceptual apparatus. From the point of view of pragmatics, which examines the contribution of context to the interpretation of meaning by human users, polysemy results from the constant need to mean more than conventionalized signs allow us to say easily. As such, polysemy provides evidence of how conventional signs, contexts, and inferencing systems interact. Shared language structure emerges through 'invisible hand' effects—as an unintentional product of intentional communicative acts (Keller 1998)—and polysemy is a key site for studying the interplay of individual speaker attempts to communicate through figurative language, and the accommodation of these extended uses in a conventionalized language system as patterns of standardized polysemy. Figurative language and polysemy thus provide an important window on language evolution (and comparative reconstruction) in the semantic domain.

	Stage 1	Stage 2	Stage 3	Stage 4
	f has meaning *p*	*f* has meaning *p* and a common implicature *q*	*f* has two meanings *p* and *q*	*f* has meaning *q*
Form	*f*	*f*	*f*	*f*
Meaning	'*p*'	'*p*'(+>'*q*')	'*p*', '*q*'	'*q*'

Figure 23.7. Stages in semantic change (adapted from Enfield 2003: 29)

With polysemy, the sign's combinatorics remain unchanged; where a change in signified is accompanied by a change in combinatorics, this is known as heterosemy (Lichtenberk 1991). The combinatoric difference may be major, such as a shift in word class (e.g. from noun to transitive verb, in the case of English *fish*/*to fish*), or it may be minor, such as a change in gender (German *die See* [fem.] 'sea, ocean' vs. *der See* [masc.] 'lake'). In such minor cases, one language's heterosemy is often another's polysemy. The metonymic relationship between 'yamstick' and 'woman', widespread in Australian languages and based on the symbolism of 'yamstick' as the prototypical woman's implement, appears as polysemy in some languages (Warrgamay *gajin* 'yamstick, female') and as heterosemy in others (Dyirbal *bala gajin* [neuter] 'yamstick', *balan gajin* [fem.] 'girl'), reflecting the fact that Dyirbal has a gender system but Warrgamay does not (Evans 1992). For this reason, it is often useful to include data from both polysemy and heterosemy in cross-linguistic work, though it is also important to remember that the semantic increment between the two meanings may be contributed, wholly or partially, by the semantics associated with the combinatoric class (e.g. activity or process, in the case of English *to fish*).

Language-particular studies of polysemy need to ensure that we are not dealing simply with monosemy, in the form of categories which are unitary from an emic viewpoint but which happen to involve more than one translation equivalent into English or some other metropolitan language of investigation.

Imagine I come to the analysis of English 'uncle' either from the background of Latin, where paternal and maternal uncle are each distinguished from father, or of Kayardild, where only the mother's brother has a distinct term (*kakuju*) and the father's brother is grouped with the father as *kanthathu*. Our naive Latin-centric and Kayardild-centric linguists might be tempted to postulate polysemy of English 'uncle', such that it includes '1. mother's brother, 2. father's brother', adding (from the Kayardild perspective) that the second meaning is 'a type of *kanthathu* who has not begotten the anchor of the kin relation'. As English speakers, we would feel that this analysis is clearly foisting unnecessary distinctions on a single category, simply definable as 'brother of a parent'.

This gets back to the point, made in 1.3, that emic language-specific categories should always be sought, for the sake of parsimonious semantic characterization; heuristically, monosemous definitions should be seriously attempted before postulating polysemy. However, polysemy is so widespread in every human language that it is naive to assert, on trust, the existence of some currently unformulable common meaning, leading to the sort of relativistic position which simply lists a very wide range of meaning without giving a precise common formulation. It also happens often that claimed monosemist analyses make use of a great deal of fuzzy interpretive latitude in determining exactly which cases a definition is supposed to apply to.

Because not all sources have gone through the necessary analytic steps to demonstrate unquestionably whether monosemy or polysemy is involved—and because there is frequently debate on the best analysis—typological work often adopts the same methodological shortcut that we mentioned in section 1.3,

comparing the maximal etic set directly without worrying whether some of them can be packaged together into emic characterizations for some of the languages involved. In fact, the cumulative process of comparing semantic ranges of individual signs is probably the most powerful tool in the quest to produce a maximally differentiated map of all meaning distinctions made in human languages—a semantic etic grid—while at the same time showing which meanings are particularly close. (This is comparable to the task, in which we are much more advanced, of compiling an inventory of all attested phonetic distinctions.)

We illustrate with the case of indefinite pronouns like 'somewhere', 'anything', and 'nobody', drawing on Haspelmath (1997). One dimension of organization, which we ignore here, concerns the ontological type of the referent; for example, person (*someone*), thing (*something*), place (*somewhere*). The other dimension involves a complex mesh of functional types, involving speaker knowledge (or otherwise), existence, nonexistence, specificity, or free choice of the referent.

Although languages typically distinguish a number of these functional types, none yet known distinguishes all of them. For example, most of the distinctions made in the English system are neutralized in a language like Hindi: *koii* can translate *someone* (*koii has phoned*, for 'someone has phoned'), the negated uses expressed by *no one* (*no koii is at home*, for 'no one is at home'), and the question use expressed alternatively by *someone* or *anyone* (*did you see koii*, for 'did you see someone/anyone?').

Looking in the other direction—distinctions made in other languages but not in English—*somebody* fails to make the distinction made in Russian by the choice between the *koe* series for specific known (to the speaker) (1) and the *-to* series for specific unknown (to the speaker) (2):

(1) Russian

Maša	vstretilas'	koe	s	kem	okolo	universiteta
Masha	met	INDF	with	who	near	university

'Masha met with someone (whose identity is known to me) near the university.'

(2) Russian

Maša	vstretilas'	s	kem-to	okolo	universiteta
Masha	met	with	who-INDF	near	university

'Masha met with someone (whose identity is unknown to me) near the university.'

Likewise, English indefinite pronouns do not distinguish between specifics—involving a specific single referent—and non-specifics—which can involve a range of different referents, either under distribution or multiple occurrence. Consider the ambiguities between the specific (a) and non-specific (b) readings of (3) and (4):

(3) *Everybody is reading something.*

a. the same thing is being read by everybody;
b. each person is reading something, not necessarily the same thing

(4) *On Saturdays someone from Derbent comes here.*
   a. it is always the same someone who comes
   b. a different someone from Derbent comes every time

A number of languages make this distinction formally: Lithuanian would express the specific reading of 'something' in (3) as *kaž-ką*, and the non-specific reading as *ką nors*, while Russian would express the specific reading of 'someone' in (4) as *kto-to*, and the non-specific reading as *kto-nibud'*.

Despite the very large number of systems one finds across the world's languages, each characterized by at least some polysemy, it is not the case that any given pair of meanings is equally amenable to expression by the same signifier. Rather, it is possible to construct a semantic map (see van der Auwera and Gast, this volume) which condenses a huge number of individual statements about possible shared forms in different languages into a single cross-linguistically integrated two-dimensional representation. In semantic maps, adjacency of two points (A and B) indicates that some language uses the same form to express both A and B. If points are non-adjacent, there will only be a form that expresses them both if it also takes in a complete sequence of intermediate points between them. (In this way, semantic maps can readily be translated into sets of implicational statements; see Haspelmath 1997: 62.) Haspelmath proposes the following semantic map for indefinite pronouns, based on his survey of 40 languages; on the map, I have superimposed the particular patterns of polysemy found in Hindi, Hausa, and English (Figure 23.8). Note that in this visual representation, direct semantic links are possible between 'close vertically adjacent' points (such as question and conditional) but not between 'distant vertically adjacent' ones (like free choice and direct negation).

The utility of semantic maps is not confined to the investigation of grammatical subsystems. They work equally well for representing meaning relatedness in lexical domains. Viberg's (1984) influential study of perception verbs found major cross-linguistic regularities: *see* may extend down to cover perception by other senses but not the reverse, and there is a bifurcation of downward extension between non-contact senses (hear, smell) and contact senses (touch, taste) such that *hear* can extend to smell but not to taste, while *touch* can extend to taste but not to smell. A complementary study by Williams (1976) investigated synaesthetic adjectives (e.g. the extension of *warm* from touch to colour, or of *sharp* from touch to hearing (in music)), and found an almost converse pattern: whereas verbs of sensory perception extend downwards from sight to the other senses, adjectives of sensation extend upwards from the lower senses (touch, taste) to the upper ones (sound, vision).

As these examples show, typologies of polysemy have now uncovered many wide-ranging cross-linguistic regularities (Traugott and Dasher 2002). Yet in other cases, scholars have discovered polysemic patterning that is highly specific to a particular culture area (see e.g. Matisoff 1978 on specific types of polysemy characteristic of Southeast Asia as a culture area), or even more specifically to

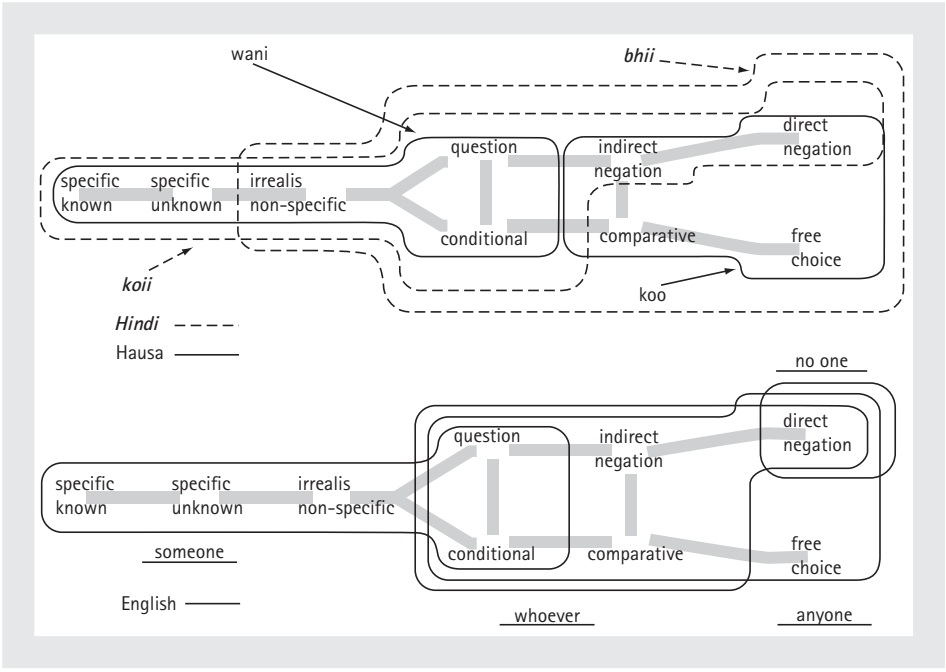

Figure 23.8. Semantic map of indefinite pronoun meaning?functions, in Hindi, Hausa, and English (adapted from Haspelmath 1997)

individual languages. For example, Sweetser (1990), in a study based on Indo-European languages, found only 'see', never 'hear', as the source of verbs for 'knowing' and 'understanding'. Yet a comparable examination of how perception maps metaphorically onto cognition in Australian languages (Evans and Wilkins 2000) found that 'hear' is the primary metaphorical source for verbs of understanding, thinking, and knowing, even though Australian languages parallel others in taking vision as the primary source for figurative extensions of perceptual verbs across sensory modalities. An example of the sort of context that promotes this particular extension is the Aboriginal practice of memorizing travel routes by learning sequences of place names (typically, in sung form). A Yidiny example illustrating how 'listen to' can generate the implicature 'remember/know' in a particular context is given in (5); the material in square brackets contains the non-literal implicatures as translated in this context.

(5) *bamaan guwal jarral galiingal / garru**binangalna** bulmba wanyja galing*
[Guyala replied:] 'People's names must be given to places all along the way. So that by-and-by [people] can **listen to** [and remember the sequence of place names along a route and know] where the places are going to.' (Dixon 1991)

Culturally patterned differences in polysemy thus arise as speakers of different languages appeal, in their figurative expressions, to culturally specific assumptions.

To the extent that their interlocutors share their assumptions, what starts out as a creative implicature in a particular 'bridging context' can become semanticized, losing its dependence on specific contexts for correct interpretation and entering the structured lexical system. In this way, studies of polysemy can be particularly revealing of the 'cultural scripts' that license particular figures of speech and other creative uses of language. This makes the study of polysemy an interesting meeting ground of general cognitive preferences and culture-specific modulations.

3.3 The semantics of covert categories

Rather than taking individual signs as our point of departure, we can set up classes of signs with comparable combinatorics and then examine what is common to their meanings. The unit with which we are associating the meaning is no longer a given sign with a given form, but a class of signs sharing the same combinatoric; it is in this sense that Whorf (1945) employed the term 'covert categories' (for him, defined by their 'reactance'), which we can usefully take over here.

Taking a word class like adjectives, for example, we can ask what range of signifieds is exhibited by members of the class under investigation. A classic example of this approach is Dixon's (1977) study of adjectives, which showed that if a language has an adjective class, it will include the words for 'big' and 'small', and 'good' and 'bad' before including words denoting human propensity ('intelligent', 'lazy', etc.). Similar approaches can be applied not just to the major word classes but also to subclasses like 'transitive verb' and so forth. An example of this approach is Kemmer's (1993) study of the middle voice, which includes a cross-linguistic comparison of which verb lexemes, when taken with a plural subject, give a reciprocal reading even without overt reciprocal encoding, of the type 'they fought (each other)' or 'they kissed (each other)' as opposed to 'they insulted *(each other)' or 'they stroked *(each other)'.

Work of this type has been able to show that even though the exact content of word classes varies cross-linguistically (thus, 'know' is expressed by a verb in English but by the predicative adjective *mungurru* in Kayardild), their core membership is stable, and it is only the peripheral members that vary across languages (see Bisang, this volume). It is also possible to turn the procedure around and see how semantically defined classes of lexemes map onto word classes, as in the study of kinship terms by Dahl and Koptjevskaja-Tamm (2001b), which demonstrates a number of distinctive combinatoric characteristics that mark them off from other nominals.

A particularly important line of research examining the semantics of combinatorically defined subclasses originated with work by the natural language philosopher Zeno Vendler (1967), then developed further by the formal semanticist David Dowty (1979). The essence of this approach is to define verbal subclasses—

Aktionsarten or 'types of actions', grouped by their inherent temporal properties—by using a battery of combinatorically defined tests. These tests may examine simple grammatical acceptability in certain morphosyntactic frames (e.g. 'be V-ing', which excludes stative verbs like *know*). Or they may look at entailments between variant syntactic environments (e.g. does 'John V-ed for an hour' entail 'John V-ed'), which works with 'activity' expressions like 'painted' but not with 'accomplishments' like 'painted a picture'. The crucial next step is to motivate the various combinatoric properties by showing how they interact with the internal semantic structure of the relevant verb, such as causative and inchoative elements. The study of a class's combinatoric properties thus becomes a major tool in effecting a partial semantic decomposition that represents the meaning common to all class members. Though the Vendler/Dowty work was primarily based on English and German, more recent work has sought to broaden the empirical base (e.g. Foley and Van Valin 1984, and Van Valin and LaPolla 1997). More sophisticated cross-linguistic work on aspect, which posits a more elaborate set of aspectual categories (Sasse 2002b), has shown that we need to increase the number of subclasses if we are to account for a fuller set of languages.

In fact, we can use a number of quite different combinatoric batteries to set up verbal subclasses on virtually orthogonal dimensions. We can use their interaction with valence-sensitive environments, defined by differences in voice and case frames, or with different types of complement clause to set up classes that are largely defined by argument structure. Two milestone language-specific studies are Apresjan (1974) for Russian and Levin (1993) for English. Or, in languages like Jaminjung (Schultze-Berndt 2000), whose rich set of auxiliary verbs makes these a sensitive test of verbal semantics, we can examine the covert classifications revealed by which auxiliary the lexical verb combines with (McGregor 2002). The initial findings from such studies indicate yet another semantic dimension of classification, having more to do with location, movement, and contact type. Again, though, combinatorically defined classes of the Jaminjung type have only been investigated in languages from one large-scale genetic grouping (Australian), and we lack a proper cross-linguistic systematization.

Event expressions, because of the internal complexity of their semantics and the great cross-linguistic variability in their lexicalization, are undoubtedly the most challenging domain for semantic typology. As indicated here, approaches sensitive to covert semantic categories are particularly fruitful in this domain. An integrated typological approach to the typology of event expressions will need to draw together the different sorts of classifications effected by combinatoric tests sensitive to internal aspectual structure, argument structure, and spatial disposition. This Herculean task has barely been articulated, let alone tackled in a systematic cross-linguistic fashion.

4. Compositional semantics

It is the ability to assemble signs recursively into complex structures which gives language the power to express an infinitude of meanings. The Principle of Compositionality posits that 'the meaning of an expression is a function of the meanings of its parts and of how they are syntactically combined' (Partee 1999: 739). Modelling this requires an apparatus capable of showing how semantic representations are built up alongside morphosyntactic assemblage. The most successful approaches to doing this have been carried out within the enterprise of formal semantics, which draws on the apparatus of logic to produce semantically interpreted versions of morphosyntactic structures.

Until relatively recently, formal semantics did not evince great interest in cross-linguistic variation, concentrating on English. Yet it is obvious that many of the phenomena discussed in formal semantic literature depend on contingent aspects of linguistic structure that happen to be present in English. Consider the well-known ambiguities of English sentences like *Every boy kissed someone here*, ambiguities which disappear when this is translated into languages like Lithuanian or Russian which distinguish specific and non-specific indefinite pronouns (3.2). The last decade has seen an explosion of interest in what consequences linguistic diversity has for the way semantic composition should be formally modelled. As Faltz (1995: 271) put it, 'if we take the notion of compositionality seriously, we are going to have to allow for the possibility that major typological distinctions in syntax might demand fundamentally distinct kinds of semantic interpretive mechanisms'. An epochal collection of studies of quantification, drawn from a wide range of languages, is Bach Jelinek, Kratzer, and Partee (1995); see also Matthewson (2001) for a more recent survey of how different languages deal with quantification, and Matthewson (2004) for issues in data collection.

To illustrate the interest of these issues, I will briefly mention work on one key question: whether the essential role of NPs in all languages is to express grammatical quantifiers over the domain of discourse.

In English and most familiar European languages, the normal position for quantifier placement is in the determiner slot of NPs—*all the men*, *each woman*, *some children*, *a girl*, etc.—even though this is not their position in the logical representation for sentences. Indeed, it is the centrality of quantifiers to this position that led to the terminological shift from 'NPs' to 'DPs' (Determiner Phrases) in more recent syntactic theories in the generative tradition. Such was the impact of English-type structures on conceptions of Universal Grammar that Barwise and Cooper (1981: 177) proposed the following 'NP-Quantifier Universal':

> Every natural language has syntactic constituents (called 'noun-phrases') whose semantic function is to express generalized quantifiers over the domain of discourse.

Now the cross-linguistic evaluation of this claim depends on how it is interpreted. As Partee (1995: 542) points out, following Thijsse (1983), if this claim is taken to mean simply that 'all languages have NPs and all NPs *can* be analyzed as generalized quantifiers', it is unobjectionable, and perhaps unfalsifiable. However, if it is taken in the following, stronger form, it becomes empirically problematic:

> All languages have essentially quantificational NPs, i.e. NPs which can be analysed as generalized quantifiers but not reasonably as referential (type e) or predicate (<e, t>). (Partee 1995: 542–3)

Challenges to this formulation come from languages where quantifiers do not form part of NP-like constituents. (Partee 1995 proposes the term 'D-quantifiers' for quantifiers which behave like determiners syntactically.) In Straits Salish, for example, quantifiers like *mək*ʷ 'all' cannot plausibly be syntactically linked to any phrasal constituent, and exhibit a corresponding lack of selectivity in scope. An example is (6), where *mək*ʷ can have scope over either of the arguments of the predicate, or indeed over the predicate itself.

(6) Straits Salish (Jelinek 1995: 514)

məkʷ=ł	ʾəw'	a-t-ø	cə	xčenxw
all=1PL.NOM	LNK	eat-TR-3ABS	DET	be.fish

'We ate all the fish/we all ate fish/we ate the fish up completely.'

Jelinek (1995) links this scopal indeterminacy to the syntactic structure of Straits Salish, which she analyses as a language without a noun/verb distinction and with just one major word class (predicate), which extends even to proper names. Predicates are followed by clitics indexing the person and number of arguments. But fuller lexical specification that would be done in English by placing a noun in a NP (e.g. *the fish*) is accomplished by forming an adjoined clause whose predicate, here, would be *xčenx*ʷ 'be fish', introduced by the determiner *c*ə, whose role is to mark the following predicate as giving further information about the argument indexed in a higher clause (here by 3ABS -ø). As a result, Straits Salish lacks D-quantification 'since only pronouns and variables occupy argument positions' (Jelinek 1995: 530).

To accommodate cases like these, Partee (1995) proposes an expanded typology of quantifier types, adding a further type, 'A-quantifiers', where A stands for 'adverbial'. These do not form a syntactic constituent with NPs, and must therefore resort to other means, such as topic-focus articulation, to determine what is in their scope. Languages whose only quantifiers are of this type are problematic for Barwise and Perry's proposed Universal, and imply that, to model them successfully, we may need quite different types of compositional architecture. This task—a fundamental one for the most basic levels at which meaning is represented—will require much greater collaboration between typologists and formal semanticists than the field has seen so far.

5. Conclusion

In semantic typology, more than any other sub-field of typology, many of the major investigations have been carried out by investigators who did not see themselves as doing typology—including anthropologists of kinship, ethnobiologists, philosophers of language, and cognitive semanticists looking at figurative speech. This, added to the deep fragmentation in fundamental assumptions that plagues the field of semantics, has retarded the growth of a systematized field of semantic typology. Nonetheless, the findings presented here should show how rich and varied the field is, how much it has to tell us about how humans think in language, and how the forces shaping language structure are tugged between the universal and the culturally specific—not to mention its implications for many other fields and endeavours, such as the design of the planned 'semantic web'.

Huge challenges still face the field: to extend its methods into new semantic domains, to develop a universal semantic grid in the form of an articulated ontology of possible referents that works for all domains in all languages, to chart a universal semantic map that links together the fragments that semantic typologists have begun to piece together (e.g. sensory verbs, indefinite pronouns), to balance systematization with a willingness to open up new lines of enquiry that discoveries in newly studied languages can throw up, and for logical approaches to develop a more flexible architecture of compositionality able to represent semantic differences across languages.

On the one hand, we need much more integration of existing findings stemming from other disciplines within the general conceptual framework of linguistic typology. But on the other, it is clear that semantic typology will continue to benefit, more than perhaps any other branch of typology, from the insights of other fields, including developmental psycholinguistics, concept formation, and neurocognition, which will enable us to see how the whole conceptual system and its connectivities is afforded by the human mind and brain.

To convey meaning is arguably the most basic goal any human language must achieve. At the same time, the ability of culture to shape many meaning categories makes semantics the domain of language which may prove to be more cross-linguistically variable than any other. This makes the quest to systematize and understand cross-linguistic differences in how languages organize meaning one of the most fundamental and challenging tasks not just for linguistic typology, but for humanistic scholarship and cognitive science.

Further reading

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