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Implicational Hierarchies¹

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Hierarchies are one of the most powerful theoretical tools available to the typologist. They allow us to make specific and restrictive claims about possible human languages. This means that it is easy to establish what would count as counter-examples, and as a result there are relatively few hierarchies which have stood the test of time.

1. The basic logic of hierarchies

Hierarchies are built out of typological statements, which are chained together. Let us start with an example:

(1) The committee have already discussed the proposal six times.

In British English, and to a lesser extent in some other varieties of English, it is normal to find a plural verb (*have*) in agreement with a noun phrase headed by a singular noun such as *committee*. This is an instance of ‘semantic agreement’, that is agreement according to meaning (since *the committee* implies more than one individual member). However, it is not simply that *committee* always allows the possibility of semantic agreement. We do not find:

(2) *These committee ...

Here only agreement according to form, or ‘syntactic agreement’ is possible. There are numerous other examples in the literature (see Corbett 2006: §§7.3-7.4 for references) where we find semantic agreement to be possible in the predicate but not in attributive position. We do not find the reverse. This means that we can make the simple implicational claim:

(3) the possibility of semantic agreement in attributive position *implies* the possibility of semantic agreement in predicate position

There are further agreement domains, as in these examples:

(4) a. The committee, which has met ... b. The committee, who have met ...

(5) a. The committee It ... b. The committee They ...

From a range of evidence, of which these examples are just a part, we can make two further implicational claims:

(6) semantic agreement in predicate position *implies* semantic agreement of the relative pronoun²

(7) semantic agreement of the relative pronoun *implies* semantic agreement of the personal pronoun

Each of these implicational claims is of interest to the typologist if taken individually. However, they are evidently connected, and we can chain them together into a hierarchy, with considerable predictive power:

(8) The **Agreement Hierarchy** (Corbett 1979)

attributive > predicate > relative pronoun > personal pronoun

Note that the claims are chained together in terms of their content; we are not dealing with a simple stacking up of unrelated implications. We have represented this chaining using the “>” sign. It represents decreasing canonicity of agreement domains (Corbett 2006: §1.4.3).³ With it goes greater likelihood of semantic agreement, which could equally be indicated with “<”. The use of either symbol makes good sense: the crucial point is the relative ordering of the four positions. What counts as top or bottom may vary according to the phenomenon and to one’s point of view.

Given the hierarchy as in (8), a basic claim would be that if semantic agreement is available at any position on the Agreement Hierarchy, it must be available at all positions to the right. The constraining effect of the hierarchy applied in this way can be seen in (9):

(9) Systems allowed by the Agreement Hierarchy

attributive	predicate	relative pronoun	personal pronoun	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	✓
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	✓
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	x
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	x
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	x
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	x
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	x
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓

= semantic agreement

In the way that we have stated the constraint, eleven of the theoretically possible sixteen situations are ruled out. However, hierarchies are in fact much more powerful than this as we shall now see.⁴

2. Monotonic increase

So far we have considered only binary choices at the different points of the hierarchy (semantic agreement is either possible or not possible). However, the published claim for the Agreement Hierarchy is much stronger, and reads as follows:

- (10) For any controller that permits alternative agreements, as we move rightwards along the Agreement Hierarchy, the likelihood of agreement with greater semantic justification will increase monotonically.

A monotonic increase is simply one with no intervening decrease, thus the following series each represent a monotonic increase: 1-2-3-4, 1-1-1-2, 10-42-42-88, 1-1-3-3. In contrast the following series do not: 2-1-2-3, 2-2-8-6. The appeal to a monotonic increase means that the hierarchy can be applied to constructions which show optionality and variability, as is certainly the case with *committee* nouns in English. The claim is that semantic agreement is as likely or more likely in the predicate as compared with attributive position; and then semantic agreement is as likely or more likely in the relative pronoun as compared with the predicate, and so on.

This is a strong claim. Specifically for the English construction, there has been a detailed investigation, by Levin (2001), and we shall report just some of his results here. Levin worked with substantial corpora of written and spoken language, checking not just for *committee* but for a further 25 similar nouns too (2001: 50), which we shall call ‘*committee nouns*’.⁵ Let us consider his data on spoken language. Levin used the Longman Spoken American Corpus (LSAC), which has five million words, and the ten million word section of the British National Corpus (BNC) devoted to spoken language:

(11) *Committee nouns in spoken American English and spoken British English*
(Levin 2001: 109)

	verb		relative pronoun		personal pronoun	
	N	% plural	N	% plural	N	% plural
LSAC	524	9	43	74	239	94
BNC	2086	32	277	58	607	72

There is a substantial amount of data represented here for the three positions on the Agreement Hierarchy where there is a potential choice (recall that in attributive position we find 0% semantic agreement for these controllers). Thus of the 524 examples of verb agreement with *committee nouns* in the Longman Spoken American Corpus, 9% showed semantic agreement, and so on. For both varieties there is clear evidence of a monotonic increase in semantic agreement as we move rightwards along

the hierarchy. The two varieties differ considerably, but each shows a pattern fully in accord with the requirement of the Agreement Hierarchy.

Since the English example is familiar and perhaps not too surprising, I will give a rather different set of data to confirm the effect of the Agreement Hierarchy. The data concern quantified expressions in Serbian/Croatian/Bosnian, consisting of a lower numeral ('two', 'three', 'four') or *oba* 'both' and a masculine noun of the first inflectional class. I have cited this construction previously, because it is so specific and unusual and yet it fits within the constraints of the Hierarchy perfectly. Moreover, there has been a second corpus study, confirming the results of earlier work.

In this construction, the noun stands in a special form, a survival of the dual number which is synchronically the same as the genitive singular. Attributive modifiers in this construction must take the ending *-a*. This form too is a remnant of the dual number and here I will non-committally label it as 'remnant'.⁶ It is an instance of syntactic agreement:

Serbian/Croatian/Bosnian

- (12) dv-a dobr-a brat-a
two-M.NOM good-REMNANT brother(M)-SG.GEN
'two good brothers'

In the predicate the syntactically agreeing form (the remnant form) is possible, but so too is the masculine plural form, which represents semantic agreement:

- (13) on-a dv-a brat-a su
 that-REMNPANT two-M.NOM brother(M)-SG.GEN AUX.3PL
 nesta-l-a / nesta-l-i
 disappear-PST-REMNPANT / disappear-PST-M.PL
 ‘those two brothers have disappeared’

The relative pronoun is also found in both forms:

- (14) dv-a brat-a koj-a / koj-i ... On-i ...
 two-M.NOM brother(M)-SG.GEN who-REMNPANT / who-M.PL... 3-M.PL ...
 ‘two brothers who ... They ... ’

However, as also illustrated in (14), the personal pronoun offers no choice; it must stand in the masculine plural form *oni* (we might have expected a remnant form, **ona*, but that form is not accepted).⁷

We have seen syntactic agreement in attributive position, both types of agreement occur in the predicate and the relative pronoun, and only semantic agreement is found with the personal pronoun. We have statistical data on the distribution of forms in the two relevant domains. The first set was collected before my claim about the Agreement Hierarchy was first made. The figures are derived from Sand (1971: 55-6, 63), who surveyed texts mainly from Serbian, and had a large proportion of newspapers in her sample. There is a second survey, by Leko (2000), which specifically tests the validity of the Agreement Hierarchy. This uses the Oslo Corpus of Bosnian texts from the 1990s (around 1.5 million words).

(15) Semantic agreement (per cent) with lower numerals in Serbian/Croatian/Bosnian

	attributive	predicate	relative pronoun	personal pronoun
Sand (1971) Serbian texts	[0%]	18% (N=376)	62% (N=32)	[100%]
Leko (2000) Bosnian texts	1% (N=507) ⁸	42% (N=259)	56% (N=52)	100% (N=18)

I give the percentage of masculine plural forms (semantic agreement) from the total of plural forms (the masculine plural and the remnant forms).⁹ The figures in ‘[]’ are included for the positions where Sand gives no data, since there is essentially no choice. The number of personal pronouns in Leko’s count is small because subject pronouns are frequently dropped.

This construction is highly language specific, and it is restricted to a few numerals together with nouns of one type only. Yet we still find a remarkably clear picture. Each successive cell in the table shows a monotonic increase in the likelihood of agreement with greater semantic justification. While the two corpora differ, they show essentially the same pattern. And more generally, the requirement of monotonic increase is much more constraining than the situation illustrated in (9). For further discussion of the Agreement Hierarchy see Cornish (1986: 203-11), Barlow (1991) and Wechsler and Zlatić (2003: 83-94).

3. Examples of hierarchies

We now turn to examples of typological hierarchies, and will consider in turn syntactic, morphosyntactic and lexical hierarchies.

3.1. Syntactic

A well-known syntactic hierarchy is the Accessibility Hierarchy, as presented in Keenan and Comrie (1977, 1979). It is constituted like this:

(16) The **Accessibility Hierarchy** (Keenan and Comrie 1977)

SU > DO > IO > OBL > GEN > OCOMP

The Hierarchy concerns the noun phrase positions which can be relativized, and the claim is that a S**U**bject is more accessible to relativization than a D**O**bject, which is in turn more accessible than an I**O**bject, and so on through major oblique, adnominal G**E**Nitive, and Object of C**O**mparison. Keenan and Comrie provide a semantic definition for relative clauses, such that a given language may have more than one relativization strategy (for instance, it may use relative clauses and participial phrases). However, the *primary* relative clause forming strategy must apply to a top segment of the Hierarchy. In other words, if it applies to any position on the Hierarchy it must also apply to all positions above that. It might apply just to the subject, or just to the subject and direct object, and so on. Let us begin with English examples, going from the top of the Hierarchy:

(17) The student who is presenting the paper

(18) The paper which the student presented ...

(19) The student to whom I lent the book ...

(20) The book about which everyone is talking ...

(21) The student whose bike I borrowed ...

(22) The man who Mary is taller than ...

The last example is possible, even if somewhat forced. Contrast this with French, where there are examples comparable to (17)-(21), but it is not possible to relativize on the last position on the Hierarchy (Keenan and Comrie 1977: 74):

(23) *le jeune homme que que Marie
DEF.ART.M.SG young man(M) than whom Marie
est plus grand-e
be.3SG more tall-F.SG
'the young man than whom Marie is taller'

This is an interesting difference between the two languages, brought out by the Hierarchy. Note that it is not necessary that every language should distinguish each

position; the claim is rather that if there is a distinction, then any difference in accessibility will be constrained by the Hierarchy.

A great deal of data has been put forward and discussed concerning the Accessibility Hierarchy, and there are issues which continue to require consideration. The Hierarchy depends on the notion ‘subject’, which itself needs careful analysis in many languages. There are also interesting problems which arise when a language has more than one relativization strategy. For discussion of this important Hierarchy see Comrie (1989: 155-160) and Song (2001: 211-256).

3.2. Morphosyntactic

Here there are two well-established examples. There is the Agreement Hierarchy, which we have already discussed (§1) and the Animacy Hierarchy, to which we now turn. This hierarchy has been proposed in several different variants, and under various names. For an account of the precursors see Corbett (2000: 55-56). We shall give a version modified from that presented by Smith-Stark (1974):

(24) The **Animacy Hierarchy** (Corbett 2000: 56, following Smith-Stark 1974)

speaker > addressee > 3rd person > kin > human > animate > inanimate (1st person pronouns) (2nd person pronouns)

This Hierarchy constrains number marking, as follows:

(25) As we move rightwards along the Animacy Hierarchy, the likelihood of number being distinguished will decrease monotonically (that is, with no intervening increase).

In many languages we find for instance that not all nominals can distinguish number. Even in English, where number-differentiability extends further down the Hierarchy than in most languages, we come at the bottom to nouns like *health* and *friendliness* which do not distinguish number. For a survey of the evidence available, see Corbett (2000: 57-75). To take an interesting example showing the constraint at work consider the Austronesian language Muna (a member of the Western Malayo-Polynesian branch), spoken on Muna, an island off the southeast coast of Sulawesi, Indonesia (van den Berg 1989: 51-52). Here we concentrate on verb agreement (rather than on the marking of nominals). Plural pronouns and plural nouns denoting humans take plural agreement:

(26) ihintu-umu o-kala-amu
2-PL 2-go-PL
'you go'

Nouns denoting inanimates, even when carrying a plural marker (as in (27)), take singular agreement:

(27) bara-hi-no no-hali
good-PL-his 3SG.RLS-expensive
'his goods are expensive'

That leaves non-human animates, which may take a singular or a plural verb:

- (28) o kadadi-hi no-rato-mo / do-rato-mo
ART animal-PL 3SG.RLS-arrive-PFV / 3PL.RLS-arrive-PFV
‘the animals have arrived’

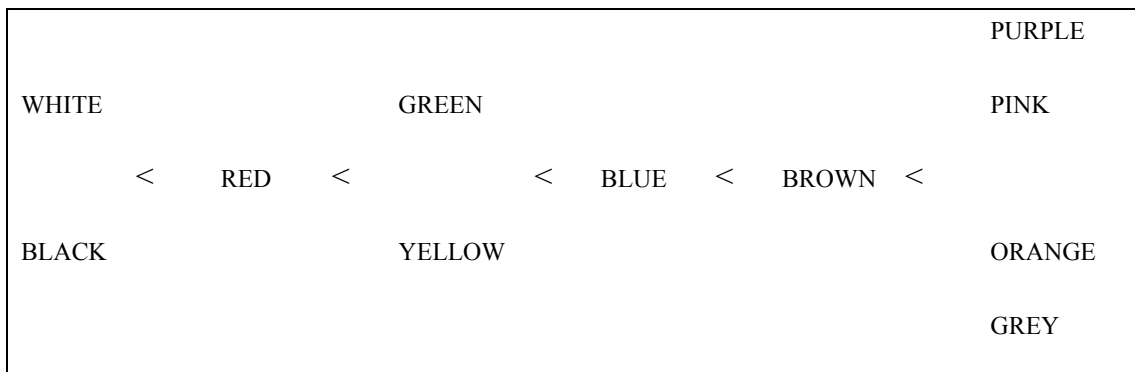
In Muna, the data available suggest that noun marking and agreement are in accord with the Animacy Hierarchy; however, the cut-off point for agreement is higher than that for marking on the noun. Note too the variable behaviour of the non-human animates, which fits with the monotonic requirement of the constraint.

3.3. Lexical

It may seem surprising that there could be a typological hierarchy for lexis, but a particularly famous one, the Berlin and Kay Hierarchy, is of this type, and it has generated a good deal of research. It was proposed in part as a reaction to extreme forms of linguistic relativity, since it showed that colour terms – often a standard example to demonstrate relativity – are subject to typological constraints. Since it was first proposed, the Hierarchy has undergone various revisions; it retains its interest both for the ongoing debates on linguistic relativity and for the wealth of research on many languages which it stimulated.

As originally formulated by Berlin and Kay (1969: 5), the hierarchy consists of the following positions:

(29) The **Berlin and Kay Hierarchy**



The Hierarchy constrains the possible inventories of basic colour terms as follows: the presence of any given term implies the existence of all those to the left (thus a language with a basic term for YELLOW will have basic terms for WHITE, BLACK and RED). For example, Berlin and Kay (1969: 46, 60, 64) claimed that Dani (New Guinea) has terms for light shades [WHITE] and dark [BLACK]; while Tiv (Nigeria) has in addition a term for RED, Hanunóo (Philippines) also has a term for GREEN, and so on.

Berlin and Kay were concerned with *basic* colour terms. Intuitively it is clear that *red* is a basic colour term, while *avocado* and *the colour of my favourite sweater* are not. However, defining ‘basic colour term’ is not straightforward. Berlin and Kay gave a set of criteria (four main and four supplementary ones); these criteria are discussed in Corbett and Davies (1995), where various linguistic and behavioural measures for basicness are proposed and evaluated.

The Hierarchy constrains the possible colour inventories substantially, allowing relatively few of those which would otherwise be theoretically possible. In fact it

proved too restrictive, and so it underwent a series of revisions, as more data and more systems emerged (see Kay, Berlin and Merrifield (1991) and Kay, Berlin, Maffi, and Merrifield (1997) for a restatement of the Hierarchy). The restatement is less straightforwardly hierarchical in nature, which is why we retain the original version for exposition.

4. Support from other phenomena

Any proposed hierarchy must be justified by the range of data which it explains and the closeness of fit between the data and the claim made. Further support may also be available from rather different phenomena. That is, when a hierarchy is proposed and justified on the basis of one set of data, the case is strengthened if the hierarchy proves applicable to other phenomena too. Let us see how this applies to the hierarchies already discussed.

The **Accessibility Hierarchy** was proposed to account for the relative clause formation. It was then applied to a quite different phenomenon, the behaviour of the different noun phrases involved in causative constructions (Comrie 1975a, 1976). This extension is discussed critically in Song (1996: 159-185) and Dixon (2000: 54-59).

The **Agreement Hierarchy** accounts for the possible patterns of syntactic and semantic agreement. It was later shown to be relevant to a related but different problem, the control possibilities of possessive adjectives (Corbett 1987). Here the

question is not one of the distribution of different types of agreement (as in §1) but rather whether the control of agreement of different targets is possible or not.

The **Animacy Hierarchy** has wide application. We saw above how it relates to number; it is also a determining factor in the distribution of case marking patterns (nominative-accusative and ergative-absolutive). Indeed, it was work by Silverstein (published in 1976 but presented earlier) on case marking which inspired Smith-Stark's use of the Hierarchy for the typology of number. For further discussion of its application to case see Comrie (1989: 185-200) and Filimonova (2005).

By its nature, however, the **Berlin and Kay Hierarchy** applies to colour terms and cannot be extended to further phenomena.

5. Use of hierarchies for research on individual languages

Hierarchies are typically proposed on the basis of cross-linguistic data; that is in the nature of typology. Once proposed and justified they have on occasion provided useful insights into individual languages. Just some illustrative examples are given here. Thus Keenan (1975) applied the **Accessibility Hierarchy** in a study of relativization in English, with interesting results. He argued that the Hierarchy could be justified only cross-linguistically since no one language could provide sufficient cut-off points to support the whole Hierarchy. Given that, would it then be reflected in a language which allows relativization at all points on the Hierarchy, and for which it could therefore be argued to be irrelevant? He collected 2200 examples of relative clauses from a selection of English texts. Relativization on indirect objects was taken

together with obliques. Usage showed a good fit with the Hierarchy in that relativization on subject position was by far the most frequent, followed by direct object, oblique and genitive (and interestingly there were no examples of relativization on the object of comparison like (22) above). This appears impressive. There is a possible alternative explanation, as Keenan himself points out, according to which the distribution would merely reflect the overall distribution of noun phrases in texts (that is, subjects are the most frequent, then direct objects and so on). This alternative suggestion has not actually been demonstrated.

Keenan further investigates different sorts of written texts, contrasting those with evidently simple sentence structures with those which presented greater complexity. Those which were more complex on other grounds showed more instances of relativization for positions lower on the hierarchy, as compared with the simpler texts (while still following it). Thus use of relative clauses for less accessible positions goes hand in hand with other markers of complexity. And in general, Keenan shows that the Hierarchy is relevant for a language which in principle can relativize on all positions on the Accessibility Hierarchy. More recently, Herrmann investigates relative clause strategies in British English dialects, and she pays particular attention to the Accessibility Hierarchy (2005: 48-86).

The **Agreement Hierarchy** was used to inform a series of small corpus studies of different Slavonic languages (Corbett 1983: 11-41, 158-159). Later it was tested rigorously in a large scale study of varieties of English (Levin 2001) and in a smaller investigation of Bosnian (Leko 2000).

The **Berlin and Kay Hierarchy** also proved an important tool for research into individual languages. It could be that there is simply a divide between basic and non-basic terms, the Hierarchy defines different possible inventories, and there is no

more to be said. Corbett and Morgan (1988) investigated the other possibility, namely that even in a language with a full set of basic terms, the Hierarchy can still be observed. In other words, some terms are ‘more basic’ than others. One line of investigation was frequency of use. If the Hierarchy is no longer reflected in a language with a full inventory of colour terms, we have no prediction concerning frequency. If, however, if the Hierarchy *is* still reflected, and we take frequency as an indicator of psychological salience (one of the Berlin and Kay criteria), then we may see effects of the Hierarchy in frequency. From a corpus of over one million words of twentieth century Russian (Zasorina 1977) we can extract the data given in (30):

(30) Frequency of basic colour terms in Russian texts

term	number of occurrences	rank (basic terms)
belyj 'white'	471	2
černyj 'black'	473	1
krasnyj 'red'	371	3
zelenyj 'green'	216	4
želtyj 'yellow'	109	8
sinij 'dark blue'	180	5
goluboj 'light blue'	137	6
koričnevij 'brown'	23	10
fioletovij 'purple'	22	11
rozovij 'pink'	49	9
oranževij 'orange'	15	12
seryj 'grey'	116	7
<i>highest non-basics (for comparison)</i>		
belosnežnyj 'snow-white'	67	
ryžyj 'ginger'	59	
buryj 'brown'	31	

If we bear in mind the null hypothesis, namely that the Hierarchy should have no effect, then the picture presented here is quite striking. There is an evident pattern which is similar to the Hierarchy. Thus the two most frequent terms are indeed *belyj*

‘white’ and *černyj* ‘black’. The degree of correlation with the hierarchy is high, $\tau = .77$, $p < .001$ (that is, this would occur by chance less than once in a thousand). See Corbett and Davies (1995: 304-312) for discussion of appropriate statistical tests for data relating to the Hierarchy.

There are also questions raised by the data in (30). Three basic colours are ‘out of order’. First *želtij* ‘yellow’ has fewer occurrences than would fit its position on the Hierarchy; this is a common problem with YELLOW, found in several other languages besides Russian. *Koričnevij* ‘brown’ is also low; it is taking over from an earlier term BROWN term *buryj* (Corbett and Morgan 1988: 45, 48, 51-2). In this corpus, *buryj* is actually more frequent than *koričnevij*; other counts of twentieth century Russian have reported *koričnevij* to be the more frequent (Corbett and Morgan 1988: 47). *Seryj* ‘grey’ is higher than expected; this proved a general problem with the Hierarchy, and GREY was given ‘wild card’ status.

There are two general points here. There is a remarkable similarity between the Hierarchy and the frequency data in Russian. The match is not complete, and the Hierarchy leads us to new questions about Russian. The most interesting of these is the situation of blue. Both *sinij* ‘dark blue’ and *goluboj* ‘light blue’ behave as basic terms in Russian (and their frequency shown in (30) is one piece of the evidence). This makes Russian particularly interesting in this respect. For fuller discussion see Corbett and Morgan (1988) and Corbett and Davies (1995: 328-330).

6. Further applications

6.1. *Diachrony*

Since a hierarchy constrains what is a possible language, it is also a constraint on language change, because languages move from one possible state to another. And indeed the requirement of monotonic increase sets bounds within which it is easy to conceive of particular changes.

As one example, changes in the balance of syntactic and semantic agreement often begin at the pronoun end of the **Agreement Hierarchy**. This is understandable, since the pronoun can be indefinitely distant from its antecedent, and this can lead to uncertainty as to the antecedent. Various examples are discussed in Corbett (1991: 248-259), including the interesting study of Wald (1975), who describes a change running through the gender system of some thirty Bantu languages, in accord with the Agreement Hierarchy.

The **Berlin and Kay Hierarchy** is particularly relevant to diachronic study. Colour terms appear to have an evolutionary development. Most areas of typological interest are cyclical in nature: they rise, develop, decay and are lost (and they can arise anew). Yet colour inventories seem only to grow.

6.2. *Varieties*

Linked to the issue of diachrony is that of varieties of a given language, since these may be the result of different changes or else of the same changes operating at different speeds. The most substantial study relating to hierarchies here is that of Levin (2001), who shows how the different varieties of English are remarkably different in their use of agreement, and how at the same time this variation is subject to the constraint of the **Agreement Hierarchy**.¹⁰

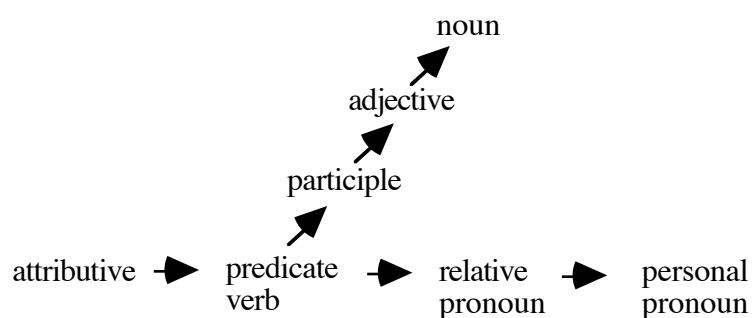
7. Further theoretical issues

We consider an extension of hierarchies, and the relation of hierarchies to semantic maps.

7.1. Subhierarchies

In some instances the data are more complex than can be described by a simple hierarchy. For instance, Comrie (1975b) gives a hierarchy of predicate types, justifying this hierarchy mainly on the evidence of agreement with honorific pronouns. We might imagine that we could slot this hierarchy of predicate types into the Agreement Hierarchy, simply by splitting the predicate position. However, this will not work, since the predicate type which favours semantic agreement to the greatest extent, the nominal predicate, is more likely to take semantic agreement than is the relative pronoun. We need a subhierarchy, anchored in the Agreement Hierarchy at the predicate position (which is narrowed to the verbal predicate) with the other predicate types extending out (somewhat like a branch line on a railway):

(31) The Agreement and Predicate Hierarchies



[NOTE TO TYPESETTER: These arrows should be the same as in (8): it's just that I can't do a '>' at a rising angle]

The claim for the monotonic increase in semantic agreement then applies to each link of the combined hierarchies. The resulting constraint is that semantic agreement will be more likely for predicate nouns than for predicate adjectives, and so on; however, there is no direct claim about the relative frequency for predicate nouns as compared with relative pronouns. For details and for the evidence in favour of this solution, see Corbett (1983: 87-88, 89-92, 163-174, 2006: §7.7.1) and Leko (2000: 271-277).

7.2. Semantic maps

It is worth asking how hierarchies relate to semantic maps, as proposed by Anderson (1974, 1982). A clear account of semantic maps is provided by Haspelmath (2003).

The important point to note is that 'an implicational hierarchy allows far fewer language types and thus makes stronger predictions than an implicational map.'

(Haspelmath 2003: 238). For critical discussion of semantic maps see Gil (2004: 414-416).

8. Conclusion

Hierarchies are a key part of linguistic typology. Even those which are restricted to binary choices make substantial testable claims. When we introduce the notion of monotonic increase, then hierarchies allow us to make very strong claims. Given this, it is not surprising that relatively few have survived. The ones that do hold up in the

face of the data place severe and interesting constraints on what is a possible human language.

9. Further reading

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² For English we can infer the number of the relative pronoun only from that of its predicate.

³ The relative pronoun is the least important of the hierarchy positions, given that many languages use other strategies for forming relative clauses.

⁴ If there is a proposed hierarchy but with some counter-examples, serious statistical issues arise: the obvious interpretation may well not be correct, and it is necessary to apply appropriate statistical tests. See Cysouw (2003), Maslova (2003) and Dryer (2003) for discussion. The discussion in those papers concentrates on cases where there are binary choices (such as 'possible' versus 'impossible') at each position on the hierarchy. We shall move on to instances where the requirement is for a monotonic increase along the hierarchy; this bears a heavier burden of proof.

⁵ Since the relative pronoun does not mark number, Levin first checked his substantial data and confirmed that *which* normally takes a singular verb and *who* is normally followed by a plural. He then counted relative pronouns as singular or plural on this basis, rather than establishing their number each time from the verb. Since relative *that* allows greater choice he included predicates of *that* within the predicate count. These decisions blur the picture somewhat, but Levin gives explicit information to allow others to recalculate and reinterpret his results (2001: 32-3, 55-60).

⁶ A case can be made for treating it synchronically as the neuter plural (Corbett 1983: 13-14, 89-92).

⁷ The pronoun is identical in a few forms with the demonstrative *onaj* 'that' (as in (13)); this is not significant for our examples.

⁸ Leko records six plural attributive modifiers but these are of the frozen modifier *nekih* 'some', which is genitive plural, and not strictly relevant (2000: 268).

⁹ The predicate may occasionally also be singular, something found much more frequently with higher numerals. To be consistent with Sand's count we omit four such examples from Leko's figures.

¹⁰ Typological hierarchies also form the stimulus for psycholinguistic work: see Keenan and Hawkins (1987) for a study based on the **Accessibility Hierarchy**, and Corbett and Davies (1995: 312-325) for discussion of psycholinguistic approaches to the **Berlin and Kay Hierarchy**.