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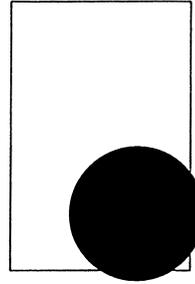
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# Marking theory and kinship analysis

Cross-cultural and historical applications

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## Abstract

The concept of marking was discovered in phonology by Trubetzkoy and generalized to morphology and grammar by Jakobson. In a fundamental application to anthropology, Greenberg integrated a generalized concept of marking into a cognitive-linguistic theory of kinship universals. Greenberg's theory is important for three reasons: (1) it leads to the discovery and explanation of cross-cultural universals in kinship classification; (2) it predicts the order in which kin terms evolve and establishes, thereby, criteria for evaluating alternative, competing reconstructions of kinship systems; (3) it provides a means for inferring features of prehistoric social organization. This paper illustrates these applications and points out the typological and cognitive implications of marking effects in kinship systems. The analysis demonstrates that a formal deductive approach to kinship can yield results not obtainable by more usual informal and inductive methods.

## Key Words

cognition • kinship theory • linguistics • marking theory

The concept of binary opposition at any level of the linguistic system as a relation between a mark and the absence of this mark carries to its logical conclusion the idea that a hierarchical order underlies the entire linguistic system in all its ramifications. (Roman Jakobson (Jakobson and Pomorska, *Dialogues*))

The concept of marking, or markedness, was discovered in phonology by Trubetzkoy (1929) and generalized to morphology and grammar by Jakobson (1932, 1939). Trubetzkoy realized that phonemic oppositions assume a hierarchical form in linguistic consciousness. One term is 'perceived as actively modified and as positively possessing some mark, while the other term is perceived as positively unmodified and lacking the mark' (Jakobson and Pomorska, 1983: 94–5). Jakobson saw that complicated morphological and grammatical systems, for example systems of declension and conjugation,

'display a clear and simple logic when they are properly decomposed into a hierarchical ensemble of pairs of marked and unmarked components in opposition to each other' (Jakobson and Pomorska, 1983: 96). Jakobson thought that marking was one of Trubetzkoy's 'most remarkable and productive ideas' and he anticipated interesting applications to ethnology and culture history. In a fundamental application to anthropology Greenberg (1966, 1990[1980]) integrated a generalized concept of marking into a cognitive-linguistic theory of kinship universals. Greenberg's theory, although it is not well known, is important for three reasons: (1) it leads to the discovery and explanation of cross-cultural universals in kinship classification; (2) it predicts the order in which kin terms evolve and establishes, thereby, criteria for evaluating alternative, competing reconstructions of kinship systems; (3) it provides a means for inferring features of pre-historic social organization. My purpose is to illustrate these applications and to point out the typological and cognitive implications of marking asymmetries in kinship terminologies. The analysis demonstrates that a formal deductive approach to kinship can yield results not obtainable by more usual informal and inductive methods.<sup>1</sup>

### GREENBERG'S THEORY

In Greenberg's theory there are two basic determinants of kin terms: the avoidance of disjunctive categories and marking rules. Conjunctive categories are 'defined by the joint presence of the appropriate value of several attributes' (Bruner et al., 1956: 41). Disjunctive categories are defined by the alternative presence of one or another value of these attributes. Experiments in cognitive attainment have shown that disjunctive categories are more difficult to learn than conjunctive ones (Bruner et al., 1956), and several studies, beginning with Greenberg's (1966) analysis of aunt-uncle and grandparent terms, have shown that disjunctive categories are rare or non-existent in kinship terminologies (Hage, 1997; Kronenfeld, 1974, 1996; Nerlove and Romney, 1967).<sup>2</sup> The conjunctive property of kin terms means that their evolution can be modeled as a semilattice in which change occurs in binary sequences (Epling, Kirk and Boyd, 1973; Hage and Harary, 1996).

Marking refers to a hierarchical relation between two terms of an opposition. In general the unmarked as opposed to the marked term is 'simpler in form, more common in usage and more elaborated in terms of subtypes' (Moravcsik and Wirth, 1986: 2). In phonology, for example, the marked nasal vowel is 'more complex acoustically than its oral counterpart in that it involves nasal resonances in addition to the oral resonances of oral vowels' (Greenberg, 1990[1980]: 317). In grammar and lexicon, marking involves contrasting values in meaning. In languages with tenses, the present tense, which can refer to present, habitual or future actions, is unmarked with respect to the past tense which can only designate actions in the past. In Greenberg's (non-generative) theory, marking applies to all aspects of language – phonological, grammatical and lexical-semantic – and is defined by ten logically independent, empirically convergent criteria. Five of these criteria are relevant to the present analysis.

- 1 Universal implicational statement. The presence of the marked term implies the presence of the unmarked term but not conversely. In linguistic morphology the presence of initial consonant clusters implies the presence of medial consonant clusters but not conversely. In kinship terminologies the presence of sex distinctions in

- the second descending (-2) generation implies the presence of sex distinctions in the second ascending (+2) generation but not conversely (Greenberg, 1966).
- 2 Zero expression in the unmarked term. Analogous to the presence of the mark in phonology, the marked term is overtly indicated. In Wappo, a Penutian language in California, the term for 'daughter' *ek'a* is simply the term for son plus a feminine suffix *ek'abi* (Gifford, 1922).
  - 3 Par excellence expression. The unmarked term may represent the entire category or the opposite of the marked term. In Tikopian kinship terminology *tama* means 'son' as opposed to *tama fafine* 'daughter' and it also means 'child' (Firth, 1936).  
We note that Scheffler (1987), in a critique of Greenberg, accepts only the par excellence criterion of marking. In English, *great uncle* (a kind of uncle) is marked for both Scheffler and Greenberg, but *grandfather* (not a kind of father) is marked for Greenberg, by overt expression, but not for Scheffler. In Scheffler's view, marking applies only to certain 'privative' oppositions. There is no compelling theoretical reason to insist on one particular criterion of marking as Greenberg (1987) made perfectly clear in his response to Scheffler. Scheffler's position seems to be that no predictions about marking are possible and that kinship terminologies must be taken on a case by case basis. The evidence presented in this article does not support such an agnostic view.
  - 4 Syncretization. When two sets of categories intersect, distinctions that are present in the unmarked category are absent or neutralized in the marked category. In the English pronominal system, a gender distinction in the singular (he, she, it) is neutralized in the plural. In English, sex differences are present in sibling terms but absent in cousin terms. Neutralization, as we shall see, can be interpreted diachronically as well as synchronically.
  - 5 Facultative expression. The overt expression of the marked category may be optional, e.g. author, a writer of either sex (unmarked), and authoress, a writer of the female sex (marked) (Greenberg, 1987: 368). A kinship example is 'the extended use of such terms as "mother" to include both the consanguineal type of female parent and the affinal type of female parent of spouse while the term "mother-in-law" designates only the affinal kin type' (Greenberg, 1966: 51).<sup>3</sup>

According to Greenberg, the criteria of par excellence, zero expression, syncretization, and facultative expression are implicit in Jakobson's 'over-all' definition of marking: 'The general meaning of a marked category states the presence of a certain property A; the general meaning of the corresponding unmarked category states nothing about the presence of A and is used chiefly, but not exclusively, to indicate the absence of A' (Jakobson, 1971 [1957], quoted in Greenberg, 1966: 72).

Greenberg's theory of marking in kinship terminologies unites two conceptual hierarchies in a single deductive framework: genealogical closeness and generational distance. In the first hierarchy, genealogically close relations are unmarked as against genealogically remote relations, where closeness is defined as the number of parent-child links in a genealogical chain connecting ego and alter with a common ancestor. Lineal relations are unmarked as against collateral relations, and close collaterals as against distant collaterals, e.g. 'sibling' ('brother' and 'sister') as against 'cousin'. Consanguineal relations are unmarked as against affinal relations, e.g. 'sister' as against 'sister-in-law'.

In the second hierarchy +1 relations are unmarked as against all other generations, and higher generations are unmarked as against corresponding lower generations, e.g. in Tikopian 'father' – *mana* and 'mother' – *nana* as against 'grandparent' – *tupuna* (Firth, 1936) and in Miwok 'grandfather' – *papa* and 'grandmother' – *ama* as against 'grandchild' – *atca* (Gifford, 1922).

There are two dimensions on which marking effects are culturally variable: sex and seniority – relative age (Hage, 1999a; Hage and Marck, 2001). The culturally variable marking of the seniority distinction can be exploited in the historical analysis of kinship systems as illustrated later.

**APPLICATIONS**

**Cross-cultural universals**

Anthropologists have often been puzzled by asymmetries in kinship terminologies, interpreting them as anomalies or inexplicable inconsistencies. In a study of Palauan kinship, Force and Force (1972: 62) concluded that 'the most notable terminological inconsistency was the presence of bifurcate collateral avuncular terminology [F ≠ FB ≠ MB] coexisting in a system that exhibited Hawaiian cousin terminology [G = PGC]'. This 'inconsistency' is not unique to Palauan. In a cross-cultural study, D'Andrade (1971) found that the presence of cross and lineal distinctions in cousin terms implies the presence of cross and lineal distinctions in uncle terms but not conversely. D'Andrade could not find a satisfactory explanation for this result, but in Greenberg's theory this is an implicational universal in which the presence of distinctions in more remote, marked, cousin terms implies the presence of the same distinctions in closer, unmarked, uncle terms but not conversely.<sup>4</sup>

An implicational universal is conventionally represented by a tetrachoric table in which exactly one cell has a minus value and the other cells have plus values. The unmarked feature is displayed horizontally and the marked feature vertically (Greenberg, 1978). In Tables 1 and 2, from D'Andrade, the unmarked uncle terms are displayed horizontally and the marked cousin terms vertically.<sup>5</sup> Since there is one exception in Table 1, and four exceptions in Table 2, these are 'near universals'.

D'Andrade's discovery is deducible from Greenberg's theory of marking:

It has long been known that cousin terminology is generally consonant with aunt-uncle terminology . . . but many exceptions exist. A study of these discrepancies will reveal a marking principle once more at work. The cousins as more remote relatives merge distinctions found in the aunt-uncle terms but almost never the other way

Table 1. Relation between uncle terms and cousin terms for cross distinction (from D'Andrade, 1971).

Cousin terms	Uncle terms	
	Cross distinction present	Cross distinction absent
Cross distinction present	174	1
Cross distinction absent	82	82

Table 2. Relation between uncle terms and cousin terms for lineal distinction (from D'Andrade, 1971).

Cousin terms	Uncle terms	
	Lineal distinction present	Lineal distinction absent
Lineal distinction present	82	4
Lineal distinction absent	135	118

around. Thus bifurcate merging systems are often accompanied by Hawaiian cousin terminology. The opposite situation, in which a generational system is accompanied by Iroquois cousin terminology, is far less common. (Greenberg, 1990[1980]: 325)

D'Andrade, in effect, independently discovered the concept of an implicational universal in kin term relations and he recognized its diachronic significance. As Kay (1971) wrote in the introduction to D'Andrade's paper:

The approach is in the style of Murdock's classic treatise, with two important innovations. First, D'Andrade capitalizes on zero or non-zero table frequencies and interprets these as phenomena requiring explanation in themselves. This approach to tables – which might be phrased, 'Look first for what never occurs and worry later about the relative frequencies of events that do occur' – is a useful one . . . D'Andrade notes that almost never does a semantic distinction occur in a language's cousin terms and not in its uncle terms. From this, it follows that a language not possessing a distinction must gain it, if at all, in its uncle terms before its cousin terms, and similarly that a language possessing a distinction in both uncle and cousin terms must lose it, if at all, in the cousin terms first. (Kay, 1971: 60)

D'Andrade's study illustrates the effect of marking on collateral distance. A well-known study by Aberle (1967) can be interpreted to show the effect of marking on generational distance (Hage, 1999b). Both studies illustrate the limitations of a purely inductive approach to kinship analysis.

In a cross-cultural analysis of alternate generation terminologies Aberle (1967) found that the merging of relations in the  $+1/-1$  generations (prototypically, PG = GC) implies the merging of relations in the  $+2/-2$  generations (PP = CC or PP = PGC = CC), but not conversely. Aberle, like D'Andrade, was unable to explain his result and concluded that it was 'a finding in search of a theory'. The implicational relation between  $+1/-1$  and  $+2/-2$  equations is, however, predictable from Greenberg's theory of marking if it is rephrased to say that the *presence* (as opposed to the absence) of distinctions in the marked  $-2/+2$  generations implies the presence of distinctions in the unmarked  $+1/-1$  generations but not conversely. This relation, using Aberle's limited data, is shown in Table 3.<sup>6</sup> The only exception in Table 3, Moala, distinguishes between PG and GC in terms of address but not in terms of reference.

Many other implicational hypotheses, which could be tested cross-culturally, follow from Greenberg's theory. An unexpected but logically consistent marking relation concerns sex of speaker. As Greenberg (1966: 105) observed, sex of speaker distinctions, if

Table 3. Implicational relation between alternate generation terminologies based on data in Aberle (1967).

Distinctions in +2/-2 generations	Distinctions in +1/-1 generations	
	Present (PG ≠ GC)	Absent (PG = GC)
Present (PP ≠ CC)	35 cases	Moala
Absent (PP = CC)	Gilbertese	!Kung
	Masai	Murugin
	Suban	Araucanian
	Western Apache	Dobu
		Hekandika
	Kapauku	
	Nyakyusa	

they do not apply to both members of a reciprocal or self-reciprocal pair, will always be distinguished by egos in the higher, unmarked, generation. This asymmetry is found in both elementary (prescriptive) and cognatic terminologies. In Kariera, a prototypically elementary system, closest to the *ur*-human kinship system proposed in Allen's (1986) tetradic theory, sex of speaker distinctions apply to all four +2/-2 terms: *maeli* = FF and man's SC; *kabali* = FM and woman's SC; *tami* = MF and man's DC; and *kandari* = MM and woman's DC.<sup>7</sup> In Spokane, and in many other cognatic terminologies in western North America, the +2/-2 terminology is isomorphic to that of Kariera while the +1/-1 terminology has sex of speaker distinctions either for both members of a reciprocal or self-reciprocal pair or for the senior member alone (Elmendorf, 1961; Gifford, 1922; Hage, 1999c).

We note that marking effects also occur in 'linked relationship terms'. In Tikopian a relational particle, *tau*, can be used to refer to pairs of kinfolk (Firth, 1936). For example, *kave* means 'opposite sex sibling' but *tau kave* means 'brother and sister'. When the kinfolk are in different generations, the term for the relative in the higher unmarked generation is used. *Mana* means 'father' and *tama* means 'child' but *tau mana* means 'father and child'; *tuatina* means 'mother's brother' and *iramutu* means 'sister's child' but *tau tuatina* means 'mother's brother and sister's child' and so on.

### Historical interpretations

Marking theory is implicitly diachronic, concerned with processes of terminological change. It can contribute to the historical analysis of kinship systems in three related ways.

First, synchronic universals can be interpreted diachronically to predict the order in which kin terms evolve. For example, the implicational relation between the presence of cousin and uncle terms implies that cousin terms are either added last or (probably more likely) lost first. Historical ethnographic evidence for the latter possibility was collected by Dole (1969). Dole showed that kinship terminologies with bifurcate merging aunt-uncle terms and generational (Hawaiian) cousin terms, which she christened 'bifurcate generational', are common in the world even though they have escaped the notice of

many anthropologists. She interpreted cousin terms as 'more sensitive indicators of social change', and she attributed their loss in three different regions of the world – lowland South America, the plains of North America, and Oceania – to the disappearance of kin group exogamy consequent upon demographic disturbance and social disruption.

Dole made no reference to Greenberg and D'Andrade made no reference to Dole or Greenberg, but all three studies clearly belong together. Greenberg's theory of marking predicts the implicational relation between cousin and uncle terms, D'Andrade's cross-cultural test confirms the hypothesis, and Dole's analysis provides historical evidence and a possible sociological explanation for this relation.<sup>8</sup>

In the case of alternate generation terminologies, a recent comparative linguistic analysis supports the diachronic interpretation of marking theory (Hage, 1999c). Proto-Salish had both  $+2/-2$  and  $+1/-1$  equations, but one or both of these equations were lost in some of the daughter terminologies. Consistent with the prediction of marking theory, the emergence of distinctions between members of alternate generations happened first in the unmarked  $+1/-1$  generation and then in the marked  $+2/-2$  generation.

Second, the recognition of marking asymmetries can assist in the evaluation of alternative competing reconstructions of kinship systems. In a reconstruction using the comparative method of historical linguistics, Hoijer (1956) concluded that Proto-Athapaskan had two grandparent terms ( $FF = MF, MM = FM$ ), generational (Hawaiian) cousin terms ( $G = PGC$ ), and bifurcate collateral aunt-uncle terms ( $F \neq FB \neq MB, M \neq MZ \neq FZ$ ). White (1957) challenged this conclusion on the basis of Murdock's (1949) typological (non-linguistic) reconstruction of Proto-Athapaskan society as 'Normal Hawaiian', a type in which both cousin and aunt terms are generational.<sup>9</sup> White assumed that kinship terminologies are generally symmetric: 'The fact that Hoijer independently concludes that grandparent and cousin terms were generational in form in Proto-Athapaskan would make an interpretation of a generational form for aunt-uncle terminology more consistent with a functioning system' (White, 1957: 447).

White's argument of symmetry in Proto-Athapaskan kinship terminology can be rejected for two reasons. First, as Hymes and Driver (1958: 154) pointed out, White's argument presupposes 'an incredibly large number' of independent parallel shifts in which 'the same cognate forms [for aunt and uncle] independently acquired the same meaning'. Second, and conclusively, given that White (1958) remained unconvinced by the linguistic objections of Hymes and Driver, his argument ignores the implicational relation between cousin and uncle terms and between  $+1$  and  $+2$  generation terms. As shown in Tables 1 and 2, the presence of lineal and cross distinctions in marked cousin terms implies the presence of these distinctions in unmarked uncle terms, but not conversely. The same holds for cousin and aunt terms, as can be verified using the data in Murdock's (1970) cross-cultural tabulation of kin terms. Similarly, if Proto-Athapaskan grandparent terms were generational, i.e. included PPG, this would also be consistent with marking theory, which predicts that lineal and cross distinctions are present in  $+2$  terms if and only if they are present in  $+1$  terms, but not conversely. Hoijer's reconstruction of Proto-Athapaskan kinship terminology is perfectly consistent with the predictions of marking theory.<sup>10</sup>

Third, marking, in the form of neutralization effects, can lead to inferences regarding aspects of prehistoric social organization. In Dole's study, the loss of cousin terms was

interpreted as a reflection of the shift from exogamous to endogamous marriage systems. A somewhat different example may be given based on the neutralization of relative age distinctions in Oceanic sibling terminologies (Hage, 1999a).

It appears that seniority (relative age) – eG versus yG – is not marked on a universal basis. If so, the marking of one or the other of these terms may provide clues regarding types of social organization. Proto-Oceanic sibling terminology had four terms based on the distinctions of sex, seniority and parity: *\*tuqaka* 'essG', *\*tansi* 'yssG', *\*mwaqane* 'woman's B', *\*papine* 'man's Z' (Milke, 1938; Pawley, 1981). Comparative ethnographic evidence shows that many Oceanic-speaking societies are stratified by a rule of primogeniture and it has been proposed that this was a feature of Proto-Oceanic society (Kirch, 1997). The linguistic evidence for this proposal is the presence of a seniority distinction in Proto-Oceanic sibling terminology and its continuation in many Oceanic terminologies. Cross-culturally, however, many egalitarian societies in different parts of the world have sibling terminologies with a seniority distinction. Marking theory suggests a stronger argument.

If Proto-Oceanic society was in fact stratified by a rule of primogeniture, the term for elder sibling, as designated heir and successor, should be marked. This is shown

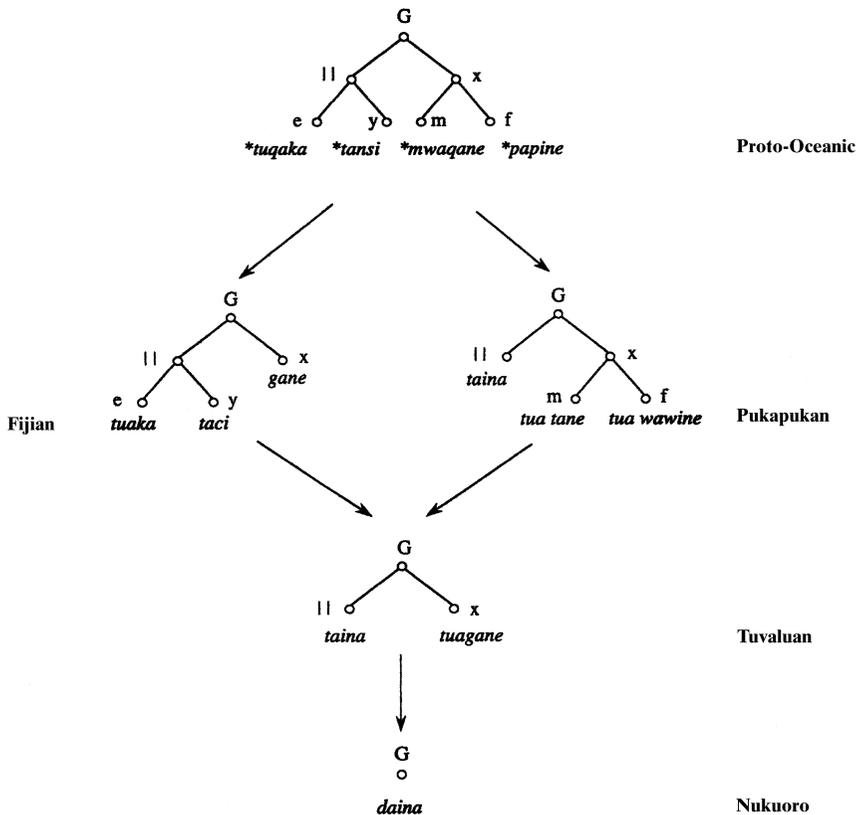


Figure 1. A lattice model of evolutionary changes in Oceanic sibling terminologies. Key: G sibling; || parallel; x cross; e elder; y younger; m male; f female.

synchronously, in languages such as Fijian in which the term for 'younger (parallel) sibling' also means 'sibling' irrespective of age or sex (Thompson, 1940; Hage, 1999a). It is shown diachronically in the neutralization of the term for elder sibling. In the evolution of Oceanic sibling terminologies, when the seniority distinction is neutralized (lost) the term for younger parallel sibling invariably replaces the term for elder parallel sibling and stands for parallel sibling, and ultimately for sibling in general.<sup>11</sup> This process is shown in the 'lattice' of Figure 1, which depicts the devolution of Oceanic sibling terminologies starting from a proto-terminology consisting of four terms, changing to terminologies with three terms, two terms and ending with a single term. The Pukapuka and Tuvaluan terms for 'parallel sibling', *taina* (and the Nukuoro term for 'sibling', *daina*), are reflexes of the Proto-Oceanic term for younger parallel sibling *\*tansi*. As Jakobson emphasized with respect to the application of marking rules to ethnology, the relevant thing is to discover which term of an opposition is marked for a given culture or epoch (Jakobson and Pomorska, 1983).

### MARKING THEORY, TYPOLOGY AND COGNITION

The premise of marking theory is that kinship systems, like other linguistic systems, are hierarchically structured. This property has important typological and cognitive implications.

#### Typological implications

Trautmann (1981) has observed that the Lowie (1928)–Kirchhoff (1932) typology, in effect, doubled Morgan's (1870) overly simplistic descriptive-classificatory scheme by distinguishing four different types of kinship terminologies: bifurcate collateral ( $F \neq FB \neq MB$ ,  $M \neq MZ \neq FZ$ ), bifurcate merging ( $F = FB \neq MB$ ,  $M = MZ \neq FZ$ ), lineal ( $F \neq FB = MB$ ,  $M \neq MZ = FZ$ ), generational ( $F = FB = FZ$ ,  $M = MZ = FZ$ ). Trautmann emphasizes the adequacy of this typology for cross-cultural analyses on the presumption that kinship terminologies have 'strong symmetry'.

The new [Lowie–Kirchhoff] taxonomy directed attention to the parents' generation and singled out three genealogical kintypes as diagnostics, either the males F, FB and MB or the females M, MZ and FZ, sex of relative being in this method a matter of indifference, because actual terminologies generally classify both sexes in a comparable manner. The strong symmetry of actual terminologies provides that the reciprocals of these kintypes in the children's generation [man's C; man's BC; man's ZC; woman's C; woman's ZC; woman's BC] will be merged or distinguished in a comparable way and further makes it likely that kintypes in ego's generation will be classified in analogous fashion. For these reasons the fourfold classification [of Lowie and Kirchhoff] makes a convenient and effective preliminary sorting device with which to approach the problems of worldwide cross-cultural comparisons. (Trautmann, 1981: 83)

Certainly, the Lowie–Kirchhoff typology has its uses, but, as we have seen, in actual kinship systems 'strong symmetry' is too strong an assumption. On the dimension of generation, many bifurcate merging systems are 'bifurcate generational' (Dole, 1969), having separate terms for cross-aunt and cross-uncle (unmarked) but not for cross-cousin

(marked). On the dimension of sex, many bifurcate merging systems are 'semi-bifurcate merging' (Lounsbury, 1969), having terms for cross-uncle (unmarked), but not cross-aunt (marked). In Lounsbury's (1964: 387) classification, fully bifurcate merging 'distinguishes between "cross" and "parallel" kin types for both males and females in the first ascending generation and, in relation to both a male and a female ego, for kin types of the first descending generation'; while semibifurcate merging 'distinguishes between "cross" and "parallel" kin types only among males in the first ascending generation, and only in relation to a male ego for kin types of the first descending generation'. The hypothesis, which can be tested cross-culturally, is that *male* is the unmarked term in these specific contexts. Similar considerations apply to bifurcate collateral systems.

Other types of predictable marking asymmetries are exemplified in Trautmann's (1981: 40) prototypic model of a Dravidian terminology, Nanjilnattu Vellalar. Thus, cross/parallel distinctions apply to closer (unmarked) +1 and -1 generations but not to more remote (marked) +2 and -2 generations; sex of speaker distinctions apply to unmarked ascending +1 and +2 generations but not to marked descending -1 and -2 generations; seniority distinctions apply to unmarked +1 and 0 generations but not to marked +2, -1, and -2 generations. The recognition of such asymmetries would be very relevant to the historical reconstruction of Dravidian kinship systems.

The value of marking theory, as Greenberg (1990[1980]) pointed out, is its focus on limited as opposed to global typologies – on systematic relations as opposed to general characterizations. There is a parallel between standard classifications of kinship terminologies and earlier classifications of language types.

... as scholars hostile to cross-cultural approaches will doubtless have noted, our typologies have all referred to limited sectors of kinship such as grandparental terminology or sibling terminology. In this respect, it is like contemporary linguistic typology which always refers to some limited aspect of language, whereas in nineteenth century typologizing such terms as inflective and agglutinative were meant to characterize languages as wholes. Just so the Lowie-Kirchhoff typology sought a salient property which was central to the kinship system as a whole.

The interrelation of limited typologies defines the hierarchical structure of kinship systems:

... as we extend our typologies to include, for example, the mutual limitations on type which obtain when we consider uncle-aunt typologies along with cousin typologies, we will begin to understand systems more and more as integrated wholes. (Greenberg, 1990[1980]: 325)

There is no need to reject theoretically motivated typologies such as elementary (prescriptive) versus complex (nonprescriptive) or bifurcate merging versus generational or Dravidian versus Iroquois, but there is a need to take account of systematic changes in the transition between types, and for this marking theory will prove indispensable.

### Cognitive implications

There is a long-standing controversy in anthropology as to whether kin terms are primarily determined by cognitive-linguistic factors, as Kroeber (1968[1909]) maintained,

or social institutions, as Rivers (1914) insisted. Greenberg's theory obviously follows in the tradition of Kroeber. In effect, it specifies the cognitive-linguistic determinants of kin terms alluded to by Kroeber. In an anticipation of the marking concept, Kroeber observed that the eight categories of kinship classification he elucidated – generation, collaterality, seniority, sex, sex of speaker, affinal-consanguineal, condition of life of the connecting relative – are only partially expressed in individual kinship terminologies.<sup>12</sup> Terminologies such as English use a limited set of principles fairly completely, while the North American Indian terminologies cited in Kroeber's paper use all eight principles, but incompletely. In either case not all logically possible combinations of kinship categories are realized, and the number of terms does not exceed a rather modest upper bound of about 35 in Kroeber's sample.<sup>13</sup> In the language of componential analysis, the semantic space of kinship terminologies is 'nonorthogonal': certain dimensions or certain values of certain dimensions do not combine to define kin terms (Wallace and Atkins, 1960). The 'problem of incomplete paradigms' has often been a source of puzzlement. As Goodenough (1968[1956]) wrote, the fact that only some of the many possible combinations in a given paradigm are symbolized by lexemes is

not without cultural and psychological significance. To give all [combinations] symbolic expression in lexemes would, as Kroeber (1968[1909]) and after him Murdock (1949) have pointed out, result in a superfluity of lexemes far beyond the number needed for practical problems of communication. Why only certain combinations of their values are symbolized in lexemes, are questions that have challenged many students of social organization. (Goodenough, 1968[1956]: 115)

The general answer to this question must be that there is a limitation on human cognitive capacities that, as Greenberg (1990[1980]) observed, is similarly expressed in restrictions on phonological systems. A specific answer is that marking effects inevitably result in predictable, terminological asymmetries.

## CONCLUSION

We conclude from this brief survey that Greenberg's theory of marking has interesting and useful applications to the comparative and historical study of kinship systems. Just as Trubetzkoy's theory of marking closed a 'gap' in his and Jakobson's theory of phonemic correlations, so Greenberg's theory of marking closes a gap in semantic theories of kinship terminologies. A hierarchical order underlies kinship just as it does all linguistic systems and this order has far-reaching typological and cognitive consequences.

## APPENDIX

It is often convenient to represent kinship terminologies using the graph theoretic model of a twin binary tree (Hage and Harary, 1996). In Figure 1, the root of each tree is labeled 'G' for sibling and the other nodes are labeled by the binary dimensions of sex with 'm' for male and 'f' for female, '||' for parallel (same sex as ego) and 'X' for cross (opposite sex from ego), and seniority with 'e' for elder and 'y' for younger. The endnodes of each tree represent kin terms.

The evolution of conjunctively defined kinship terminologies can be modeled as a 'lattice' or more generally as a 'semilattice' in which change occurs through the progressive deletion or addition of binary features (Epling et al., 1973; Hage and Harary, 1996).

In a *directed graph*  $D$  an *upper bound*  $w$  of two nodes  $u$  and  $v$  in  $D$  is a node that can reach both  $u$  and  $v$  by directed paths. Further,  $w$  is a *least upper bound (LUB)* for  $u$  and  $v$  if it is not only an upper bound, but, for any other upper bound  $w'$ , every path from  $w'$  to either  $u$  or  $v$  must contain  $w$ . The directional dual of the LUB ( $u, v$ ) is their *greatest lower bound (GLB)* defined similarly.

A *lattice* is a partially ordered set in which every two nodes have an *LUB* and a *GLB*. An upper *semilattice* is a partially ordered set in which every two nodes have an *LUB*.

It is customary to represent a lattice by its 'Hasse diagram'. In a digraph  $D$ , node  $u$  *covers* node  $w$  if there is no node  $v(u \ v \ w)$ . In the *Hasse diagram* of a lattice only the arcs of its covering digraph are drawn. (Equivalently, all the transitively derivable arcs of  $D$  are omitted. It is also a convention to omit the directional arrows but they are retained here for clarity.) The lattice in Figure 1 models the evolution, in this case the progressive simplification, of Oceanic sibling terminologies.

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### Notes

- 1 The following abbreviations are used in the text and figures: P parent; F father; M mother; C child; S son; D daughter; G sibling; B brother; Z sister; e elder; y younger; ss same sex, os opposite sex, or equivalently, x cross (opposite sex from ego), || parallel (same sex as ego); +1 and +2 first and second ascending generation; -1 and -2 first and second descending generation; 0 ego's generation.
- 2 An example of a disjunctive terminology is one that classifies together F and MB in contrast to FB. The kin types F and MB differ in collaterality and bifurcation and thus have no attributes in common (other than sex and generation which they share with FB). Disjunctive terminologies are 'unthinkable' (Hage, 1997).
- 3 Greenberg (1966: 73-4) considers zero expression and facultative expression as 'statements of the same fact from two different points of view', that of the hearer and that of the speaker. For example, in Korean, the speaker may omit a suffix for plural which the hearer interprets as plural, not singular, given the context.
- 4 D'Andrade experimented with stimulus sampling and majority response models, but concluded that these psychological models were not to be taken as seriously as the empirical findings.
- 5 With respect to the Palauan case, bifurcate collateral avuncular and Hawaiian cousin terminologies are counted in both Tables 1 and 2.
- 6 Aberle had to sift through individual ethnographies to find his data. Unfortunately, Murdock's (1970) worldwide tabulation of kin term patterns gives +2/-2 but not +1/-1 alternating generation equations.
- 7 Noted by Goodenough (1980[1969]).
- 8 We say 'possible' in light of the comments by Basso (1970) and Needham (1974).
- 9 Murdock's classification uses only aunt terms.
- 10 In a later work, Dyen and Aberle (1974) reconstructed Iroquois cousin terms for Proto-Athapaskan. This reconstruction is also consistent with the implicational relation between +1 and 0 generation kin terms.

- 11 That is, where a new term for parallel sibling is not introduced.
- 12 Conspicuously missing from this inventory and also from Greenberg's theory of marking is the principle of parity. It appears that parallel is usually unmarked in relation to cross. Such is the case in the Oceanic sibling terminologies in Figure 1, where the cross term *tuagane* is neutralized by the parallel term *taina*. (See Hage, 1997, 1998.)
- 13 Kroeber (1968[1909]: 22) did not count terms 'such as great grandfather, great uncle, and second cousin, which are not generally used in ordinary speech and exist principally as a reserve available for specific discrimination on occasion'.

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