Complex Scales in Multiargument Agreement

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Background: Hierarchy Effects in Agreement

Hierarchical Agreement: The verb agrees with the argument which is highest on a prominence scale.

Inverse Marking: The verb shows inverse marking iff the object is higher on a prominence scale than the subject.

(1) *Person-driven hierarchical agreement and inverse marking in Nocte*

a. 1st person > 2nd person > 3rd person

b.

	Intransitive
1sg	rang-ka-ang
1pl	rang-ka-e
2sg	rang-ka-o
2pl	rang-ka-an
3sg	rang-ka-a
3pl	rang-ka-a
	('to go')

c.

	Direct	Inverse	
1sg→3sg	hetho-ang	hetho-h-ang	**3sg→1sg**
	teach-1SG	teach-INV-1SG	
2sg→3pl	hetho-o	hetho-h-o	**3sg→2sg**
	teach-2SG	teach-INV-2SG	
1sg→2sg	hetho-e	hetho-h-ang	**2sg→1sg**
	teach-1PL	teach-INV-1SG	
	('to teach')		

(Trommer, 2001; Gupta, 1971)

(2) *Number-driven hierachical agreement in Dumi*

a. plural > dual > singular

b. **sg** phikh-a 'he got up' — get:up-[−du]; **pl** a-phikh-ini 'you (pl.) got up' — MS-get:up-[+pl]

c. **sg + pl** do:khot-t-ini (*-a) 'he sees them (pl.)/they (pl.) see him' — see-NPast-[−1 +pl]

(van Driem, 1993; Trommer, 2006)

(3) *Transitive paradigm parts by a canonical {1, 2} > 3 hierarchy relation*

a.

A		P	paradigm part	1/2>3
1/2	→	3	*direct*	A>P
3	→	1/2	*inverse*	A<**P**
1/2	→	1/2	*local*	A=P
3	→	3	*non-local*	A=P

b.

	1/2P	3P
1/2A	*local*	*direct*
3A	*inverse*	*non-local*

c.

	1/2P	3P
1/2A	1/2→1/2	1/2→
3A	→1/2	3→3

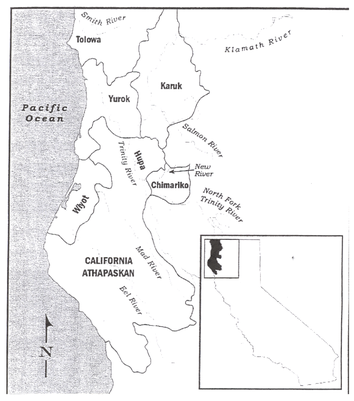
Standard Analyses of Hierarchy Effects

- Analyses typically refer to **simple markedness scales** (e.g. person scale, number scale, animacy scale) and and the economic use of formal marking – as also known from other hierarchy effects (e.g. Differential Object Marking).
- It is usually implicitly assumed, that the **effects of person and number agreement** are in principle independent.
- The **interaction of person and number** in Karuk demands for a generalization of the hierarchy-effect concept to **complex scales** and the **quantification of hierarchy mismatches**.

Data: Person Agreement in Karuk

The Karuk Language

- Nearly extinct Amerindian language of Northwestern California
- Part of the (controversial) Hokan Language family and forming a sprachbund with other languages of the area (Yurok, Hupa, Chimariko)
- Agreement morphology using prefixes and suffixes akin to similar systems in Algonqian and Algic (e.g. Cree and Yurok)



ʔu-	*ʔááku*	–
kín-		*-ap*
pron. prefix	verbal stem	suffix

(4) a. ***ʔu**-ʔáák-tih*
3(SG)-hit-DUR
'He's hitting him/them.'

b. *ʔiim-pú=**kín**-ʔááku-tih-**ap***
you(sg)-NEG=**1**-hit-DUR-**INV**
'You're not hitting us.'

(Macaulay 1992: 185)

Hierarchical Agreement

(5) *Hierarchical agreement syncretisms comparing 1/2→3 with 3→1/2 prefixes (agreed-with argument in bold)*

a.

1→3	3sg	3pl
1sg	*ná-*	*ná-*
1pl	*kín-*	*kín-*

3→1	1sg	1pl
3sg	*ná-*	*kín-*
3pl	*ka-ná-*	*kín-*

b.

2→3	3sg	3pl
2sg	*ʔi-*	*ʔi-*
2pl	*ku-*	*ku-*

3→2	2sg	2pl
3sg	*ʔi-*	*ki·k-*
3pl	*ʔi-*	*ki·k-*

(6) *Agreement for 1→2 and 2→1 forms (agreed-with argument in bold)*

1→2	2sg
1sg	*kín-*
1pl	*kín-*

1→2	2pl
1sg	*ki·k-*
1pl	*ki·k-*

2→1	1sg	1pl
2sg	*ná-*	*kín-*
2pl	*ka-ná-*	*kín-*

a. **1sg→2sg** b. **1pl→2sg** c. 1sg→**2pl** d. 1pl→**2pl**
e. 2sg→**1sg** f. 2sg→**1pl** g. 2pl→**1sg** h. 2pl→**1pl**

Karuk person agreement distribution

Agreement is with the object, superseded by subject-agreement if either:

a) the subject is first or second and the object is third person (1→3, 2→3)

b) the subject is first person and the object is second person singular (1→2sg)

c) the object is third person singular and the subject is anything different (3pl→3sg)

(7) *Subject and object features expressed by Karuk agreement affixes*

	1sg	1pl	2sg	2pl	3sg	3pl
1sg	–	–	1sg→	→2pl	1sg→	1sg→
1pl	–	–	1pl→	→2pl	1pl→	1pl→
2sg	→1sg	→1pl	–	–	2sg→	2sg→
2pl	pl→1sg	→1pl	–	–	2pl→	2pl→
3sg	→1sg	→1pl	→2sg	→2pl	→3sg	→3pl
3pl	pl→1sg	→1pl	→2sg	→2pl	3pl→	pl→3pl

Previous Analysis

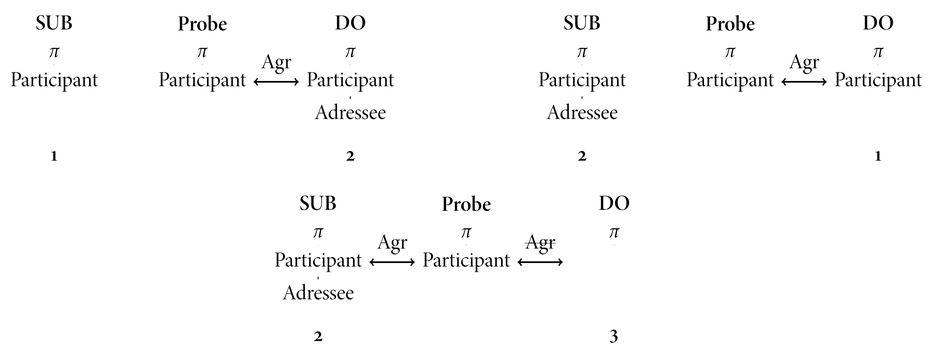
Karuk Agreement in a Model with Independent Person and Number Agreement (Bejar 2003)

- Person and number are different syntactic probes which trigger independent agreement processes.

3rd Person	1st Person	2nd Person	Singular	Plural
π	π	π	#	#
	Participant	Participant		Group
		Adressee		

– A probe agrees with a goal which is identical or more specific than the probe.
– The person probe tries to establish an Agr relation with the direct object.
– Only if this fails, the probe initiates Agr with the subject.

1. **Person Agreement:** π-agreement is with the object if this is 1st/2nd person.



2. **Number Agreement:** #-agreement is with the object if this is plural.

Empirical Problems

- 2nd person objects should not allow subject π–agreement.
- 3pl objects should not allow subject #-agreement

		Sg DO 1	Sg DO 2	Sg DO 3	Pl DO 1	Pl DO 2	Pl DO 3
Sg Sub	1	–	*nú-*	*ni-*	–	*ki·k--ap*	*ni-*
	2	*ná-*	–	*ʔi-*	*kín-*	–	*ʔi-*
	3	*ná-*	*ʔi--ap*	*ʔu-*	*kín-*	*ki·k--ap*	*ʔu-*
Pl Sub	1	–	*nú-*	*nú-*	–	*ki·k--ap*	*nú-*
	2	*kaná-*	–	*ku-*	*kín-*	–	*ku-*
	3	*kaná-*	*ʔi--ap*	*kun-*	*kín-*	*ki·k--ap*	*kín-*

Analysis

Observation

- The Karuk agreement pattern strictly follows the canonical person hierarchy: **{1, 2} > 3**
- The 1/2→1/2 cases cannot be reduced to **1 > 2, 2 > 1, A > P, P > A, pl > sg,** etc.
- They depend on **specific person/number combinations** and **default agreement**:

(8) *Contradictions from possible simple scales resulting from 1sg→2sg subject and 1pl→2pl object agreement*

1sg→2sg ⇔	1sgA > 2sgP		2plP > 1plA ⇔ 1pl→**2pl**
	1 > 2	↯	2 > 1
	A > P	↯	P > A
	sg = sg		pl = pl

Hypothesis

- The agreement pattern is based on a **complex hierarchy**, :

1 > 2pl > 2sg > 3plA > 3plP > 3sgA > 3sgP

- Mismatches on the scale are **weighted**:
  – Hierarchical agreement occurs with the argument that is **two or more steps higher** on the scale.
  – If there is no such mismatch between the arguments, there is **default object agreement**.

Implementation

- Sub-differentiate equally ordered categories of a more important scale:
  – Apply a less important scale.
  – Conserve the restrictions of the more important scale(s).
- Licence **complex scales** like (11) composed from **simple base scales** like (9), maintaining their restrictions in the order of a **precedence ranking** like (10).

(9) *Base scales for composition*
a. {1, 2} > 3 b. pl > sg c. A > P

(10) *Ranking of scales*
PERSON ≻ NUMBER ≻ GRAMMATICAL FUNCTION

(11) *Complex scale for Karuk hierarchical agreement*
1 > 2pl > 2sg > 3plA > 3plP > 3sgA > 3sgP

Technical Details

Scale Construction

(12) **Scale Basics**

a. Atomic scales rank features (e.g. 1, 2, sg, pl, A, P, etc.)
Complex scales rank bundles of features (e.g. 1pl, 2sgA, etc.)

b. A bundle B_1 is higher than a bundle B_2
for an atomic scale $S = F_n > F_{n-1} > \ldots > F_1$ **iff:**
there is a feature $F_i \in B_1$ and a feature $F_j \in B_2$ such that $F_i > F_j$

(13) **Scale Composition**

A complex scale $CS = B_m, B_{m-1}, \ldots, B_1$ is licensed
by the ranking of atomic scales $SS = S_n > S_{n-1} > \ldots > S_1$ **iff:**
for every pair of bundles B_i, B_j, $i > j$:
If $B_j > B_i$ for scale S_p
then $B_i \geq B_j$ for scale S_o, $o > p$

Optimality Theoretic Derivation of Scale Effects

(14) a. COHERENCE(X)
Count a constraint violation for every output with more than one marker that realizes features of type X.

b. AGREE(π)-P
Count a constraint violation for every output without a marker that realizes the person feature of the tr. object

c. AGREE(π)-X ⤳ x
If one transitive argument outranks the other one by two (or more) steps on the following scale in the input
1 > 2pl > 2sg > 3plA > 3plP > 3sgA > 3sgP
count a constraint violation for every output without a marker that realizes the person feature of the higher one.

(15) COHERENCE(π) ≫ AGREE(π)-X ⤳ x ≫ AGREE(π)-P

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