How to satisfy probes: person- and number-hierarchy effects in Äiwoo

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Introduction  The person marking system of Äiwoo (Oceanic; Solomon Islands) shows a split along the lines of both a person hierarchy ($2 > 1 > 3$) and a number hierarchy ($\text{pl} > \text{sg}$). I analyze this as a direct/inverse split and model it with an expanded version of Cyclic Agree (Béjar and Rezac 2009): a person ($\pi$) probe and a number probe ($\#$) are fused into one complex $\phi$-probe, and keep probing until they are completely satisfied (Deal 2015), i.e. all their features have been checked. I argue that this $\phi$-probe has to be satisfied disjunctively in Äiwoo: the $\phi$-probe is satisfied as soon as either subprobe ($\pi$ or $\#$) has all its features checked.

The data: two person marking constructions  I examine a systematic alternation between two patterns of person marking on the Äiwoo verb, represented here by the simplified examples in (1)-(2) (Naess and Boeger 2008). In the default case (the “direct” construction; (1)), the (non-overt) subject is indexed by a suffix (-mu/-mi) on the verb, and the object is realized as a free-standing pronoun (iu, imi). Some combinations of arguments, however, show a different pattern (the “inverse” construction; (2)). In (2a), the object is indexed by a suffix (-mu/-mi) on the verb, following the subject suffix -nee. In cases where the subject is 3sg (2b-d), the object is once again indexed by a suffix following the suffix -gu, which I leave unglossed per now. As summarized in table 1, the construction in (2) is used if and only if: (i) subject = 1sg and object = 2nd person (2a); (ii) subject = 3sg and object = non-3sg (2b-d); for all other combinations, the direct construction in (1) is used. (In table 1, dashes represent reflexive combinations and question marks represent unattested combinations).

The descriptive analysis: a direct/inverse split  I analyze the distinction between these two constructions as a split following both a person hierarchy ($2 > 1 > 3$) and a number hierarchy ($\text{pl} > \text{sg}$); similar hierarchy effects are known from e.g. Algonquian languages (see a.o. Coon and Bale 2014). All cases that trigger the inverse construction (2) are such that the subject is ranked lower than the object on these hierarchies: the 1st person subject is ranked lower than the 2nd person object in (2a), and 3sg is outranked by everything else (2b-d). Number also plays a role: if the subject is plural (ranked higher than singular), the direct construction is triggered regardless of the person specification of subject and object, see (1b) vs. (2b). Crucially, for all the combinations where the subject is ranked highest on either hierarchy (i.e. 2nd person or plural; cf. (1), or the lower half of table 1), the inverse construction is blocked altogether.

Theoretical assumptions  First, I follow Harley and Ritter (2002) in taking $\phi$-features to have an internally complex geometry, as shown in (3), where 1st and 2nd person share a feature [part{participant}] and 2nd person is singled out by a feature [addr{essee}]. Importantly, “3rd person” is not present in the syntax per se, but consists of the absence of person features; similarly, “singular” consists of the absence of a [pl] feature. Second, I adopt the Cyclic Agree model from Béjar and Rezac (2009), and expand it in order to account not only for hierarchy effects related to person, but to number as well. Essentially, a ($\pi$/$\#$) probe can check a subset of its features with a goal, but it will keep looking for more goals to agree with as long as it has unchecked features; in Deal’s (2015) terminology, a probe does not stop probing (interacting with goals) until it is completely satisfied.

Expanding Cyclic Agree: fused probes  For agreement systems showing complex interactions of hierarchy effects both for person and number, Coon and Bale (2014) argue that probes can be fused. In their analysis of Mi’gmaq (Algonquian) they posit a person ($\pi$) probe, searching for [participant] and [speaker] features, and a number ($\#$) probe, searching for [pl] features; however, these probes are fused on one syntactic head ($\phi^3$). Fused probes search simultaneously, although they each have their own matching criteria, and they jointly determine the result for the search of the whole complex probe. To account for the Mi’gmaq data, they propose...
that the complex probe is satisfied \textit{conjunctively}. In other words, the complex probe is not completely satisfied until both subprobes are completely satisfied; the search continues until there are no more unchecked features. In Äíwoo, however, I argue that the complex probe must be satisfied \textit{disjunctively}; the complex probe is completely satisfied as soon as \textit{either} of the subprobes is completely satisfied. Although this seems to be implicitly predicted to be possible in Deal (2015), it has not been previously formally proposed for any language.

**Deriving the direct construction** I propose that in a position c-commanding both arguments there is a complex probe \( \varphi^0 \), consisting of two fused subprobes (\( \pi \) and \#), of which the former looks for \([\textit{addr}]\) and \([\textit{part}]\) features, and the latter for a \([\textit{pl}]\) feature. Whenever the features of the subject and the object trigger the direct construction, the derivation proceeds as shown in (4). In this particular example, the \( \pi \) probe matches one of its features with the subject, and the \# probe does the same. Since one subprobe (here, \#) is completely satisfied, the whole probe stops looking for new goals, and the object is never agreed with. A derivation like this applies to all examples where the subject is either 2nd person or plural. These cases prove the necessity of the disjunctive satisfaction mechanism: if the search were to be allowed to continue, then a combination such as this one would trigger the inverse construction, that is, the probe would be able to agree with both arguments. In essence, disjunctive satisfaction is a mechanism that allows to block the inverse construction altogether in the presence of a plural subject or a 2nd person subject.

**Deriving the inverse construction** This is triggered when none of the subprobes is completely satisfied after interacting with the subject, i.e. only with 1sg and 3sg subjects. In (5), for example, first the \( \pi \) probe checks its \([\textit{part}]\) feature with the subject; at this point, both subprobes still have unchecked features, so a second agreement cycle is triggered (notated with a double-lined arrow and strike-through). Since the object is more featurally specified than the subject, the \( \pi \) probe can agree with it as well (if the object were 3rd person, this would not happen). In the configurations of the type 3sg \( \rightarrow \) non-3sg (6), the subject bears no relevant (\( \pi/\# \)) features at all; the probes interact with the subject, but none of them can check any of its features with it, so a second cycle is triggered. When the probes then find the (non-3sg) object and check their features with it, the marker \(-gu\) is inserted as a way to encode that agreement has failed at the first cycle, but succeeded at the second one; the presence of \(-gu\) is thus a “second-cycle effect” (Béjar and Rezac 2009). Essentially, I analyze \(-gu\) as an inverse marker (i.e. for when the subject is ranked lower than the object on the hierarchies), contra the previous literature on Äíwoo, where it was analyzed as a special marker for 3sg subjects (a.o. Niess and Boerger 2008). The system proposed so far does not account for the combination 1sg \( \rightarrow \) 3pl, which triggers the direct construction (cf. table 1); in principle, the \( \pi \) probe could agree with the subject, and the \# probe with the object. I solve this by analyzing the 1st/2nd person markers as clitics, and the 3rd person markers as suffixes; arguments for this come from the fact that only 3rd person markers (and not 1st/2nd) co-occur with DPs and are more dissimilar from full pronouns. In the spirit of Preminger (2014), the \( \varphi^0 \) itself would not be spelled out as a suffix whenever a clitic is adjoined to it; in the case of 1sg \( \rightarrow \) 3pl, the \# probe does agree with the object, but the \([\textit{pl}]\) feature is never spelled out due to the presence of the 1sg clitic.

**Conclusions and prospects** I propose an analysis based on Cyclic Agree for the agreement system of Äíwoo, where person and number hierarchy effects are interwoven. I argue that the Áíwoo agreement probe is a complex one, consisting of two subprobes (person and number), and that this complex probe is satisfied disjunctively, i.e. as soon as either subprobe is satisfied. This adds to the current understanding of agreement, probes and hierarchy effects, in that it establishes a pattern that was predicted, but not previously attested.

**References**  
- Preminger, O. 2014. \textit{Agreement and its failures}.