

Modal strengthening in Ecuadorian Siona

In this work, I expand the known typology of modal force by characterizing and analyzing a unique modal force system, found in Ecuadorian Siona (Western Tucanoan language, 250 speakers), from original field data. There is only one functional deontic modal in Siona – *ba'iji*. In embedded contexts, it is unambiguously interpreted as a necessity modal (cf. (1)). However, there are environments in which it can be interpreted as a possibility modal (cf. (2), (6a), (6b), (7)). I argue for an analysis of *ba'iji* as an underlying possibility modal that is grammatically strengthened to a necessity modal in upward-entailing contexts, due to the lack of a necessity scalemate. This strengthening is neutralized in non-upward-entailing contexts (e.g. negation, questions and conditionals). I implement this analysis in Fox's (2007) framework to account for grammaticalized scalar implicatures and Free Choice.

The modal construction *ba'iji* is formed from the impersonal construction 'it is'/'there is', with the embedded verb in the infinitive (Bruil 2014), as shown in (1).

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| (1) Sai-ye ba-'i-ji.
go-inf be-ipf-3s
We must/should go. | (2) Elena sai-ye beo-ji.
Elena go-inf neg.be-3s
Elena {mustn't,*doesn't have to} go. |
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The negated version of this modal construction (cf. (2)) is formed by the negated copular verb *beo* and an embedded verb in the infinitive. This is the first indication that the modal force of *ba'iji* is underlyingly existential: if it were universal, we would expect the reading "not have to" to be available. These strong readings are obligatory in unembedded contexts: this can be checked with examples in which only the possibility interpretation is available, as in (3) and (4), to be contrasted with (5), that uses the possibility construction *deoji* "is good".

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| (3) #Sai-ye ba-'i-ji, bēa-ye ba-'i-ji.
go-inf be-ipf-3s, stay-inf be-ipf-3s.
One should go, one should stay. | (4) #Sai-ye beo-ji, bēa-ye beo-ji.
go-inf neg.be-3s, stay-inf neg.be-3s.
One shouldn't go, one shouldn't stay. |
| (5) Sai-ye deoji, bēa-ye deoji.
go good stay good
One can go, one can stay (= you have the option). | |

In questions, conditionals, and under extra-clausal negation, the possibility reading of *ba'iji* emerges (though it is optional).

- (6) Context: I am waiting to see if there is going to be a spot for me in the boat, wondering whether I should go.
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| a. Sai-ye bai-to, sa-si-'i.
go-inf exist-cond go-fut-ass
If I can go, I will go. | b. Bai-quë saiye?
go-non.ass go?
Can I go? |
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- (7) Sai-ye ba-'i-ji ca-ye bahuë mē'ëre.
go-inf be-ipf-3s say-ipf neg to.you
I didn't say that you could leave.

I propose a strengthening analysis for Siona *ba'iji*. For similar strengthening analyses in other quantificational domains, see Bowler 2014, Bassi & Bar-lev 2016, Singh et al 2016. Like these authors, I argue that *ba'iji* is a possibility modal that lacks a stronger scalemate, but still triggers subdomain alternatives. Strengthening effects have been analyzed as the result of recursive application of Fox's (2007) EXH operator, developed for accounting for Free Choice within a grammatical neo-Gricean approach to scalar implicatures. The EXH operator, cf. (8), is akin to a covert *only* and negates all *innocently excludable* (IE) alternatives, cf. (9).

- (8) $\llbracket \text{EXH} \rrbracket (\text{Alt}(p)_{\langle st, t \rangle})(p_{st})(w) \equiv p(w) \wedge \forall q \in \text{Alt}_{\text{IE}}(p, \text{Alt}(p)) [\neg q(w)]$
(9) $\text{Alt}_{\text{IE}}(p, \text{Alt}(p)) = \bigcap \{ \text{Alt}(p)' \subseteq \text{Alt}(p) : \text{Alt}(p)' \text{ is a maximal set in } \text{Alt}(p),$
s.t. $\{\neg q : q \in \text{Alt}(p)'\} \cup \{p\}$ is consistent } (the set of IE alternatives of p)

The alternatives $\text{Alt}(S)$ of a sentence S containing a quantifier Q are the union of S 's 'scalar alternatives', obtained by replacing Q with members of its Horn set (e.g. $\langle \text{can}, \text{must} \rangle$), and S 's 'subdomain alternatives', replacing the domain of Q with all its subsets. I propose that *ba'iji* projects subdomain alternatives, namely existential modal claims over subsets of its modal base, but crucially, it does not project scalar alternatives, due to its lack of a Horn scalemate. For example, for $S = \llbracket \text{ba}'iji(p) \rrbracket = \exists w \in \{w_1, w_2\}.p_w$, its alternative set is: $\text{Alt}(S) = \{ \exists w \in \{w_1, w_2\}.p_w, \exists w \in \{w_1\}.p_w, \exists w \in \{w_2\}.p_w \}$.

I show sample derivation of the strengthening procedure, that achieves the necessity interpretation of *ba'iji* by EXH application. I show in (10) the LF before EXH application, where the modal stays *in situ* below negation. I assume here that *ba'iji* has the (simplified) modal base $\{w_1, w_2\}$, and p is the proposition denoting its prejacent, e.g. 'one enters'.

- (10) $S = \diamond_{\{w_1, w_2\}}p$ (simplified notation for $\exists w \in \{w_1, w_2\}.p_w$)
(11) a. $\text{Alt}(S) = \{ \diamond_{\{w_1, w_2\}}p, \diamond_{\{w_1\}}p, \diamond_{\{w_2\}}p \}$ b. $\text{Alt}_{\text{IE}}(S) = \emptyset$
(12) $S' = \text{EXH} [\text{Alt}(S)][S] = \diamond_{\{w_1, w_2\}}p$ [First EXH application: no effect on truth conditions]
(13) a. $\text{Alt}(S') = \{ \text{EXH} [\text{Alt}(S)][\diamond_{\{w_1, w_2\}}p], \text{EXH} [\text{Alt}(S)][\diamond_{\{w_1\}}p], \text{EXH} [\text{Alt}(S)][\diamond_{\{w_2\}}p] \}$
 $= \{ \diamond_{\{w_1, w_2\}}p, \diamond_{\{w_1\}}p \wedge \neg \diamond_{\{w_2\}}p, \diamond_{\{w_2\}}p \wedge \neg \diamond_{\{w_1\}}p \}$
b. $\text{Alt}_{\text{IE}}(S') = \{ \diamond_{\{w_1\}}p \wedge \neg \diamond_{\{w_2\}}p, \diamond_{\{w_2\}}p \wedge \neg \diamond_{\{w_1\}}p \};$
(14) $S'' = \text{EXH} [\text{Alt}(S')][S'] \equiv \diamond_{\{w_1, w_2\}}p \wedge \neg (\diamond_{\{w_1\}}p \wedge \neg \diamond_{\{w_2\}}p) \wedge \neg (\diamond_{\{w_2\}}p \wedge \neg \diamond_{\{w_1\}}p)$
 $\equiv \diamond_{\{w_1, w_2\}}p \wedge (\diamond_{\{w_2\}}p \leftrightarrow \diamond_{\{w_1\}}p) \equiv \square_{\{w_1, w_2\}}p$ [Second EXH application: strengthening]

None of the alternatives of S can be excluded non-arbitrarily (11), making EXH application trivial. But after the alternatives of S' are exhausted with respect to each other (13), EXH application results in strengthening. Applying EXH twice to S is obligatory, since it removes ignorance inferences about alternatives in $\text{Alt}(S)$.

This analysis is reminiscent of that proposed by Deal 2011 for Nez Perce, in which there is one deontic modal *o'qa*, that is variably interpreted as a possibility or a necessity modal. Deal argues that the variability of the interpretation arises from the lack of a stronger scalemate, and thus the lack of a Gricean scalar implicature. I propose that Nez Perce differs from Siona *ba'iji* in that only the latter triggers subdomain alternatives, thus grammaticalizing the strengthening process and making the necessity reading obligatory.

References. Bassi & Bar-Lev, 2016. A unified existential semantics for bare conditionals. In *Sinn und bedeutung* (Vol. 21). • Bowler, 2014. Conjunction and disjunction in a language without 'and'. In *Semantics and linguistic theory* (Vol. 24, pp. 137-155). • Bruil, 2014. *Clause-typing and evidentiality in Ecuadorian Siona*. LOT, Netherlands Graduate School of Linguistics: Utrecht. • Deal, 2011. Modals without scales. *Language*, 87(3), pp.559–585. • Fox, 2007. Free choice and the theory of scalar implicatures. In *Presupposition and implicature in compositional semantics* (pp. 71-120). Palgrave Macmillan, London. • Singh, Wexler, Astle-Rahim, Kamawar & Fox, 2016. Children interpret disjunction as conjunction. *Natural Language Semantics*, 24(4), 305–352.