Seeing Possible Worlds

Sign languages (SLs) often make it possible to see things that are covert in spoken languages. Inevitably, this situation brings theoretical challenges. The focus here is the semantics of modal signs and their covert part, namely, their accessibility relations. We propose that for modals, manually-articulated pieces ('signs') carry modal *force*, whereas the nonmanually-articulated pieces (NMMs) are the visible counterpart of Kratzer's (1981) accessibility relation and ordering among worlds, that is, modal *flavor*. This is seen in (i) changing intensification of NMMs with context changes, and (ii) differing computations of signs and NMMs.

Some SLs, like DGS (GermanSL), can entail epistemic meaning via just NMMs (brow raise 'br', head nod 'hn') (1) while others, like TID (TurkishSL), use both signs (POSSIBLE) *and* NMMs (eye squint 'es', head thrust 'ht') (2). If analysis were based only on DGS that NMM is the operator of the modal, we would need a different explanation for the TID required manual sign.

$$\overline{\qquad\qquad\qquad\qquad\qquad\qquad}^{\text{br,hn}}$$
(1) (PROBABLY) SWEN WORK$_1$ GO$_1$ (DGS; Bross&Hole 2017; p.23)
       'Probably Swen went to work.'

$$\overline{\qquad\qquad\qquad\qquad\qquad\qquad}^{\text{es, ht}}$$
(2) MOM HOME EXISTENTIAL POSSIBLE   (TID; Karabuklu et al 2018)
       'Mom may be at home.'

There are also cases in TID where the *epistemic* NMM 'es' co-occurs with the *deontic* sign NECESSARY (3). That NECESSARY is the deontic sign can be seen in (4) where it is accompanied by brow raise 'br' and eyes open 'eo'. That the sign is accompanied by epistemic 'es' is seen in (5) where it accompanies the epistemic sign POSSIBLE (as seen in 2 above).

$$\overline{\qquad\qquad\qquad\qquad\qquad\qquad\qquad}^{\text{es}}$$
(3) BOSS #O CL-ROOMa IX-3a BE NECESSARY
       'Boss should be in his office.'

$$\overline{\qquad\qquad\qquad\qquad}^{\text{br,eo}}$$
(4) THURSDAY COME NECESSARY
       'He must come on Thursday.'

$$\overline{\qquad\qquad\qquad\qquad\qquad}^{\text{es[i]}}$$
(5) IX-3a COMPUTER-a POSSIBLE IX-3a
       'It may be this computer.'

To successfully use (3), all other possibilities must be eliminated from context; it is unacceptable where being in the office is one of many possibilities. This shows that the sign is not just a host for a NMM, but brings its own semantics to the computation which is not overridden by the semantics of NMM.

The accessibility relation is the ordering that ranks worlds according to how close they come to satisfy the ideal. Since conversational background may be a covert argument to a modal (Kratzer 1981; Hacquard 2011), we created 4 contexts for each target sentence to test whether NMMs entail the accessibility relation (total 136). For epistemic, we changed certainty and possibility; for deontic, obligation and necessity; for ability, capabilities; and for permission, possibilities.

We observed two main patterns: (i) intensity of NMMs is affected by degree of possibility, necessity or obligation, and (ii) additional NMMs also appear, such as shoulders up, flat chin or torso forward.

(i) The intensity of a NMM is changed based on the semantics of the modal. When we presented possibility as an option among many others, meaning it is less accessible, 'es' is intensified (as in 5: [i]). When possibility was one of only two options, therefore more accessible, 'es' is not present (6; brow frown'bf', multiple head nod'mhn'). Thus, we propose that the presence or absence of a NMM does not mean there is no accessibility relation. Rather, it sets a norm on the degree and the change in NMM shows how accessible the worlds and the propositions are.

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                                 ___bf
_____mhn
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(6) IX-3a COMPUTER-a POSSIBLE IX-3a
    'It may be this computer.'

Following Hacquard's semantics of epistemic and deontic modals, our proposal for these readings in TID are in (7), where $Best_{g(w)}(\cap f(w))$ stands for accessibility relations that come with NMMs.

(7) $[[epistemic]]^{w,f,g} = \lambda q_{<st>} . \exists w' \in Best_{g(w)}(\cap f(w)) : q(w')=1$

    $[[deontic]]^{w,f,g} = \lambda q_{<st>} . \forall w' \in Best_{g(w)}(\cap f(w)) : q(w')=1$

In this study, we systematically manipulated degrees of possibility, necessity, ability or certainty to observe how contextual information is carried on a single sentence. The findings show that different degrees cause changes either in the NMM intensity (with additional NMMs to facilitate this intensity as in (6)), or another NMM appears to convey degrees in the background context. It seems what is expressed in contexts (modal flavors) are visible through NMMs in SLs.

To account for differences across SLs, we propose that modal force is phonologically empty (no sign) for epistemic in DGS-kind languages; thus we predict that an epistemic NMM will be always present for such a meaning. In contrast, a manual epistemic sign is phonologically required in TID-kind languages; the absence of NMM is the established norm in the ordering and accessibility relation. *Change* in NMM intensity shows differing degrees in the ordering, providing an overtly visible marking of what is only covert in spoken languages.

References:
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