**Deontic priority – converging evidence for a universal in modal semantics**

**Summary:** Theoretical and typological research on modality has yielded various fruitful hypotheses on the range of crosslinguistic variation and possible linguistic universals in the modal domain (Nauze 2008, Rullmann & Matthewson 2018, Steinert-Threlkeld et al. 2022, a.o.). We present novel evidence contributing to this research program. Based on a crosslinguistic fieldwork study, we propose a universal in the domain of negative modality, which we label Deontic Priority (DP): If a language has a lexicalized form for impossibility, it has a lexicalized form for *deontic* impossibility. We explore the idea that this generalization can be captured in terms of a utility bias in an informativeness/complexity trade-off model (see e.g. Imel & Steinert-Threlkeld 2022), supported by a computational modeling study and experimental data.

**Crosslinguistic data:** In our crosslinguistic study, we adapted Vander Klok's (2021) revised modal questionnaire and added contexts for eliciting negative modality (non-necessity and impossibility) expressions with epistemic, deontic, teleological and (pure) circumstantial flavor. In our sample of 24 languages, we observed that non-necessity is always realized as a combination of morphologically overt negation and a modal marker, while impossibility is lexicalized to some extent in several languages. Among these, we identify two patterns: either a language uses a lexicalized impossibility modal across all flavors, or only in the deontic flavor (which is the more common case in our sample). In (1) and (2) below, Basque exemplifies the first pattern, Hausa the second. In (1) we illustrate lexicalized deontic impossibility in both languages and contrast it with epistemic impossibility (2), where only Basque allows for the use of the impossibility modal.

(1) Deontic impossibility: You are going to visit your friend in the hospital. When you enter into the hospital, you stop at the information desk to inquire what room your friend is in. But the woman at the information desk tells you that you can't visit your friend now because it's already 8pm. She says: "I'm sorry, the hospital regulations say that... **Visitors mustn't stay after 6pm**."

a. Bisitariak **ezin** dira 6 ostean gelditu. (Basque)
Visitors MOD($\neg\Diamond$) be.3pl.ind 6 after stay

b. **Kada** maziyarta su wuce ƙarfe 6 na yamma. (Hausa)
MOD($\neg\Diamond$) visitors 3pl.prosp stay hour 6 pm

(2) Epistemic impossibility: Ben goes swimming every day. Ben is not obliged or required to go swimming; it is just a habit of his. It is now time for Ben to be swimming, so... **Ben can't be at home**.

a. Benat **ezin** da etxean egon. (Basque)
Ben MOD($\neg\Diamond$) aux home be

b. **Ba** zai **yiwu** Ben ya kasance a gida **ba**. (Hausa)
NEG 3sg.fut MOD($\Diamond$) Ben 3sg be at house NEG

c. (# **Kada** Ben ya kasance a gida.)

Table 1 summarizes the two patterns and lists the languages in our sample that exhibit them:

| | **Non-necessity** | **Impossibility** | | |
|---|---|---|---|---|
| | (any flavor) | epistemic | deontic | other root flavors |
| Basque, Turkish | × | ✓ | ✓ | ✓ |
| Hausa, Hebrew, Thai Hungarian, Russian, (Kîîtharaka) | × | × | ✓ | × |

Table 1: ✓ means the meaning is lexicalized, × means it is not

**Deontic Priority:** As Table 1 illustrates, in our sample there is no language that lexicalizes impossibility but does not lexicalize deontic impossibility. This observation motivates the Deontic Priority (DP) generalization: If a language lexicalizes any impossibilities, then it lexicalizes deontic impossibility.

**Computational modeling:** The DP generalization suggests that a theory of modal lexicalization must capture the contrast between flavors (deontic vs. others). In a computational modeling study, we explored how Imel & Steinert-Threlkeld's (2022) existing model in terms of a complexity/informativeness trade-off can be extended to capture the contrast. In particular, we explored if asymmetries in the communicative utility function yield a picture in which bias correlates with the optimality of languages that satisfy the DP generalization. The results in Fig. 1 suggest that optimizing the trade-off between simplicity and informativeness, in the presence of a bias for the deontic flavor, could explain the DP generalization. In particular, given a utility bias for deontic flavor, all languages that are closest to the optimal trade-off between complexity and informativeness (depicted as a black line) are languages that adhere to the DP generalization (depicted in blue triangles, as opposed to red circles that represent non-DP languages). This result contributes to a growing body of literature suggesting that augmenting the basic efficient communication analyses with certain biases may be necessary to account for semantic typology in certain domains (e.g. Chen et al. 2022, Zaslavsky et al. 2021).

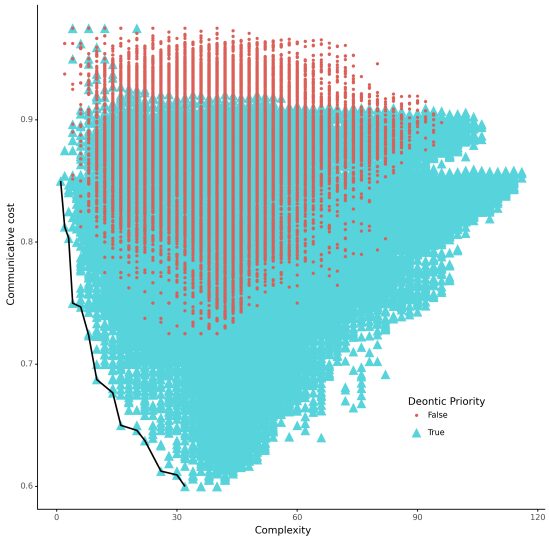


Figure 1: Complexity vs. communicative cost

**Experiment:** The modeling results raise the issue to what extent the utility bias for the deontic flavor is empirically grounded. We tested the hypothesis that the bias relates to particularly high pressure to communicate successfully in the case of deontic impossibility, since its communicative function (prohibition) is to prevent negative and potentially dangerous situations. In a 2×3 design, we crossed the factors FORCE (levels: impossibility, possibility) and FLAVOR (levels: deontic, circumstantial, epistemic). Modal flavor was disambiguated by means of designated lexical items (*allowed/ not allowed* for deontic, *able/ not able* for circumstantial and *it's possible / not possible* for epistemic possibility and impossibility, respectively). We constructed 18 items of the form in (3) in 6 conditions. The items were distributed across 6 lists in a Latin square design and intermixed with fillers. The participants (64 English native speakers) were asked to rate how important it is that the content of a modal sentence as conveyed by the speaker was correctly understood by the addressee on a scale from 1 (not important) to 7 (very important).

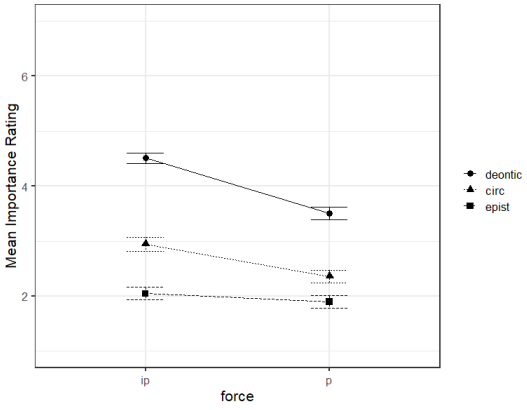


Figure 2: importance ratings

(3) Paul says to John: Max is not allowed to play the piano. [condition: deontic impossibility]
Question: How important is it that John heard correctly what Paul said?

The results are depicted in Fig. 2. An ordinal logistic mixed effects model fitted to the data reveals a significant effect of FLAVOR: deontic modal sentences were rated as more important than circumstantial ($\beta$ = -2.88, 95% CI [-3.78, -1.98], $p < .001$) and epistemic sentences ($\beta$ = -4.37, 95% CI [-5.21, -3.53], $p < .001$). This result provides motivation for a utility bias for deontic modality as assumed in our modeling study. Also, we observe a significant main effect of FORCE ($\beta$ = -1.82, 95% CI [-2.6, -1.04], $p < .001$). If we focus on deontic vs. epistemic comparison, we observe a FORCE-FLAVOR interaction ($\beta$ = 1.51, 95% CI [0.57, 2.44], $p < .01$). We discuss interpretations of this interaction and their typological predictions in the presentation.

**Selected references:** • Chen, Futrell & Mahowald (2022). Investigating information-theoretic properties... SIGTYP 4. • Imel & Steinert-Threlkeld (2022). Modal semantic universals optimize... SALT 32 • Nauze (2008): *Modality in typological perspective*. UvA diss. • Vander Klok (2021). Revised modal questionnaire for cross-linguistic use. Open access field linguistics tool.