

## GRADING MODALITY: A NEW APPROACH TO MODAL CONCORD AND ITS RELATIVES

**Background:** Modal Concord (Geurts & Huitink 2006, Zeijlstra 2008) is a phenomenon where two modal operators co-occur in a sentence, but modal force is only expressed once, cf. (1).

- (1) Visitors **must mandatorily** sign this form before entering the facility.  
 ≈ Visitors **must** sign this form before entering the facility.

Previous accounts of modal concord assume that such constructions involve one genuine modal operator and one modal element that must match the modal operator, but does not contribute modal force itself. Geurts & Huitink (2006) assume a semantic approach where one of the two modal elements combines with a type shifting operator, yielding a “functional” meaning under which it merely “checks” the meaning of the other modal. Similarly, Zeijlstra (2008) assumes a syntactic approach where one of the two modal elements is semantically vacuous and contains an uninterpretable modal feature [u $\forall$ MOD] or [u $\exists$ MOD] that has to be checked by a corresponding interpretable feature [i $\forall$ MOD] or [i $\exists$ MOD] respectively.

**A Problem for the Previous Theories:** While modal concord requires matching in modal force and type, Grosz (2009) observes that we also find a modal concord-like matching phenomenon in constructions that involve a universal modal and a negated existential modal.

- (2) Visitors **mandatorily may not** cross the yellow line without a special permit.  
 ≈ Visitors **may not** cross the yellow line without a special permit.

Given that there is no evidence that such “modal matching” is fundamentally distinct from modal concord, a theory of modal concord should be able to account for modal matching of this type. The previous theories crucially fail to do so. Geurts & Huitink assume the structure in (3a) and the semantics in (3b+c), which crucially involves identification of two modal operators.

- (3) a. [[[@ mandatorily] must] visitors sign this form before entering the facility]  
 b.  $\|@ \| = \lambda P. \lambda Q. P = Q. P$   
 c.  $\|mandatorily\| = \|must\| = \lambda p. \lambda w. \forall w' [R(w)(w') \rightarrow \boxed{p(w')}]$

Even though possibility under negation is equivalent to impossibility (i.e. “necessity that *not* p”), *mandatorily* and *may not* do not end up being synonymous, as emphasized by the boxes in (4) vs (3c). Therefore, Geurts & Huitink’s approach cannot easily accommodate for the facts in (2).

- (4)  $\|may\ not\| = \lambda p. \lambda w. \neg \exists w' [R(w)(w') \ \& \ p(w')] \equiv \lambda p. \lambda w. \forall w' [R(w)(w') \rightarrow \boxed{\neg p(w')}]$

In the same vein, a syntactic account fails to account for the new facts, as illustrated by the difference between the successful derivation in (5a) and the failed derivation in (5b).

- (5) a. mandatorily<sub>[i $\forall$ -MOD]</sub> Visitors must<sub>[u $\forall$ -MOD]</sub> sign this form before entering the facility.  
       ✓   
 b. mandatorily<sub>[i $\forall$ -MOD]</sub> Visitors may<sub>[u $\exists$ -MOD]</sub> not sign this form before entering the facility.  
       ↯ ×

We can conclude that none of the previous approaches expands into a uniform approach to both modal concord as illustrated in (1) and modal matching as found in (2).

**The Proposed Solution:** I propose that modal concord and modal matching can both be analyzed in terms of *degree modification*, grouping adverbs like *mandatorily* with the more general degree modifiers *absolutely* and *really*, as in (6). Crucially, this differs from previous analyses in that it assumes that modal concord and modal matching operate on the compositional meaning of *may not*, rather than on the lexical meaning of *may*.

- (6) a. You **absolutely must** sign this form. / It is **absolutely necessary** that you sign this form.

b. You **really must** sign this form. / It is **really necessary** that you sign this form.

I show that this accounts for two properties of modal concord and modal matching discussed by Zeijlstra (2008). The first property is that modal concord has a *strengthening effect*, e.g. modal concord with necessity modals increases the necessity of the modified proposition. This follows straightforwardly from the degree modification account. The second property is that modal concord configurations are typically more specific with respect to the chosen *ordering source* than the corresponding single modal constructions. I argue that this follows from the nature of graded modality. I adopt Portner's (2008) approach to graded modality which models it in terms of monotone inclusive ordering sources that represent the commitment to a certain proposition:

(7)  $\{p\} \subset \{p, q\} \subset \{p, q, r\} \subset \dots$  (e.g.  $p = \text{you don't kill}$ ,  $r = \text{you don't park in house entries}$ )

In this model, a more inclusive ordering source (e.g.  $\{p, q, r\}$  in (7)) is more *restrictive* than a less inclusive one (e.g.  $\{p, q\}$ ) as it admits less possibilities and enforces more necessities. As Portner shows, graded modality can be linked to restrictiveness. If a proposition is a necessity with respect to a less restrictive ordering source, it has a higher degree of necessity than if it is a possibility with respect to a less restrictive ordering source, i.e.  $p$  is more necessary than  $q$  in (7).

(8)  $p$  is more necessary than  $q$  iff there is some ordering source  $g$  with respect to which  $p$  is a necessity, and every ordering source  $h$  with respect to which  $q$  is a necessity includes  $g$ .

(my definition, based on Portner's 2008:6 analysis of *more possible*)

In analogy, we can assume that *absolutely* refers to the endpoint of a scale, and propose (9).

(9)  $p$  is *absolutely necessary* iff  $p$  is necessary w.r.t. the least restrictive ordering source.

I propose to analyze modal matching (subsuming modal concord) in analogy to such degree modification. First, I argue that modal matching configurations localize the degree of necessity (or possibility) in an interval that is relatively high on the scale. Secondly, I derive the fact that modal matching restricts the possible ordering sources from the assumption that ordering sources associated with different "modal types" (e.g. "in view of criminal law" versus "in view of administrative law") can stand in an inclusion relation with each other (e.g. among the deontic ordering sources in (7),  $p$  is a necessity in view of criminal law, whereas  $r$  is only a necessity in view of administrative law). More specifically, I assume that rules whose violation is punished by the law carry more weight and are thus contained in less restrictive ordering sources than rules whose violation isn't punished. In this sense, *mandatorily must / may not* can draw a cut-off line between what is mandated by the law and what isn't. As shown in (10b), I assume that *mandatorily* combines with the compositional meaning of *may not* ( $\neg \Diamond p$ ), i.e. *must not* ( $\Box \neg p$ ).

(10) a. *mandatorily must p* iff  $p$  is necessary w.r.t. some ordering source that is at most as restrictive as a contextually given ordering source  $g$  that is mandated by the law.

b. *mandatorily may not p* iff *not p* is necessary w.r.t. some ordering source that is at most as restrictive as a contextually given ordering source  $g$  that is mandated by the law.

Modal matching involving modals that express possibility or negated necessity is analogous, with the difference that *higher possibility* correlates with *more restrictive* ordering sources.

**Conclusion:** Analyzing modal matching as degree modification derives modal concord (1), modal matching (2), the observed strengthening effect and the restrictions on the modal type.

**References:** Geurts, B. and J. Huitink (2006): 'Modal Concord', in *Proceedings of the ESSLLI 2006 Workshop 'Concord Phenomena at the Syntax Semantics Interface'*. • Grosz, Patrick (2009): 'German Particles, Modality, and the Semantics of Imperatives', in *Proceedings of NELS 39*. • Portner, Paul (2008): 'Scales of Probability', ms., Georgetown University. • Zeijlstra, Hedde (2008): 'Modal Concord is Syntactic Agreement', in *Proceedings of SALT 17*.