Modal comparatives and (in)commensurability

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Modality Across Categories
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Introduction

- Gradable modality: It's a thing.

(1) a. It is somewhat/very/extremely important that Bill go to the party.

b. It is more important that Bill go to the party than it is that Mary go.

- Entailment relations
  - *In view of* α, *must p* $\Rightarrow$ *In view of* α, *important p*
  - *In view of* α, *important p* $\Rightarrow$ *In view of* α, *should p*

Overview of the Talk

- Due to the nature of scales in their theory, Portner & Rubinstein's (2014) world-quantifying approach to gradable modality predicts incommensurability effects where they do not arise.
- To resolve this, we keep modal degrees in the ontology, and add a degree argument to the ordering source.
- World-orderings from higher degrees "filter down" to world-orderings at lower degrees (similar to von Fintel & Iatridou 2008).
- This allows us to remain agnostic about the nature of modal scales and when incommensurability effects should (not) arise.

Three Approaches to Gradable Modality

	Aux		Adj	
	Degrees?	WO/Q?	Degrees?	WO/Q?
Conservative (Portner & Rubinstein 2014)	✓	✓	✓	✓
Liberal (Lassiter 2011)	✓	✗	✓	✗
Non-Unified (Klecha 2014)	✗	✓	✓	✗

(WO/Q = world ordering/quantification)

We'll focus on **conservative** approaches to **root** modals
(in particular, *important*).

Portner & Rubinstein 2014: Their Theory

- $g(w)$ is a set of propositions (Kratzer 1981). We'll ignore the modal base for now.
  - For our example, $g(w) = \{p, q, r\}$.
  - For simplicity's sake, we'll say p, q, and r are independent.
- Make a Russian nesting doll of $g(w)$: generate subsets that can themselves be linearly ordered by subset relation.
  - For our example, we'll say the set of subsets is $\{\{p, q, r\}, \{p, q\}, \{p\}\}$.

Their Theory (cont'd)

- Our set of degrees D_a = sets of propositions true in all ideal worlds by each subset of the ordering source.
  - $D_a = \{d_1, d_2, d_3\}$, where
    $d_1 = \{p' : p \cap q \cap r \subseteq p'\}$
    $d_2 = \{p' : p \cap q \subseteq p'\}$
    $d_3 = \{p' : p \subseteq p'\}$
- Degrees ordered ($\leq_{D_a}$) via superset relation.
  - $d_1 \supset d_2 \supset d_3$, so $d_1 <_{D_a} d_2 <_{D_a} d_3$

Their Theory (cont'd)

- In our example, p (and all entailments) $\in d_3$; p, q (and all entailments) $\in d_2$; and p, q, r (and all entailments) $\in d_1$.
- Assuming no funny business with the modal base, we get that p is d_3-important, q is d_2-important, and r is d_1-important.
- Since $d_1 <_{D_a} d_2 <_{D_a} d_3$, p is more important than q, which is more important than r.

Problem 1

- Let's build a new scale, $\langle D_b, \leq_{D_b} \rangle$, using the same ordering source ($\{p, q, r\}$).
- This time, we'll reprioritize p, q, and r. We'll use the subsets $\{p, q, r\}$, $\{q, r\}$, and $\{r\}$.
- $D_b = \{d_1, d_4, d_5\}$, where
  d_1 is the same as before ($= \{p' : p \cap q \cap r \subseteq p'\}$)
  $d_4 = \{p' : q \cap r \subseteq p'\}$
  $d_5 = \{p' : r \subseteq p'\}$
- Since $d_1 \supset d_4 \supset d_5$, $d_1 <_{D_b} d_4 <_{D_b} d_5$.

Problem 1 (cont'd)

- What happens when we try to compare a degree from D_a (e.g. d_2) with a degree from D_b (e.g. d_4)?
- $d_2 = \{p' : p \cap q \subseteq p'\}$, $d_4 = \{p' : q \cap r \subseteq p'\}$
- $d_2 \not\supseteq d_4$, $d_4 \not\supseteq d_2$ (incommensurability)
- In general, we predict a substantive change in ordering source or prioritization to lead to incommensurability effects. But...

(2) (*Context: Bill's employer issued a new, more relaxed dress code on Tuesday.*)
(In view of his company's dress code,) On Monday, it was more important that Bill wear a suit to work than it is today.

Problem 2

- Let's say p and q are incompatible in the modal base (i.e., $p \cap q \cap (\cap f(w)) = \emptyset$).
- On P&R's initial theory, this entails that it is impossible for p to be as important as q.
  - *p as important as q* entails there is some degree d such that $p, q \in d$.
  - Hence, some subset A of $g(w)$ such that in all A-ideal worlds in $\cap f(w)$, p and q hold.
    - Impossible because of incompatibility of p and q in $\cap f(w)$.
- But. . .

(3) It is as important to preserve the wetlands as it is to build the new housing (which would drain the wetlands). (Portner & Rubinstein 2014)

Problem 1 = Problem 2?

- Their solution: *important* doesn't universally quantify over possible worlds. (We'll leave the details and other issues aside.)
- But we're still left with Problem 1, and lose a nice generalization:

Problem 2 is fundamentally the same as Problem 1.

(3a) It is as important (in view of our environmental priorities) to preserve the wetlands as it is (in view of our financial priorities) to build the new housing.

A New Conservative Theory: Overview

- Universally quantifying modals still universally quantify.
- Modal degrees are part of the ontology (type d), rather than derived objects.
- *important* is a measure function returning a degree (cf. Kennedy 1997, a.o.).

Overview (cont'd)

- Add degree argument to g: (context-sensitive) function from worlds and degrees to sets of propositions.
  - Intuition: some moral principles (for example) are ranked higher than others, e.g. *don't kill* vs. *don't steal*.
- We first order worlds w.r.t. single degrees (via $\leq_{g,w,d}$), then use that to order worlds w.r.t. a degree and all degrees above it (via $\leq^{+}_{g,w,d}$).
- Set of $\leq^{+}_{g,w,d}$-ideal worlds gets "smaller" as d gets lower.
- If $d_1 <_d d_2$, fewer props hold at all $\leq^{+}_{g,w,d_2}$-ideal worlds than at all $\leq^{+}_{g,w,d_1}$-ideal worlds (cf. von Fintel & Iatridou 2008).

Mini-Example

- $d_1 <_d d_2$,
  $g(w)(d_2) = \{\lambda w.\text{ no murder in } w\}$,
  $g(w)(d_1) = \{\lambda w.\text{ no theft in } w\}$
- $w_1 <^+_{g,w,d_2} w_2$ iff there are murders in w_2 but not in w_1.
- $w_1 <^+_{g,w,d_1} w_2$ iff
  - there are murders in w_2 but not in w_1, or
  - there are no murders in w_1 or w_2, but there are thefts in w_2 and not in w_1, or
  - there are murders in both w_1 and w_2, but there are thefts in w_2 and not in w_1.
- Note similarity to OT constraints: for $\leq^+_{g,w,d_1}$, $g(w)(d_1)$ only matters if $g(w)(d_2)$ hasn't already decided for us.

The Details

- $\leq_{g,w,d}$ (world-ordering at a single degree) is defined in Kratzerian fashion:

(4) $w_1 \leq_{g,w,d} w_2$ iff
$\{p \in g(w)(d) : w_1 \in p\} \supseteq \{p \in g(w)(d) : w_2 \in p\}$

The Details (cont'd)

	d_5	$w_1 \leq_{g,w,d_5} w_2$
	d_4	$w_1 \leq_{g,w,d_4} w_2$
$w_1 <^{+}_{g,w,d_3} w_2$	d_3	$w_1 <_{g,w,d_3} w_2$
$w_1 <^{+}_{g,w,d_2} w_2$	d_2	doesn't matter
$w_1 <^{+}_{g,w,d_1} w_2$	d_1	doesn't matter

(5) a. $w_1 <^{+}_{g,w,d} w_2$ iff

$$\exists d' \geq_d d[w_1 <_{g,w,d'} w_2 \wedge \forall d'' \geq_d d'[w_1 \leq_{g,w,d''} w_2]]$$

The Details (cont'd)

$w_1 =^{+}_{g,w,d_5} w_2$	d_5	$w_1 =_{g,w,d_5} w_2$
$w_1 =^{+}_{g,w,d_4} w_2$	d_4	$w_1 =_{g,w,d_4} w_2$
$w_1 \neq^{+}_{g,w,d_3} w_2$	d_3	$w_1 \neq_{g,w,d_3} w_2$
$w_1 \neq^{+}_{g,w,d_2} w_2$	d_2	doesn't matter
$w_1 \neq^{+}_{g,w,d_1} w_2$	d_1	doesn't matter

(5) b. $w_1 =^{+}_{g,w,d} w_2$ iff $\forall d' \geq_d d[w_1 =_{g,w,d'} w_2]$

c. $w_1 \leq^{+}_{g,w,d} w_2$ iff $w_1 =^{+}_{g,w,d} w_2$ or $w_1 <^{+}_{g,w,d} w_2$

Toy Example I: World-Ordering

- Scale restricted to four degrees: $d_1 <_d d_2 <_d d_3 <_d d_4$.
- Restriction to five worlds: w_1, w_2, w_3, w_4, and w_5.
- w is world of evaluation.
- $\leq^+_{g,w,d}$-equivalent worlds grouped together. Solid lines indicate strict ordering.
- Blue ellipse indicates set of ideal worlds.

Toy Example I (cont'd)

$$g(w)(d_4) = \emptyset$$

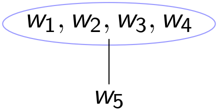
$$\leq^{+}_{g,w,d_4}:$$

$$w_1, w_2, w_3, w_4, w_5$$

Toy Example I (cont'd)

$$g(w)(d_3) = \{\{w_1, w_2, w_3, w_4\}\}$$

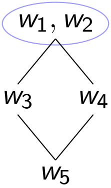
$$\leq^+_{g,w,d_3}:$$



Toy Example I (cont'd)

$$g(w)(d_2) = \{\{w_1, w_2, w_3\}, \{w_1, w_2, w_4\}\}$$

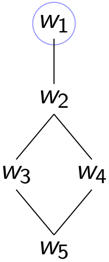
$$\leq^{+}_{g,w,d_2}:$$



Toy Example I (cont'd)

$$g(w)(d_1) = \{\{w_1, w_5\}\}$$

$$\leq^{+}_{g,w,d_1}:$$



Note that even though $w_5 <_{g,w,d_1} w_2, w_3, w_4$, we still get $w_2, w_3, w_4 <^{+}_{g,w,d_1} w_5$.

The Big Reveal

- First we define $\textsc{Best}(f, g, w, d)$, which returns the set of $\leq^{+}_{g,w,d}$-ideal worlds in $\cap f(w)$:

$$\textsc{Best}(f, g, w, d) \equiv \{w' \in \cap f(w) : \neg\exists w'' \in \cap f(w)[w'' <^{+}_{g,w,d} w']\}$$

- Now we can define *important* (given context parameter c):

$$[\![\text{important}]\!]^{c} = \lambda p \lambda w.\, \max(\{d : \forall w' \in \textsc{Best}(f^{c}, g^{c}, w, d)[p(w')]\})$$

- In other words: pick the highest degree d s.t. p holds in all $\leq^{+}_{g,w,d}$-ideal worlds in the modal base.
    - Intuition: If highly-ranked principles sufficient to mandate something, it's more important than if you needed to bring in lower-ranked principles.

Toy Example II: Back to Problem 2

(3b) It is as important (in view of our environmental priorities $g_{\text{env}}(w)$) to preserve the wetlands as it is (in view of our financial priorities $g_{\text{fin}}(w)$) to build the new housing.

$$\max(\{d : \forall w' \in \textsc{Best}(f, g_{\text{env}}, w, d)[\text{wetlands preserved in } w']\}) \geq_d \max(\{d : \forall w' \in \textsc{Best}(f, g_{\text{fin}}, w, d)[\text{housing built in } w']\})$$

- Restriction to three degrees ($d_1 <_d d_2 <_d d_3$) and seven worlds (w_1 through w_7). w = world of evaluation.

Toy Example II (cont'd)

wetlands preserved
housing built
neither

$g_{\text{env}}(w)(d_3) = \emptyset$

$\leq^{+}_{g_{\text{env}}, w, d_3}$:

$w_1, w_2, w_3, w_4, w_5, w_6, w_7$

Wetlands not preserved in all ideal worlds.

$g_{\text{fin}}(w)(d_3) = \emptyset$

$\leq^{+}_{g_{\text{fin}}, w, d_3}$:

$w_1, w_2, w_3, w_4, w_5, w_6, w_7$

Housing not built in all ideal worlds.

(Note: Nothing requires that there be some top degree d s.t. $g(w)(d) = \emptyset$. However, it is helpful for illustration.)

Toy Example II (cont'd)

wetlands preserved
housing built
neither

$g_{\text{env}}(w)(d_2) = \{\{w_1, w_2\}\}$

$\leq^+_{g_{\text{env}}, w, d_2}$:

w_1, w_2

w_3, w_4, w_5, w_6, w_7

Wetlands not preserved in all ideal worlds.

$g_{\text{fin}}(w)(d_2) = \{\{w_4, w_5, w_6\}\}$

$\leq^+_{g_{\text{fin}}, w, d_2}$:

w_4, w_5, w_6

w_1, w_2, w_3, w_7

Housing not built in all ideal worlds.

Toy Example II (cont'd)

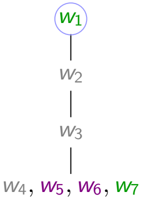
wetlands preserved

housing built

neither

$g_{\text{env}}(w)(d_1) = \{\{w_1, w_3\}\}$

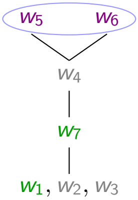
$\leq^{+}_{g_{\text{env}}, w, d_1}$:



Wetlands preserved in all ideal worlds.

$g_{\text{fin}}(w)(d_1) = \{\{w_5, w_7\}, \{w_6, w_7\}\}$

$\leq^{+}_{g_{\text{fin}}, w, d_1}$:



Housing built in all ideal worlds.

The Results

(3b) It is as important (in view of our environmental priorities $g_{\text{env}}(w)$) to preserve the wetlands as it is (in view of our financial priorities $g_{\text{fin}}(w)$) to build the new housing.

$$\max(\{d : \forall w' \in \textsc{Best}(f, g_{\text{env}}, w, d)[\text{wetlands preserved in } w']\}) \geq_d \max(\{d : \forall w' \in \textsc{Best}(f, g_{\text{fin}}, w, d)[\text{housing built in } w']\})$$

- $\max(\{d : \forall w' \in \textsc{Best}(f, g_{\text{env}}, w, d)[\text{wetlands preserved in } w']\}) = d_1$
- $\max(\{d : \forall w' \in \textsc{Best}(f, g_{\text{fin}}, w, d)[\text{housing built in } w']\}) = d_1$
- Therefore, (3) is true.
- More importantly, no false prediction of incommensurability, in spite of very different world-orderings.

Conclusion

- This theory allows us to keep our choice of ordering source separate from our choice of scale.
- As a result, we remain agnostic about when incommensurability effects should (not) arise.
- Note that there's reason to believe that modal incommensurability effects do exist, so it's good (for now) that we remain fully agnostic:

(6) * It is more likely that Bill will go to the party than it is important that Mary go.

Thanks!

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References

von Fintel, K. & S. Iatridou. 2008. How to say *ought* in foreign: The composition of weak necessity modals. In J. Guéron and J. Lecarme (eds.), *Time and modality*, 115–141. Berlin: Springer.

Kennedy, C. 1997. *Projecting the adjective: The syntax and semantics of gradability and comparison*. PhD thesis, UC Santa Cruz.

Klecha, P. 2014. *Bridging the divide: Scalarity and modality*. PhD thesis, University of Chicago.

Kratzer, A. 1981. The notional category of modality. In H.J. Eikmeyer & H. Rieser (eds.), *Words, worlds, and contexts: New approaches in word semantics*, 38–74.

Lassiter, D. 2011. *Measurement and modality: The scalar basis of modal semantics*. PhD thesis, New York University.

Portner, P. & A. Rubinstein. 2014. Extreme and non-extreme deontic modals. Ms.