# Missing words & missing worlds

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## Strong vs. Weak Modals

Traditionally, universal modal auxiliaries have been divided in two categories: strong necessity and weak necessity modals.

- strong necessity modals (such as *must* or *have to*) are semantically stronger than weak necessity modals (such as *should* or *ought to*), as the following examples show:

(1) a. you should/ought to leave but you don't have to leave.
b. you should/ought to leave; in fact you have to leave.

- Differences between *may/might* and *can/could* cannot be captured with the same notion of strength.

(2) a. #you could leave but you can't leave.
b. you might leave but you may not leave.

(3) a. #you could leave; in fact you can leave.
b. #you might leave; in fact you may leave.

- **Weak universal modals lack existential duals.**
- **Cross-linguistically, weak possibility modals are not attested.**

- **Why are weak possibility modals not attested?**

## Anchor semantics & the actual world

- Modals differ in two dimension:
  - the type of quantification over possible worlds (modal force)
  - the worlds included in their domain of quantification
- The domain of modals constructed out of two ingredients:
  - a modal anchor which projects the initial domain
  - a modal restriction that determines the final domain
- The central idea of Anchor semantics (Kratzer 2013,2020) is **Factual Domain Projection**
  - The domain of modals initially projects from a piece of actuality by considering the set of worlds that have a match of that piece of actuality.

- **The initial domain of modals includes the actual world.**

- The initial domain can further be restricted via contextual modal restrictions.

- **The final domain of modals might or might not include the actual world.**

## Strength & the actual world

- **Modals whose final domain necessarily includes the actual world are strong modals.**
- *must* is a strong modal (von Fintel & Gillies (2010,2021), Kratzer (2020) )

(4) a. #It must be raining, but it isn't raining.

(5) a. It should be raining, but it isn't raining.

- **The domain of possibility modals include the actual world.**

(6) Yalcin's puzzle:
a. #It might be snowing but it isn't.
b. #Suppose it might be snowing but isn't.

**Why are weak possibility modals missing?**

- A mere possible proposition, i.e. a proposition that is true in *some* possible world, where the chosen world doesn't have to be a candidate for the actual world, is trivially true.
- There's a ban against triviality in natural languages.

## Strength & size of the domain

- The size of modal domains can also contribute to the strength of a modal:
  - **Possibility modals:** the smaller the domain, the stronger the modal
  - **Necessity modals:** the larger the domain, the stronger the modal

## Changing the size of modal domains

There are are two procedures by which the size of modal domains can change:

- **Domain Restriction**
  - Strengthening of possibility modals (as long as the actual world is not excluded)
  - Weakening of necessity modals
- **Domain Widening**
  - Strengthening of necessity modals
  - Weakening of possibility modals

## Languages missing necessity modals

- It has been observed that there are languages, Nez Perce (Deal, 2011), Ecuadorian Siona (Jeretič, 2021), Kinande (Newkirk, 2021), whose modals can be interpreted as either possibility or necessity modals in upward-entailing environments.
- They are unambiguously interpreted as a possibility modal under a clause-mate negation.
- These authors have convincingly argued that these languages have a possibility modal that is strengthened to necessity in certain contexts.

**Our main claim:**
- Only possibility modals whose domain doesn't include the actual world can and must be strengthened via *exhaustification*!

## Pruning the actual world: a path to strength

- The key to deriving a strengthened reading via Innocent Exclusion (IE) and Innocent Inclusion (II)-based exhaustification is the assertion of singleton set alternatives.
- Assertion of singleton propositions that worlds in their domain are taken to be candidates for the actual world (strong modals) need omniscience, and thus not cognitively viable.

→ **Strong modals cannot be strengthened unless the actual world is pruned.**

- Utterances with weak possibility modals will be strengthened into weak necessity modals, as otherwise they are too weak.
- Kinande provides an evidence for our claim. The possibility modal in Kinande *anga* can only strengthened into a weak necessity modal, not a strong necessity modal ( See Newkirk ( 2021)).

| | | |
|---|---|---|
| **weak** | Domain | $\{w_1, w_2, w_3\}$ |
| | Subdomain Alt | $\{\{w_1, w_2, w_3\}, \{w_1, w_2\}, \{w_1, w_3\}, \{w_2, w_3\}, \{w_1\}, \{w_2\}, \{w_3\}\}$ |
| | $\text{EXH}^{IE+II}(\text{Alt}(\exists w \in \{w_1, w_2, w_3\}: p(w)))$ | $\forall w \in \{w_1, w_2, w_3\}: p(w)$ **weak** $\exists \rightarrow$ **weak** $\forall$ **/ Neg-raising: weak** $\exists \neg \rightarrow$ **weak** $\forall \neg$ |
| | $\text{EXH}^{IE+II}(\text{Alt}(\forall w \in \{w_1, w_2, w_3\})): p(w)))$ | $\forall w \in \{w_1, w_2, w_3\}: p(w)$ **no effect** |
| **strong** | Domain | $\{\mathbf{w_0}, w_1, w_2\}$ |
| | Subdomain Alt | $\{\{\mathbf{w_0}, w_1, w_2\}, \{w_1, w_2\}, \{\mathbf{w_0}, w_1\}, \{\mathbf{w_0}, w_2\}, \{\mathbf{w_0}\}, \{w_1\}, \{w_2\}\}$ |
| | $\text{EXH}^{IE+II}(\text{Alt}(\exists w \in \{\mathbf{w_0}, w_1, w_2\})): p(w)))$ | $\exists w \in \{w_0, w_1, w_2\}: p(w) \wedge \exists w \in \{w_1, w_2\}: p(w) \wedge \exists w \in \{w_0, w_1\}: p(w) \wedge \exists w \in \{w_0, w_2\}: p(w)$ **no effect** |
| | $\text{EXH}^{IE+II}(\text{Alt}(\forall w \in \{\mathbf{w_0}, w_1, w_2\})): p(w)))$ | $\forall w \in \{w_0, w_1, w_2\}: p(w) \wedge \forall w \in \{w_1, w_2\}: p(w) \wedge \forall w \in \{w_0, w_1\}: p(w) \wedge \forall w \in \{w_0, w_2\}: p(w)$ **no effect** |

## Conclusion

- Weak possibility modals are too weak to be lexicalized.
- In languages where they exist, they get strengthened to weak necessity modals.

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