

Modals and conditionals: Practice problem

Deontic necessity in Japanese:

Japanese does not have a modal verb/auxiliary for deontic necessity, like English *must* or Mandarin *bixū*. Instead, the complex expression *nak-ereba ike-nai* is used.

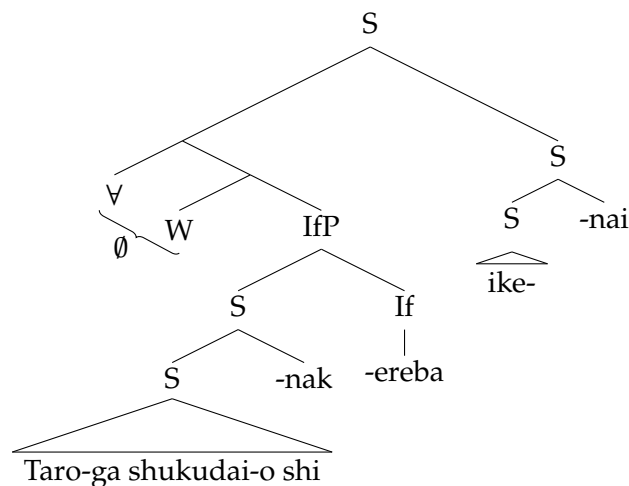
(1) Taro-ga shukudai-o shi-**nak-ereba ike-nai**.

Taro-GA homework-O do-not-if acceptable-not

'Taro **must** do homework.'

Literally: 'It's **not acceptable if** Taro **doesn't** do homework.'

Use the tree here and lexicon below to compute $\llbracket(1)\rrbracket$. Give types, rules, and denotations for each step. Explain how this expression, *nak-ereba ike-nai*, works to communicate deontic necessity.



Recall from the lecture that \forall with domain W (all worlds) is the unpronounced modal assumed for interpreting conditionals without a modal.

Lexicon:

- $\llbracket\text{Taro-ga shukudai-o shi}\rrbracket^w = \text{Do}(\text{Taro}, \text{homework}, w)$
- $\llbracket\text{ike-}\rrbracket^w = \text{Acceptable}(w)$ i.e. the world w is acceptable
- $\llbracket\text{-nak/nai}\rrbracket = (\lambda v_t . \neg v)$
- $\llbracket\text{-ereba}\rrbracket = \lambda p_{\langle s,t \rangle} . \lambda q_{\langle s,t \rangle} . \lambda w_s . p(w) \wedge q(w)$
- $\llbracket\forall\rrbracket = \lambda p_{\langle s,t \rangle} . \lambda q_{\langle s,t \rangle} . \forall w [p(w) \rightarrow q(w)]$
- $\llbracket W\rrbracket = \lambda w_s . 1$