Unifying Weak Necessity and Habituality through Homogeneity: A Case from Bengali

Shrayana Haldar (MIT)

Introduction & strategy: It has been argued in Haldar (2024) that the Bengali modal *[fiɒe̯]* is ambiguous between strong necessity (SN) and weak necessity (WN) only in the habitual form of the modal. The goal of this talk is to propose an account of why this SN-WN ambiguity arises only in the habitual. More specifically, I will propose that the morpheme that is responsible for habituality is polymorphic and can also be merged with the SN modal, thereby producing WN, because this morpheme encodes homogeneity, which is the common core of habituality and WN.

The SN-WN ambiguity: The two modals in (12) must be different in exactly the same way the modals in (1c) are, otherwise contradiction would have arisen just as in (1a-b). This shows that there's an SN-WN ambiguity in *[fiɒe̯]*. (All glossed examples are in the end.)

(1) a. #You should always do this, but right now, you shouldn't do this.
b. #You always have to do this, but right now, you don't have to do this.
c. You should always do this, but right now, you don't have to do it.

(13) illustrates that the WN reading **only** arises when the modal (whose infinitive form is *[fiɒo̯a]*) is inflected in its bare habitual form, since the future-marked modal would have exhibited the neg-raised meaning □¬ if it had a WN meaning (which is known for its neg-raising behavior; see Gajewski 2005; Iatridou & Zeijlstra 2013, Homer 2015, Jeretič 2021, Staniszewski 2022, Haslinger 2023, *inter alia*). In (14), the modal is inflected in its bare habitual form and the neg-raised meaning is available (the other possible meaning being that of a habitual SN).

Homogeneity: To understand the phenomenon, it would help to observe that a link between habituality and WN is homogeneity. Ferreira (2005) and Agha (2021) have noticed that homogeneity is observed in bare habituals. Consider (2), based on Ferreira (2005). The truth and falsity conditions of *When Bob gets hurt, he cries* leave out the truth-value gap in (2c). Thus, the presupposition becomes: Bob cries either all or none of the times he gets a vaccine.

(2) a. *When Bob gets a vaccine, he cries*
is **true iff** Bob cries all of the times he gets a vaccine.
b. *When Bob gets a vaccine, he doesn't cry*
is **true iff** Bob cries none of the times he gets a vaccine.
c. **Neither is true** iff Bob cries only some of the times he gets a vaccine.

That such a presupposition is indeed present can be verified by the following method (*cf.* Doron & Wehbe 2022, Guerrini & Wehbe 2023). Consider (3). The QUD the context sets up is: *How many of the times that Bob gets a vaccine does he cry?*. The common ground entails that he cries some of the times he gets a vaccine. So, once (3a) is asserted, the presupposition gets accommodated and the common ground comes to entail that Bob cries all of the times he gets a vaccine. Therefore, the assertion (that Bob cries some or all of the times he gets a vaccine) becomes trivial and (3a) is thus infelicitous. (3b) isn't infelicitous because the quantifier *every* removes homogeneity.

(3) I knew that Bob cries some of the times he gets a vaccine. But guess what I found out yesterday! . . .
a. #. . . he cries when he gets a vaccine.
b. . . . he cries every time he gets a vaccine.

Intriguingly, *[fiɒe̯]* shows a very similar behavior to bare habituals, as shown in (15). When the word *permission* is explicitly used in (15b), homogeneity is removed and the oddity goes away. (I will explain in the talk why a similar test can't be performed in an affirmative environment for the modal. It's not something that affects the logic of the talk.)

Analysis, informally: What I want to argue is that the emergence of the WN meaning exclusively in the bare habitual form of the modal receives a unified explanation if a single, **polymorphic** lexical entry is given for a single morpheme I will call $\exists_{\text{MOD}}$ that can be attached either

to a SN modal (which would then give rise to the homogeneous WN meaning along the lines sketched in Staniszewski 2022 by exploiting the pruning algorithm in Bar-Lev 2021) **or — and this is my innovation — to the LF of a progressive (to give rise to habituality).** That is, a progressive is to a habitual as SN is to WN. This is inspired by the idea in Ferreira (2004, 2016) that a habitual involves plurality of time intervals at which the corresponding progressive is true. As evidence in favor of his argument about plurality being involved, Ferreira (2005) pointed to the homogeneous nature of bare habituals (*cf.* (2)). Similarly, Agha & Jeretič (2022), pointing to the homogeneous behavior of WN modals (*i.e., should p* is true when $\Box p$ and false when $\Box\neg p$), argued that, while SN involves universal quantification over a set of worlds, WN involves a definite plurality of a set of worlds. Both of these analyses tie the homogeneity of a construction to an underlying plurality. **However, I don't want to make any analytical claim about plurality,** especially because Schmitt (2023) has argued that homogeneity is not necessarily a symptom of plurality, since, while homogeneity is detectable in the modal domain, cumulativity, a key feature of plurality, is absent there. See Schmitt (2023) for further details. Under my proposal, just as an existential quantifier gets exhaustified into a universal meaning in Bar-Lev (2021), an existential quantifier, $\exists_{\text{MOD}}$ (quantifying over an object of underspecified type, either that of evaluation indices or that of ordering source sequences), will get exhaustified into the universal meaning of either bare habitual or WN, depending on where $\exists_{\text{MOD}}$ is attached in the structure. **This will account for the puzzle in Bengali**. When $\exists_{\text{MOD}}$ attaches to the spine of the tree, right above the imperfective morpheme IMP, the habitual meaning arises, and when it attaches to the SN modal and then QRs for type reasons à la Staniszewski (2022), the WN meaning arises. This happens only because of there being a common semantic core to habituality and WN, but not to, say, the future. Hence, the SN-WN ambiguity arises only when the modal is in its habitual form.
Analysis, formally: The polymorphic lexical entry for $\exists_{\text{MOD}}$ that I want to propose is given in (4). *D-Alt* is a function that generates domain alternatives of a given domain (both sub- and superdomain ones), as defined in (5). (6) shows how *D-Alt* works for time-world tuples.

(4) $[\![\exists_{\text{MOD}}]\!] = \lambda M_{\mu} \,.\, \lambda\Pi_{\mu t} \,.\, \exists M' \in \textit{D-Alt}(M) \,.\, \Pi(M') = 1$
where $\mu = \langle i, s\rangle = \iota$ (for evaluation indices, *i.e.,* time-world tuples) or $\langle s, \langle \mathbb{N}, stt\rangle\rangle$ (for ordering source sequences)

(5) $\textit{D-Alt}(M) = \{M' : M' \subseteq M \vee M' \supseteq M\}$ (6) $\textit{D-Alt}(\langle t, w\rangle) = \{\langle t', w\rangle : t' \subseteq t \vee t' \supseteq t\}$

I will illustrate how this works for bare habituals, using the sentence *John smokes*. The VP of this sentence will be a predicate of events, which will have the meaning λe_v . SMOKE(e) $\wedge$ AG(e, John). Let's abbreviate the intension of this meaning as $\mathscr{P}$. The meaning of the imperfective morpheme, IMP, is given in (7), based on Ferreira (2016). This incorporates the modal nature of imperfectives (Dowty 1972, 1977, 1979, 1986; Landman 1992; Portner 1998; Ferreira 2005; *inter alia*). IMP combines with the VP via IFA (von Fintel & Heim 2021: 14).

(7) a. $[\![\text{IMP}]\!] = \lambda\mathscr{P}_{\langle s, vt\rangle} \,.\, \lambda\langle t, w\rangle_{\iota} \,.\, \forall w' \in \textit{BEST}(\mathscr{P}, M, O, w, t) \,.\, \exists e[t \subseteq \tau(e) \wedge \mathscr{P}(w')(e) = 1]$

b. $\textit{BEST}(\mathscr{P}, M, O, w, t)$ = the set of worlds w' in $\bigcap M(\mathscr{P}, w, t)$ such that there is no world w'' in $\bigcap M(\mathscr{P}, w, t)$ where $w'' <_{O(\mathscr{P}, w, t)} w'$.

I assume the LF for habituals would be like (8a). t_7 is the time interval whose left boundary coincides with the left boundary of the time interval where the earliest event in the denotation of the VP happens, and whose right boundary coincides with the right boundary of the time interval where the latest event in the denotation of the VP happens. This implementation is exactly parallel to the way the domain variable is implemented in Bar-Lev (2021). Also see Hacquard (2006: 79) for discussion on the imperfective requiring "some salient time interval" (*ibid.,* Bonomi 1997). (8b) is the resulting meaning, with the time-world tuple abstracted over.

(8) a. $[\textsc{exh}^{\text{IE}+\text{II}}\ [\exists_{\text{MOD}}\text{-}t_7\ [\textsc{imp}\ \text{VP}]]]$

b. $\lambda\langle t, w\rangle_l\ .\ \exists\langle t', w\rangle \in \textit{D-Alt}(\langle t, w\rangle)\ .\ \forall w' \in \textit{BEST}(\mathscr{P}, M, O, w, t')\ .\ \exists e[t' \subseteq \tau(e) \wedge \mathscr{P}(w')(e) = 1]$

When this meaning is exhaustified by the $\textsc{exh}^{\text{IE}+\text{II}}$ operator defined as below in Bar-Lev and Fox's work (always merged at scope positions by assumption; *cf.* Magri 2011), all the subdomain alternatives will be innocently includable (II) and all the superdomain alternatives (also generated by *D-Alt*, recall) will be weaker than the prejacent itself. Therefore, **making the independent assumption that there's no universal alternative that would have been innocently excludable (IE),** we will end up getting the universally quantified meaning. Moreover, it's well-known that *John smokes* can be true even when John doesn't smoke literally every single moment in a salient time interval. **This, arguably, is an instance of non-maximality** and it can be derived via QUD-sensitive pruning, following Bar-Lev's (2021) pruning algorithm. In negative environments, *e.g., John doesn't smoke*, the subdomain alternatives will be weaker than the prejacent ($\neg\exists$; already strong) and the superdomain alternatives will be IE. This should again derive the attested "John never smokes" meaning. (See below for non-maximality under negation.) When the prejacent of $\exists_{\text{MOD}}$ is an LF with SN, we get a habitual SN reading, which is the meaning in (14b).

(9) $[\![\textsc{exh}^{\text{IE}+\text{II}}]\!](C)(p)(w) = \forall q \in \textit{IE}(p, C)[\neg q(w)] \wedge \forall r \in \textit{II}(p, C)[r(w)]$

(10) a. $\textit{IE}(p, C) = \bigcap\{C' \subseteq C : C'$ is a maximal subset of C, s.t. $\{\neg q : q \in C\}' \cup \{p\}$ is consistent$\}$

b. $\textit{II}(p, C) = \bigcap\{C'' \subseteq C : C''$ is a maximal subset of C, s.t. $\{r : r \in C''\} \cup \{p\} \cup \{\neg q : q \in \textit{IE}(p, C)\}$ is consistent$\}$

[Bar-Lev (2018, 2021), Bar-Lev & Fox (2020)]

Crucially, in the case of WN, the same morpheme $\exists_{\text{MOD}}$ can attach to the the SN and QR for type reasons, as Staniszewski (2022) has already envisioned. If we take a sentence like *John should exercise*, then the LF will be as in (11a), where p abbreviates the prejacent of the modal, H_6 is the ordering source sequence $\textit{PRI}(w)$, and f_9 is the modal base $\textit{DEON}(w)$. The meaning of TP^4 is given in (11b), with the world variable λ-bound. When exhaustified, **making the independent assumption that there's no universal alternative that would have been IE** (see Staniszewski 2022 and Haldar 2024 for different ideas about what justifies this), we will again have a universal meaning. Just as before, the subdomain alternatives will be II and the superdomain ones will be weaker than the prejacent of $\textsc{exh}^{\text{IE}+\text{II}}$. The weakness of the necessity is conceived of by Staniszewski (2022) as an instance of **non-maximality,** which, again, is derived via QUD-sensitive pruning, depending on which priorities are relevant in which situation. In negative environments like *John shouldn't exercise*, the subdomain alternatives will be weaker than the prejacent of $\textsc{exh}^{\text{IE}+\text{II}}$ ($\neg\exists$; already strong) and the superdomain alternatives will be IE. This should derive the attested "In none of the worlds . . . " meaning. A similar derivation accounts for the reading (14a). (See below for non-maximality under negation.) **Thus, with the polymorphic $\exists_{\text{mod}}$, we can derive both habituality and WN, depending on where we attach it in the structure. This accounts for the puzzle in Bengali.**

(11) a. $[_{\text{TP}^5}\ \textsc{exh}^{\text{IE}+\text{II}}\ [_{\text{TP}^4}\ [\exists_{\text{MOD}}\ H_6]_1\ [_{\text{TP}^3}\ \lambda_1\ [_{\text{TP}^2}\ [\text{Mod}\ [\Box_{\text{SN}}\ t_1]\ f_9]\ [_{\text{TP}^1}\ p]]]]]$

b. $\lambda w_s\ .\ \exists H' \in \textit{D-Alt}(\textit{PRI}(w))\ .\ \forall w' \in \textit{max}_{H'(w)}(\textit{DEON}(w))\ [p(w') = 1]$

How to complete this account: Because of (3) and (15), a finished account of the Bengali data must send all of the calculation I've presented here to the presuppositional component of the meaning. This is doable, if we assume a presuppositional exhaustification account like that of Doron (2024). When this is done, because of the projection of non-maximality in the presupposition under negation, non-maximality should arise under negation as well. This is desirable, because, for instance, *John doesn't smoke* can be true even when John smokes once in a blue

moon, but doesn't regularly, and *John shouldn't exercise* can be true if John shouldn't exercise according one set of rules, but according to another, he may. I haven't developed the account at this level yet. This is the next step. The purpose of this talk is to show that WN and habituality can be unified and there's cross-linguistic support for the need to do that through homogeneity.

Glossed examples:

(12) to-ke e-ʈa ʃɒb.sombɒe-i koɾ-te fiɒ-e, kintu ækʰon
2.SG.INFRML-DAT this-CLF all.time-FOC do-INF COP-HAB.PRS.3 but now

to-ke e-ʈa koɾ-te fiɒ-e n-a.
2.SG.INFRML-DAT this-CLF do-INF COP-HAB.PRS.3 NEG-IMPFV

The only possible non-contradictory reading:

"You should always do this, but right now, you don't have to do it."

(13) to-ke ekʰane aʃ-te fiɒ-b-e n-a.
2.SG.INFRML-DAT here come-INF COP-FUT-3 NEG-IMPFV
"You {don't have to/won't have to/#aren't supposed to/#are required not to} come here."
(✗□¬, ✓¬□)

a. #***Context:*** The addressee is in a place that's off-limits to them. The speaker, who polices who comes into and goes out of this place, says this to the addressee. (✗□¬/¬◇)

b. ***Context:*** The addressee doesn't have to come to the office and can work virtually. The speaker refer to the office as *here*. (✓¬□$_{SN}$)

(14) to-ke ekʰane aʃ-te fiɒ-e n-a.
2.SG.INFRML-DAT here come-INF COP-HAB.PRS.3 NEG-IMPFV
"You {are not supposed to/don't have to} come here." (✓□$_{SN}$, ✓◇)

a. ***Context:*** The addressee is in a place that's off-limits to them. The speaker, who polices who comes into and goes out of this place, says this to the addressee. (✓□¬/¬◇)

b. ***Context:*** The addressee doesn't have to come to the office and can work virtually. The speaker refer to the office as *here*. (✓¬□$_{SN}$)

(15) a. ??ami ʤan-t-am ʤe ʧaru-ɾ aʃ-a badʱ:otamulɒk n-a.
1.SG.NOM know-HAB-PST.1 that Charu-GEN come-NMLZ obligatory NEG-IMPFV

kintu aʤ æk-ʈa notun ʤiniʃ ʤan-l-am. ʧaru-ke aʃ-te
but today one-CLF new thing know-PFV-PST.1 Charu-DAT come-INF

fiɒ-e n-a.
COP-HAB.PRS.3 NEG-IMPFV

Intended:

#"I knew that Charu isn't required to come. But today, I found out something new. Charu {shouldn't/isn't supposed to} come."

b. ami ʤan̪-ʈ̪-am ʤe ʧaru-ɾ aʃ-a bad̪ʱ:oʈ̪amulɒk n-a.
1.SG.NOM know-HAB-PST.1 that Charu-GEN come-NMLZ obligatory NEG-IMPFV
kin̪̪tu aʤ æk-ʈa not̪un ʤiniʃ ʤan-l-am. ʧaru-ɾ aʃ-a-ɾ
but today one-CLF new thing know-PFV-PST.1 Charu-GEN come-GEN
onumoʈ̪i nei̯.
permission NEG.exist.PRES.3
"I knew that Charu isn't required to come. But today, I found out something new. Charu isn't allowed to come."

References

Agha, Omar. 2021. Homogeneity effects in habituals and temporal adverbs. Handout for SALT 31.

Agha, Omar & Paloma Jeretič. 2022. Weak necessity modals as homogeneous pluralities of worlds. In John R. Starr, Juhyae Kim & Burak Öney (eds.), *Proceedings of SALT 32*, 831–851. Linguistic Society of America.

Bar-Lev, Moshe E. 2018. *Free choice, homogeneity, and innocent inclusion*: The Hebrew University of Jerusalem dissertation.

Bar-Lev, Moshe E. 2021. An implicature account of homogeneity and non-maximality. *Linguistics and Philosophy* 44. 1045–1097.

Bar-Lev, Moshe E. & Danny Fox. 2020. Free choice, simplification, and innocent inclusion. *Natural Language Semantics* 28. 175–223.

Bonomi, Andrea. 1997. Aspect, quantification and when-clauses in Italian. *Linguistics and Philosophy* 20(5). 469–514.

Doron, Omri. 2024. Disjunctive inferences and presupposition projection. Talk given at the LF Reading Group at MIT on February 28, 2024.

Doron, Omri & Jad Wehbe. 2022. A constraint on presupposition accommodation. In *Proceedings of the 23rd Amsterdam Colloquium*, 405–411. ILLC.

Dowty, David R. 1972. *Some extensions of a Montague fragment of English*: UCLA dissertation.

Dowty, David R. 1977. Toward a semantic analysis of verb aspect and the English 'imperfective' progressive. *Linguistics and Philosophy* 1(1). 45–77.

Dowty, David R. 1979. *Word meaning and Montague grammar*, vol. 7. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Dowty, David R. 1986. The effects of aspectual class on the temporal structure of discourse: Semantics or pragmatics? *Linguistics and Philosophy* 9(1). 37–61.

Ferreira, Marcelo. 2004. Imperfectives and plurality. In Robert B. Young (ed.), *Proceedings of SALT XIV*, 74–91. Cornell University, Ithaca, NY: CLC Publications.

Ferreira, Marcelo. 2005. *Event quantification and plurality*: Massachusetts Institute of Technology dissertation.

Ferreira, Marcelo. 2016. The semantic ingredients of imperfectivity in progressives, habituals, and counterfactuals. *Natural Language Semantics* 24. 353–397.

von Fintel, Kai & Irene Heim. 2021. Intensional semantics. MIT.

Gajewski, Jon. 2005. *Neg-raising: Polarity and presupposition*: Massachusetts Institute of Technology dissertation.

Guerrini, Janek & Jad Wehbe. 2023. Homogeneity as *pex*. Handout for a talk presented at the workshop *Gaps and Imprecision in natural language semantics: Homogeneity effects and beyond*, Vienna.

Hacquard, Valentine. 2006. *Aspects of modality*: Massachusetts Institute of Technology dissertation.

Haldar, Shrayana. 2024. Threefold ambiguities between permission, weak necessity, and strong necessity in a Bengali modal. Poster presented at FASAL 14. https://shrayanahaldar.weebly.com/uploads/1/4/5/8/145845671/fasal_14_poster_tanyas_template.pdf.

Haslinger, Nina. 2023. *Pragmatic constraints on imprecision and homogeneity*: University of Göttingen (Georg-August-Universität Göttingen) dissertation.

Homer, Vincent. 2015. Neg-raising and positive polarity: The view from modals. *Semantics & Pragmatics* 8(4). 1–88.

Iatridou, Sabine & Hedde Zeijlstra. 2013. Negation, polarity, and deontic modals. *Linguistic Inquiry* 44. 529–568.

Jeretič, Paloma. 2021. *Neg-raising modals and scaleless implicatures*: New York University dissertation.

Landman, Fred. 1992. The progressive. *Natural Language Semantics* 1(1). 1–32.

Magri, Giorgio. 2011. Another argument for embedded scalar implicatures based on oddness in downward entailing environments. *Semantics & Pragmatics* 4. 1–51.

Portner, Paul. 1998. The progressive in modal semantics. *Language* 74(4). 760–787.

Schmitt, Viola. 2023. Are there pluralities of worlds? *Journal of Semantics* 40. 153–178.

Staniszewski, Frank. 2022. *Modality and time in logical context*: Massachusetts Institute of Technology dissertation.