Wh-quantification in Alternative Semantics

Michael Yoshitaka Erlewine (mitcho)
National University of Singapore
mitcho@nus.edu.sg

GLOW in Asia XII / SICOGG XXI, Dongguk University, August 2019[1]

1 Introduction

We commonly think of question-formation as the primary use of *wh*-phrases. But in many languages, *wh*-phrases are also used for quantification.

(1) **Uses of Japanese *dare*:** (Shimoyama 2006: 143)

wh	*da're*	interrogative 'who'
wh-MO(?)	*da're-mo*	universal 'everyone'
wh-DISJ	*da're-ka*	existential 'someone'
wh-EVEN	*dare-mo*	NPI 'anyone'
wh-CSP[2]	*dare-demo*	free choice 'anyone'

Kuroda (1965: 43) introduced the term "indeterminate" to refer to *wh*-words as "nouns that behave like a logical variable."

Many languages combine *wh*-phrases with other particles to form quantifiers.

- ► Two of the most common types of morphemes involved in *wh*-quantification are (a) disjunctors and (b) scalar focus particles (see e.g. Haspelmath 1997: 157).

Q: What explains these prevalent combinations? Why these particles?

Today: I present a framework for the compositional semantics of alternatives which models various attested forms of *wh*-quantification, and helps us the prevalent use of disjunctors and focus particles in *wh*-quantification.

[1]For comments and discussion, I thank Nadine Bade, Rahul Balusu, Sigrid Beck, Kenyon Branan, Aron Hirsch, Utpal Lahiri, Keely New, and especially Hadas Kotek, and the audiences at the Tokai Semantics Workshop, the University of Tübingen, and Michigan State University.

[2]I refer to *demo* as a concessive scalar particle. I do not discuss universal *wh-mo* type today.

Wh-phrases (and disjunctions) introduce *alternatives* (Hamblin 1973 and many others). I adopt the view that these alternatives are formally the same as (Roothian) alternatives for the computation of focus (Beck 2006 a.o.).

A: Focus particles (and disjunctions) are unique in quantifying over alternatives. (With some help,) they can quantify over alternatives introduced by *wh*-phrases, using their regular focus particle semantics.

- – The approach derives common combinations such as *wh*-EVEN NPIs and *wh*-DISJ indefinites, as well as other combinations such as *wh*-CLEFT NPIs, *wh*-ONLY FCIs, and *wh*-COND-EVEN FCIs.
- – Cross-linguistic differences in *wh*-quantification are due to (a) what (combinations of) operators are spelled out morphologically and (b) the syntactic distribution of the helping operators.

§2 Alternative Semantics §3 The framework §4 Case studies §5 Variation

2 Alternative Semantics

2.1 Roothian focus semantics

(2) **Alternative Semantics (Rooth 1985, 1992):**
We keep track of *two dimensions* of meaning. For any syntactic object α, we compute:
a. the ordinary semantic value $[\![\alpha]\!]^o$; and
b. the alternative set (or focus semantic value) $[\![\alpha]\!]^{alt}$, the set of all ordinary semantic values obtained by substituting alternatives for any F-marked subparts of α.

(3) Mary only bought a $[\text{sandwich}]_F$.

(4) Mary only $[\text{bought}]_F$ a sandwich.

(3') $[\![\text{M bought a [sandwich]}_F]\!]^o = {}^\wedge\text{M bought a sandwich}$ (*prejacent*)

$$[\![\text{M bought a [sandwich]}_F]\!]^{alt} = \left\{ \begin{array}{l} {}^\wedge\text{M bought a sandwich} \\ {}^\wedge\text{M bought a pizza} \\ {}^\wedge\text{M bought a salad} \end{array} \right\} \begin{array}{c} \text{T} \\ \text{F} \\ \text{F} \end{array}$$

Alternative Semantics provides a recursive procedure for computing these alternative sets, often called "pointwise" or "Hamblin" composition.

(5) $\left[\!\!\left[\text{only} \;\; \alpha \right]\!\!\right]^{\text{o}} = \lambda w \,.\, \forall q \in [\![\alpha]\!]^{\text{alt}} \left(q \neq [\![\alpha]\!]^{\text{o}} \rightarrow q(w) = 0 \right)$

"All non-prejacent alternatives are false"

$\rightsquigarrow$ presupposition: $[\![\alpha]\!]^{\text{o}}(w) = 1$

(6) $\left[\!\!\left[\text{even} \;\; \alpha \right]\!\!\right]^{\text{o}} = [\![\alpha]\!]^{\text{o}}$

$\rightsquigarrow$ presupposition: $\forall q \in [\![\alpha]\!]^{\text{alt}} \left[q \neq [\![\alpha]\!]^{\text{o}} \rightarrow [\![\alpha]\!]^{\text{o}} <_{likely} q \right]$

"The prejacent is the least likely alternative."

1. Under this Roothian framework, any α satisfies $[\![\alpha]\!]^{\text{o}} \in [\![\alpha]\!]^{\text{alt}}$. I codify this as a requirement that every clause satisfy (7):

   (7) **Interpretability:** (based on Rooth 1992; Beck 2006)
   To interpret α, $[\![\alpha]\!]^{\text{o}}$ must be defined and $\in [\![\alpha]\!]^{\text{alt}}$.

2. Focus particles are unique in being able to look at alternative sets ($[\![...]\!]^{\text{alt}}$).[3] Other lexical items simply compose pointwise.

3. Once alternatives from a particular focus are "used" by a focus particle, those alternatives cannot be interpreted again by a higher operator. **All focus particles are "resetting"**:[4]

   (8) **Reset:**
   Op is "resetting" if it specifies $[\![Op\ \alpha]\!]^{\text{alt}} := \left\{ [\![Op\ \alpha]\!]^{\text{o}} \right\}$.

2.2 Neo-Hamblin question semantics

Hamblin 1973 proposed that the meaning of a question is the set of possible answer propositions.[5]

(9) $[\![\text{Who does Alex like?}]\!] = \left\{ \begin{array}{l} {}^\wedge\text{Alex likes Bobby,} \\ {}^\wedge\text{Alex likes Chris,} \\ {}^\wedge\text{Alex likes Dana,...} \end{array} \right\}$

[3]In (5–6), this is by giving *only* and *even* syncategorematic entries. In Rooth 1992, this is because the squiggle $\sim$ is the only operator in the grammar which can reference alternative sets, and focus particles make reference to the output of $\sim$.

[4]The claim that all focus particles are resetting is made by Beck (2006) as part of her explanation for intervention effects in *wh*-questions, but other approaches to intervention have since been proposed. See also recent discussion in Bade and Sachs 2019.

Here I present a modern implementation of this idea in the Roothian two-dimensional semantics.

A *wh*-phrase has a set of possible values ($\approx$ short answers) as its alternative set, with no defined ordinary semantic value (Ramchand 1997; Beck 2006):

(10) $[\![\textit{who}]\!]^{\text{o}}$ is undefined
$[\![\textit{who}]\!]^{\text{alt}} = \{x_e : x \text{ is human}\}$

(11) a. $[\![\text{Alex likes who}]\!]^{\text{o}}$ is undefined

b. $[\![\text{Alex likes who}]\!]^{\text{alt}} = \left\{ \begin{array}{l} {}^\wedge\text{Alex likes Bobby,} \\ {}^\wedge\text{Alex likes Chris,} \\ {}^\wedge\text{Alex likes Dana} \end{array} \right\}$

But (11) has no ordinary semantic value and violates Interpretability (7)!
An operator "lifts" the meaning in (11) into an Interpretable question meaning:

(12) **AltShift (Kotek 2016, 2019):**[6]

a. $[\![[\textsc{AltShift}\ \alpha]]\!]^{\text{o}} = [\![\alpha]\!]^{\text{alt}}$

b. $[\![[\textsc{AltShift}\ \alpha]]\!]^{\text{alt}} = \left\{ [\![\alpha]\!]^{\text{alt}} \right\}$ $\leftarrow$ reset

(13) a. $[\![\textsc{AltShift}\ [\text{Alex likes who}]]\!]^{\text{o}} = \left\{ \begin{array}{l} {}^\wedge\text{Alex likes Bobby,} \\ {}^\wedge\text{Alex likes Chris,} \\ {}^\wedge\text{Alex likes Dana} \end{array} \right\}$

b. $[\![\textsc{AltShift}\ [\text{Alex likes who}]]\!]^{\text{alt}} = \left\{ \left\{ \begin{array}{l} {}^\wedge\text{Alex likes Bobby,} \\ {}^\wedge\text{Alex likes Chris,} \\ {}^\wedge\text{Alex likes Dana} \end{array} \right\} \right\}$

[5]Hamblin also described a procedure for computing question meanings compositionally, which is equivalent to Rooth (1985) then proposed for focus alternatives: so-called pointwise composition. Historical note: Rooth was not aware of Hamblin 1973 when developing his proposal. See Rooth 1992 footnote 7.

[6]This same meaning is proposed for C_{int} in Beck 2006; Beck and Kim 2006. But in pair-list multiple questions, this operation will have to apply twice, which is why Kotek (2016, 2019) proposes that this is not the function of interrogative C, but rather a separate operator called AltShift.

2.3 Disjunction in Alternative Semantics

Alonso-Ovalle (2004) and Aloni (2007) propose that alternative sets are used for the interpretation of disjunction and its scope-taking, using a one-dimensional Hamblin semantics. They split disjunction into two steps:[7]

1. A junctor head J (Den Dikken 2006 a.o.) creates an alternative set;
2. an $\exists$ operator combines these alternatives by disjunction.[8]

Let's translate this intuition into the two-dimensional Alternative Semantics framework. J forms an expression with no ordinary value, like *wh*-phrases:[9]

(14) **J with disjuncts $x_1 ... x_n$:**
   a. $[\![\text{J } \{x_i\}]\!]^{o}$ undefined
   b. $[\![\text{J } \{x_i\}]\!]^{alt} = \bigcup \{[\![x_i]\!]^{o}\}$

(15) a. $[\![\text{J } \{\text{Bobby, Chris}\}]\!]^{o}$ undefined
   b. $[\![\text{J } \{\text{Bobby, Chris}\}]\!]^{alt} = \{\text{Bobby, Chris}\}$

(16) a. $[\![\text{Alex likes [Bobby or}_J \text{ Chris]}]\!]^{o}$ undefined
   b. $[\![\text{Alex likes [Bobby or}_J \text{ Chris]}]\!]^{alt} = \left\{ \begin{array}{l} {}^\wedge\text{Alex likes Bobby,} \\ {}^\wedge\text{Alex likes Chris} \end{array} \right\}$

(17) **$\exists$ with argument α:**
   a. $[\![\exists\ \alpha]\!]^{o} = \bigvee [\![\alpha]\!]^{alt}$
   b. $[\![\exists\ \alpha]\!]^{alt} = [\![\alpha]\!]^{alt}$

(18) a. $[\![\exists \text{ [Alex likes [Bobby or}_J \text{ Chris]]}]\!]^{o} = {}^\wedge\text{A likes B} \vee \text{A likes C}$
   b. $[\![\exists \text{ [Alex likes [Bobby or}_J \text{ Chris]]}]\!]^{alt} = \left\{ \begin{array}{l} {}^\wedge\text{Alex likes Bobby,} \\ {}^\wedge\text{Alex likes Chris} \end{array} \right\}$

But (18) violates Interpretability (7)!

[7] On splitting disjunction into an alternative-collection step and a existential closure step, see also Winter 1995, 1998; Den Dikken 2006; Szabolcsi 2015.

[8] The $\exists$ operator for one-dimensional Hamblin semantics comes from Kratzer and Shimoyama 2002, proposed for the interpretation of *wh*-indefinites.
$\exists$ operators are applied at the propositional level here, but could also be defined to apply to sub-sentential phrases as well. See e.g. Alonso-Ovalle 2006 Appendix C.

[9] An advantage of this approach is that we get alternative (disjunctive) questions for free, following Beck and Kim 2006. AltShift applied to (16) gives us a question denotation. See also Erlewine 2014, 2017a,b.

(19) **$\exists_{reset}$ with argument α:**
   a. $[\![\exists_{reset}\ \alpha]\!]^{o} = \bigvee [\![\alpha]\!]^{alt}$
   b. $[\![\exists_{reset}\ \alpha]\!]^{alt} = \left\{\bigvee [\![\alpha]\!]^{alt}\right\}$ ← reset

(20) a. $[\![\exists_{reset} \text{ [Alex likes [Bobby or}_J \text{ Chris]]}]\!]^{o} = {}^\wedge\text{A likes B} \vee \text{A likes C}$
   b. $[\![\exists_{reset} \text{ [Alex likes [Bobby or}_J \text{ Chris]]}]\!]^{alt} = \{{}^\wedge\text{A likes B} \vee \text{A likes C}\}$

3 The framework

A *wh*/J-containing clause has a non-singleton alternative set and no defined ordinary semantic value:

(21) a. $[\![[_{TP} \ldots wh/\text{J} \ldots]]\!]^{o}$ undefined
   b. $[\![[_{TP} \ldots wh/\text{J} \ldots]]\!]^{alt} = \{p, q, \ldots\}$ (a set of propositions)

This violates Interpretability (7)! In particular, we need to compute an ordinary semantic value based on (21).

► I propose that **AltShift, $\exists$, and $\exists_{reset}$ are the only operators that can define an ordinary semantic value where there is none**.[10]

- We can apply AltShift to (21) get an Interpretable question or apply $\exists_{reset}$ to get an Interpretable existential/disjunctive proposition.
- We could apply $\exists$ to (21) to define an ordinary semantic value, but this result (22) will still violate Interpretability!

  (22) a. $[\![\exists\ [_{TP} \ldots wh/\text{J} \ldots]]\!]^{o} = p \vee q \vee \ldots$
     b. $[\![\exists\ [_{TP} \ldots wh/\text{J} \ldots]]\!]^{alt} = \{p, q, \ldots\}$

  – We can then apply a focus particle, which will fix the Interpretability problem, because it "resets" (8) the alternative set.
  – Focus particles can't apply directly to (21) because there is no defined ordinary value (prejacent).

[10] These operators can only apply to structures which have no defined ordinary semantic value. In other words, it's not grammatical to override an existing prejacent value. See Erlewine 2017b and Kotek 2019 for motivation behind this restriction for AltShift.

4 Case studies

Indefinites, NPIs, and FCIs, highlighting data from three Tibeto-Burman lgs.

4.1 *Wh*-indefinites

Since J-disjunctions and *wh*-phrases create similar meanings, a language could apply $\exists_{\text{reset}}$ to a *wh*-containing clause.

(23) a. $[\![\exists_{\text{reset}}\ [\text{Alex likes who}]]\!]^{\text{o}}$
$= {}^\wedge\text{Alex likes Bobby} \vee \text{Alex likes Chris} \vee \text{Alex likes Dana}$
$= {}^\wedge\text{Alex likes someone}$

b. $[\![\exists_{\text{reset}}\ [\text{Alex likes who}]]\!]^{\text{alt}} = \{{}^\wedge\text{Alex likes someone}\}$ ← reset

4.1.1 Bare *wh* indefinites

► We yield bare *wh* indefinites if:

- J ↔ disjunctive particle, e.g. "or"
- $\exists_{\text{reset}} \leftrightarrow \emptyset$

4.1.2 *Wh*-disjunctor indefinites

As Haspelmath (1997), Bhat (2000), and others note, many languages use *wh*-phrases together with disjunctive particles as indefinites:

(24) **Some *wh*-disjunctor indefinites:**

	'who'	'someone'	
Hungarian	*ki*	*vala-ki*	(Szabolcsi 2015)
Japanese	*dare*	*da're-ka*	(Shimoyama 2006)
Kannada	*yaaru*	*yaar-oo*	(Amritavalli 2003)
Tiwa	*shar*	*shar-khi*	(Dawson to appear)

► In these languages, the pronunciation of disjunction reflects the use of $\exists_{\text{reset}}$, even in the absence of J:

- J ↔ ∅
- $\exists_{\text{reset}} \leftrightarrow$ disjunctive particle[11]

Tiwa (Tibeto-Burman; Dawson 2019, to appear) offers a nice example of the disjunctor as the realization of (versions of) $\exists_{\text{reset}}$:

(25) **Two types of *wh*-indefinites (Dawson to appear):**

Maria *shar*-**pha/khí**-go lak mán-ga.
Maria who-KHI/PHA-ACC meet-PFV
'Maria met someone.'

(26) ***Wh-pha* takes narrow scope; *wh-khí* takes wide scope:**

Chidî [*shar*-**pha/khí** sister]-go lak mán-a phi-gaido, Saldi khúp khâdu-gam.
if who-PHA/KHI sister-ACC meet-INF come-COND Saldi very happy-CF
'If Saldi meets some nun, she would be very happy.'

a. *-pha* ⇔ if > ∃: Meeting any nun will make Saldi happy.

b. *-khí* ⇔ ∃ > if: There is a particular nun that Saldi wants to meet.

► This correlates with the scope-taking behavior of two different disjunctions: *ba* and *khi*, related to *wh-pha* and *wh-khí*!

(27) ***Ba* disjunction takes narrow scope; *khi* takes wide scope:**

Mukton **ba/khi** Monbor phi-gaido, Saldi khâdu-gam.
Mukton BA/KHI Monbor come-COND Saldi happy-CF
'If Mukton or Monbor comes, Saldi would be happy.'

a. *ba* ⇔ if > ∨: Saldi is in love with both Mukton and Monbor. She will be happy if either of them comes.

b. *khi* ⇔ ∨ > if: Saldi is in love with either Mukton or Monbor, but we don't know who. Whoever it is, if he comes to visit, Saldi will be very happy.

See Dawson 2018, to appear for additional scope facts.

► The uniform wide scope of *khi*/*wh-khi* and narrow scope of *ba*/*wh-pha* can be explained if *khi* and *ba*/*pha* realize different forms of $\exists_{\text{reset}}$:

- $\exists_{\text{reset}}$ with widest scope ↔ *khi*
- $\exists_{\text{reset}}$ with narrow scope ↔ *ba*/*pha*

[11]Or the disjunctive particle spells out a feature on *wh*/J, indicating that it's in the presence of $\exists_{\text{reset}}$, for example via Agree.

4.2 *Wh*-NPIs

4.2.1 *Wh*-EVEN NPIs

NPIs have often been analyzed as involving an overt or covert *even*.

- ► **An NPI is an *even* associating with an indefinite.**

  See e.g. Heim 1984; Krifka 1994; Lee and Horn 1995; Lahiri 1998; Chierchia 2013.

Here's our basic semantics for *even*, repeated from above:

(6) $[\![[\text{even } \alpha]]\!]^{o} = [\![\alpha]\!]^{o}$

$\rightsquigarrow$ presupposition: $\forall q \in [\![\alpha]\!]^{alt}\ [q \neq [\![\alpha]\!]^{o} \rightarrow [\![\alpha]\!]^{o} <_{likely} q]$
"The prejacent is the least likely alternative."

The scalar meaning of *even* associated with an indefinite will be unsatisfiable, unless it's in a downward-entailing environment (Lahiri 1998), explaining NPI behavior (Ladusaw 1979).

(28) * [EVEN [I saw SOMEONE]]

$[\![\text{I saw SOMEONE}]\!]^{alt} = \left\{ \begin{array}{l} \wedge\text{I saw someone,} \\ \wedge\text{I saw many,} \\ \wedge\text{I saw everyone} \end{array} \right\}$

EVEN $\rightsquigarrow$ ($\wedge$I saw someone) $<_{likely}$ ($\wedge$I saw many) and
($\wedge$I saw someone) $<_{likely}$ ($\wedge$I saw everyone) ×

This presupposition is unsatisfiable, in any context!

(29) ✓ [EVEN [NEG [I see SOMEONE]]] = "I didn't see *anyone*."

$[\![\text{NEG [I saw SOMEONE]}]\!]^{alt} = \left\{ \begin{array}{l} \text{NEG}(\wedge\text{I saw someone}), \\ \text{NEG}(\wedge\text{I saw many}), \\ \text{NEG}(\wedge\text{I saw everyone}) \end{array} \right\}$

EVEN $\rightsquigarrow$ $\neg$($\wedge$I saw someone) $<_{likely}$ $\neg$($\wedge$I saw many) and
$\neg$($\wedge$I saw someone) $<_{likely}$ $\neg$($\wedge$I saw everyone)
$\Longleftrightarrow$ ($\wedge$I saw someone) $>_{likely}$ ($\wedge$I saw many) and
($\wedge$I saw someone) $>_{likely}$ ($\wedge$I saw everyone) ◯

Tibetan (Erlewine and Kotek 2016) has *wh*-(one)-EVEN NPIs but bare *wh*-(one) are not indefinites.[12]

(30) **Tibetan *wh*, indefinites, and NPIs:**

su 'who'	*mi-gcig* "person-one" 'someone'	*su-yang* 'anyone'
gare 'what'	*(calag)-gcig* "(thing)-one" 'something'	*gare-yang* 'anything'

(31) *Su*-**yang** slebs-**ma**-song / *slebs-song.
who-EVEN arrive-NEG-PRFV / *arrive-PRFV
'No one arrived.'

- ► **Tibetan a free covert $\exists$ but not $\exists_{reset}$.**

(32) a. $[\![\exists\ [\text{who arrived}]]\!]^{o} = \wedge$someone arrived

b. $[\![\exists\ [\text{who arrived}]]\!]^{alt} = \left\{ \begin{array}{l} \wedge\text{A arrived,} \\ \wedge\text{B arrived,} \\ \wedge\text{C arrived, ...} \end{array} \right\}$

× Violates Interpretability (7)!

We can fix this Interpretability problem with EVEN, because it's resetting:

(33) a. $[\![\text{EVEN}\ [\exists\ [\text{who arrived}]]]\!]^{o} = \wedge$someone arrived
EVEN $\rightsquigarrow \forall x$ [($\wedge$someone arrived) $<_{likely}$ ($\wedge x$ arrived)]

b. $[\![\text{EVEN}\ [\exists\ [\text{who arrived}]]]\!]^{alt} = \{\wedge$someone arrived$\}$

◯ Interpretable; × Unsatisfiable presupposition!

We additionally need a DE operator to get a satisfiable presupposition:

(34) a. $[\![\text{EVEN}\ [\text{NEG}[\exists\ [\text{who arrived}]]]]\!]^{o} = \wedge$no one arrived
EVEN $\rightsquigarrow \forall x$ [$\neg$($\wedge$someone arrived) $<_{likely}$ $\neg$($\wedge x$ arrived)]

b. $[\![\text{EVEN}\ [\text{NEG}[\exists\ [\text{who arrived}]]]]\!]^{alt} = \{\wedge$no one arrived$\}$

◯ Interpretable; ◯ Satisfiable (tautological) presupposition

- ► This explains why the use of EVEN is obligatory in *wh*-EVEN NPIs, even though the addition of EVEN does not make a contribution to the overall meaning expressed. **EVEN repairs the violation of Interpretability.**[13]

[12] Japanese is the same, but see footnote 13. This contrasts with e.g. Korean, which also has *wh*-EVEN NPIs but also has bare *wh* indefinites.

[13] See e.g. Crnič's 110 (2011) Non-Vacuity condition, based in turn on Gajewski 2002, 2009:

4.2.2 *wh*-CLEFT NPIs

Burmese forms *wh*-NPIs with a cleft semantics particle, *hma*:

(35) **Burmese *hma* (New and Erlewine 2018):**[14]

$$\left[\!\!\left[\overset{\frown}{hma \quad \alpha} \right]\!\!\right]^{o} = \lambda w\ .\ [\![\alpha]\!]^{o}(w)$$

$\rightsquigarrow$ presup.: $\forall q \in [\![\alpha]\!]^{alt}\left[\left(q <_{likely} [\![\alpha]\!]^{o}\right) \rightarrow q(w) = 0\right]$
"All less likely alternatives are false."

This is similar to the semantics for *it*-clefts in Velleman et al. 2012.

(36) Nga-ga [*bal* panthi]-ko-**hma** **ma**-yu-keh-**bu** / *yu-keh-deh.
1-NOM which apple-ACC-HMA NEG-take-PAST-NEG / *take-PAST-REAL
'I didn't take any apple(s).'

► **Burmese has free covert ∃ but not $\exists_{reset}$.**

Let 1, 2, and 3 be apples in the context.

(37) a. $[\![\exists$ [I took which apple]$]\!]^{o}$ = ^I took 1 ∨ I took 2 ∨ I took 3

b. $[\![\exists$ [I took which apple]$]\!]^{alt}$ = { ^I took 1, ^I took 2, ^I took 3 }

× Violates Interpretability (7)

Now apply *hma* applying to (37), with and without higher negation:

(38) * $[\![$HMA [∃ [I took which apple]]$]\!]^{o}$ = ^I took some apple
HMA $\rightsquigarrow$ ¬1 ∧ ¬2 ∧ ¬3
◯ Interpretable; × Assertion incompatible with presupposition

(39) $[\![$NEG [HMA [∃ [I took which apple]]]$]\!]^{o}$
= ¬ [I took some apple] = ^I didn't take any apple
HMA $\rightsquigarrow$ ¬1 ∧ ¬2 ∧ ¬3
◯ Interpretable; ◯ Assertion compatible with presupposition

"The meaning of a lexical item used in the discourse must affect the meaning of its host sentence (either its truth-conditions or its presuppositions)."
I am not committed to this approach for Japanese *wh-mo* NPIs, due to the arguments of Shimoyama 2006. But see also Tomioka 2014 footnote 9.

[14] In New and Erlewine 2018, we propose that the alternatives that *hma* considers must be closed under conjunction. This does not affect the discussion here.

4.3 *Wh*-FCIs

There are many different FCIs formed from *wh*-phrases with some particle (Giannakidou and Cheng 2006):

1. *Wh*-"modal particle": e.g. English *who-ever*, Greek *opjos-dhipote*,...
2. *Wh*-DISJ: e.g. Korean *nwukwu-na* (Gill et al. 2006; Kim and Kaufmann 2006; Choi 2007; Choi and Romero 2008; a.o.)
3. *Wh*-THEN-ALSO: e.g. Dutch *wie den ook* (Rullmann 1996)

Here, I mention two patterns not mentioned in Giannakidou and Cheng 2006:

(40) **Burmese *wh*-ONLY FCI:** (Keely New, p.c.)

Nga [*bal* hin]-**beh** sar-lo ya-dal.
1 which dish-ONLY eat-C get-REAL
'I can eat any dish.'

► The use of an exhaustive particle (ONLY) in the expression of free choice can be understood under the exhaustification approach to free choice (Fox 2007), and can be modeled under this proposal. See Appendix A.

Chuj (Mayan; Kotek and Erlewine 2019) also forms FCIs with *wh* + ONLY.

(41) **Tibetan *wh*-COP-COND-EVEN FCI:** (Erlewine 2019)

Mo.rang [*su* **yin-na**]-**yang**-la skad.cha bshad-gi-red.
she who COP-COND-EVEN-DAT speech talk-IMPF-AUX
[Pema is very friendly.] 'She talks to anyone.'

► *Even if* combinations are concessive conditionals, which can also form unconditionals. *Yin-na-yang* also functions as a concessive scalar particle. See Appendix B for my analysis.

And similarly in Dravidian (Rahul Balusu, yesterday)!

5 Accounting for variation

Not all languages have the same range of *wh*-particle quantifier combinations. How do languages vary?

❶ Differences in what (combinations of) operators are spelled out morphologically; and

❷ syntactic restrictions on the placement of AltShift, ∃, $\exists_{reset}$.

5.1 Different lexicalizations

We already saw this in §4.1: A disjunctive particle could morphologically realize J or $\exists_{reset}$, the two ingredients in boolean disjunction.[15]

5.1.1 Toba Batak *manang* (Erlewine 2017a, in prep)

Toba Batak (Austronesian; Indonesia) has a particle *manang* which forms disjunctions but also forms *wh*-NPI/FCIs.

(42) Man-uhor buku i [ho **manang** ahu].
ACT-buy book that 2sg MANANG 1sg
'Either you or I bought the book.'

(43) Si Poltak (dang) mang-allang [**manang** *aha*].
PN Poltak NEG ACT-eat MANANG what
'Poltak {doesn't eat / eats} anything.'

► *manang* ↔ J or ∃. See Erlewine 2017a.

[15]See Uegaki 2018 for yet another possibility — spiritually compatible with my overall framework — where the Japanese disjunctive particle *ka* realizes AltShift, attaching at different levels of structure, with J and (a variant of) ∃ both being unpronounced.

5.1.2 Two disjunctors in Mandarin (Erlewine 2017b, in revision)

Mandarin has two disjunctors: *háishi* generally forms alternative questions, whereas *huòzhe* expresses logical disjunction, leading to proposals that *háishi* but not *huòzhe* has a [+wh] feature (Huang 1982, a.o.).

But the difference is neutralized in certain environments! These are, for many speakers,[16] the same environments where *wh*-phrases also have non interrogative uses.

► *Háishi* and *huòzhe* are both J, but *huòzhe* has a [u∃] feature which requires a local ∃ or $\exists_{reset}$. See Erlewine 2017b.

Neutralizing environments consider only their sister's alternative set:
- *Wh* or J (*háishi* or *huòzhe*) can introduce those alternatives.
- If *huòzhe*, ∃ (without reset) will locally apply first.

Elsewhere, [u∃] on *huòzhe* will be satisfied by $\exists_{reset}$, leading to an Interpretable boolean disjunction. A simple ∃ without reset will violate Interpretability. For *háishi*, like *wh*, AltShift applies to form a question.

5.2 Different syntactic restrictions

One example: In many languages with bare *wh* indefinites, they are limited to lower positions in the clause (Postma 1994; Bhat 2000).

(44) **Shoshone (Uto-Aztecan) bare *wh* indefinites must be in-situ:**

a. *Hakke* ~~ɨn~~ puikka?
who you saw
'Who did you see?'

b. Nɨ kian *hakke* puikka.
I perhaps who saw
'I saw someone.'

(Bhat 2000, p. 383, citing Miller 1996)

► The distribution of $\exists_{reset}$ may be syntactically restricted.

[16]Apparently not my reviewers, but the pattern I mention here are reported by, for example, Ray Huang (2010).

6 Conclusion

Today I introduced a framework for productively understanding patterns of *wh*-quantification in two-dimensional Alternative Semantics.

- A few basic, independently motivated ingredients — *wh*, J, AltShift, $\exists$, and $\exists_{\text{reset}}$ — can together model the behavior of many attested forms of *wh*-quantification.
- Crucial are the roles of **Interpretability** and **reset**. Both are assumed notions in previous work, but they hold the key to understanding the frequent use of focus particles and disjunction in *wh*-quantification.

Q: Why are focus particles and disjunctors commonly involved in *wh*-quantification?

A:
  i. Focus particles are unique in the grammar in being able to access alternative sets ($[\![...]\!]^{\text{alt}}$) (see e.g. Rooth 1992). (Disjunctive particles often spell out $\exists_{\text{reset}}$.)
  ii. Focus particles are resetting, and therefore can repair violations of Interpretability, especially following the application of $\exists$.

The frequent use of focus particles in *wh*-quantification is unexplained by earlier approaches to *wh*-quantification such as Kratzer and Shimoyama 2002, which proposes various operators that quantify over alternatives which are unrelated to focus particles.[17]

[17]Szabolcsi 2015 presents an approach which does make a productive connection to 'even/also' particles and disjunctive particles. It's less clear how Szabolcsi's account can be extended to other focus particles, though.

References

Aloni, Maria. 2007. Free choice, modals, and imperatives. *Natural Language Semantics* 15:65–94.

Alonso-Ovalle, Luis. 2004. Simplification of disjunctive antecedents. In *Proceedings of NELS 34*, ed. Keir Moulton and Matthew Wolf, 1–5.

Alonso-Ovalle, Luis. 2006. Disjunction in alternative semantics. Doctoral Dissertation, University of Massachusetts Amherst.

Amritavalli, R. 2003. Question and negative polarity in the disjunction phrase. *Syntax* 6:1–18.

Bade, Nadine, and Konstantin Sachs. 2019. EXH passes on alternatives: A comment on Fox and Spector (2018). *Natural Language Semantics* 27:19–45.

Beck, Sigrid. 2006. Intervention effects follow from focus interpretation. *Natural Language Semantics* 14:1–56.

Beck, Sigrid, and Shin-Sook Kim. 2006. Intervention effects in alternative questions. *Journal of Comparative German Linguistics* 9:165–208.

Bhat, Darbhe Narayana Shankara. 2000. The indefinite-interrogative puzzle. *Linguistic Typology* 4:365–400.

Chierchia, Gennaro. 2013. *Logic in grammar: Polarity, free choice, and intervention*. Oxford University Press.

Choi, Jinyoung. 2007. Free choice and negative polarity: a compositional analysis of Korean polarity sensitive items. Doctoral Dissertation, University of Pennsylvania.

Choi, Jinyoung, and Maribel Romero. 2008. Rescuing existential free choice items in episodic sentences. In *Empirical Issues in Syntax and Semantics 7*, ed. Olivier Bonami and Patricia Cabredo Hofherr, 77–98.

Crnič, Luka. 2011. Getting *even*. Doctoral Dissertation, Massachusetts Institute of Technology.

Dawson, Virginia. 2018. Two disjunctions in Tiwa: Morphologically differentiated disjunction scope. Handout.

Dawson, Virginia. 2019. Lexicalizing disjunction scope. In *Proceedings of the LSA*, volume 4, 1–13.

Dawson, Virginia. to appear. Tiwa indeterminates and NP restriction in a Hamblin semantics. In *Proceedings of FASAL 7*.

DeLancey, Scott. 1999. Relativization in Tibetan. In *Topics in Nepalese linguistics*, ed. Yogendra P. Yadava and Warren W. Glover, 231–249. Kathmandu: Royal Nepal Academy.

Den Dikken, Marcel. 2006. *Either*-float and the syntax of co-*or*-dination. *Natural Language & Linguistic Theory* 24:689–749.

Erlewine, Michael Yoshitaka. 2014. Alternative questions through focus alternatives in Mandarin Chinese. In *Proceedings of the 48th Meeting of the Chicago Linguistic Society (CLS 48)*, ed. Andrea Beltrama, Tasos Chatzikonstantinou, Jackson L. Lee, Mike Pham, and Diane Rak, 221–234.

Erlewine, Michael Yoshitaka. 2017a. Quantifying over alternatives with Toba Batak *manang*. Presented at AFLA 24, Triple A 4.

Erlewine, Michael Yoshitaka. 2017b. Two disjunctions in Mandarin Chinese. Manuscript, National University of Singapore.

Erlewine, Michael Yoshitaka. 2019. Uses of Tibetan *yin.n'ang*. Presented at the 2019 Singapore Summer Meeting.

Erlewine, Michael Yoshitaka, and Hadas Kotek. 2016. *Even*-NPIs in Dharamsala Tibetan. *Linguistic Analysis* 40:129–165.

Erlewine, Michael Yoshitaka, and Keely Zuo-Qi New. 2019. A variably exhaustive and scalar focus particle and pragmatic focus concord in Burmese. Manuscript, National University of Singapore.

Fox, Danny. 2007. Free choice and the theory of scalar implicatures. In *Presupposition and implicature in compositional semantics*, ed. Uli Sauerland and Penka Stateva, 71–120. Springer.

Gajewski, Jon. 2002. On analyticity in natural language. Manuscript, Massachusetts Institute of Technology.

Gajewski, Jon. 2009. L-triviality and grammar. Handout, UConn Logic Group.

Giannakidou, Anastasia, and Lisa Lai-Shen Cheng. 2006. (In)definiteness, polarity, and the role of *wh*-morphology in free choice. *Journal of Semantics* 23:135–183.

Gill, Kook-Hee, Steve Harlow, and George Tsoulas. 2006. Disjunction and indeterminate-based quantification in Korean. Manuscript, University of Sheffield and University of York.

Hamblin, Charles. 1973. Questions in Montague English. *Foundations of Language* 10:41–53.

Haspelmath, Martin. 1997. *Indefinite pronouns*. Oxford.

Heim, Irene. 1984. A note on negative polarity and DE-ness. In *Proceedings of NELS 14*, 98–107.

Huang, Cheng-Teh James. 1982. Logical relations in Chinese and the theory of grammar. Doctoral Dissertation, Massachusetts Institute of Technology.

Huang, Rui-heng Ray. 2010. Disjunction, coordination, and question: a comparative study. Doctoral Dissertation, National Taiwan Normal University.

Kim, Min-Joo, and Stefan Kaufmann. 2006. Domain restriction in freedom of choice: A view from Korean *indet-na* items. In *Proceedings of Sinn und Bedeutung 11*, 375–389.

Kotek, Hadas. 2016. On the semantics of *wh*-questions. In *Proceedings of Sinn und Bedeutung 20*, ed. Nadine Bade, Polina Berezovskaya, and Anthea Schöller, 424–447.

Kotek, Hadas. 2019. *Composing questions*. MIT Press.

Kotek, Hadas, and Michael Yoshitaka Erlewine. 2019. *Wh*-indeterminates in Chuj (Mayan). *Canadian Journal of Linguistics* 64:62–101.

Kratzer, Angelika, and Junko Shimoyama. 2002. Indeterminate pronouns: the view from Japanese. In *The Proceedings of the Third Tokyo Conference on Psycholinguistics (TCP 2002)*, ed. Yuko Otsuka, 1–25. Tokyo: Hitsuji Syobo.

Krifka, Manfred. 1994. The semantics and programatics of weak and strong polarity items in assertions. In *Proceedings of SALT 4*, 195–219.

Kuroda, Sige-Yuki. 1965. Generative grammatical studies in the Japanese language. Doctoral Dissertation, Massachusetts Institute of Technology.

Ladusaw, William A. 1979. Polarity sensitivity as inherent scope relations. Doctoral Dissertation, University of Texas at Austin.

Lahiri, Utpal. 1998. Focus and negative polarity in Hindi. *Natural Language Semantics* 6:57–123.

Lee, Young-Suk, and Laurence Horn. 1995. *Any* as indefinite plus *even*. Manuscript, Yale University, May 1995.

Miller, Wick R. 1996. Sketch of Shoshone, a Uto-Aztecan language. In *Handbook of north american indians: Languages*, ed. Ives Goddard, 693–720. Washington: Smithsonian Institution.

New, Keely, and Michael Yoshitaka Erlewine. 2018. The expression of exhaustivity and scalarity in Burmese. In *Proceedings of SALT 28*, ed. Sireemas Maspong, Brynhildur Stefánsdóttir, Katherine Blake, and Forrest Davis, 271–288.

Postma, Gertjan. 1994. The indefinite reading of wh. *Linguistics in the Netherlands* 11:187–198.

Ramchand, Gillian Catriona. 1997. Questions, polarity and alternative semantics. In *Proceedings of NELS 27*, 383–396. GLSA.

Rooth, Mats. 1985. Association with focus. Doctoral Dissertation, University of Massachusetts, Amherst.

Rooth, Mats. 1992. A theory of focus interpretation. *Natural Language Semantics* 1:75–116.

Rullmann, Hotze. 1996. Two types of negative polarity items. In *Proceedings of NELS 26*, 335–350.

Shimoyama, Junko. 1999. Internally headed relative clauses in Japanese and E-type anaphora. *Journal of East Asian Linguistics* 8:147–182.

Shimoyama, Junko. 2006. Indeterminate quantification in Japanese. *Natural Language Semantics* 14:139–173.

Szabolcsi, Anna. 2015. What do quantifier particles do? *Linguistics and Philosophy* 38:159–204.

Tomioka, Satoshi. 2014. Ellipsis with focused antecedents. Presented at GLOW in Asia.

Uegaki, Wataru. 2018. A unified semantics for the Japanese Q-particle *ka* in indefinites, questions, and disjunctions. *Glossa* 3.

Velleman, Leah, David Ian Beaver, Emilie Destruel, Dylan Bumford, Edgar Onea, and Liz Coppock. 2012. *It*-clefts are IT (inquiry terminating) constructions. In *Proceedings of SALT 22*, 441–460.

Winter, Yoad. 1995. Syncategorematic conjunction and structured meaning. In *Proceedings of SALT 5*, 387–404.

Winter, Yoad. 1998. Flexible boolean semantics: Coordination, plurality and scope in natural language. Doctoral Dissertation, Utrecht University.

Xiang, Yimei. 2016. Interpreting questions with non-exhaustive answers. Doctoral Dissertation, Harvard.

Appendix A: Burmese *wh*-ONLY FCI

(40) **Burmese *wh*-ONLY FCI:** (Keely New, p.c.)

Nga [*bal* hin]-**beh** sar-lo ya-dal.
1 which dish-ONLY eat-C get-REAL
'I can eat any dish.'

I define a "pre-exhaustification" operator PREEXH which exhaustifies individual alternatives (see Chierchia 2013; Xiang 2016), leaving the ordinary denotation unchanged (45).

(Let EXH and ONLY here negate Innocently Excludable alternatives.)

(45) a. $[\![\text{PREEXH}\ \alpha]\!]^{o} = [\![\alpha]\!]^{o}$
b. $[\![\text{PREEXH}\ \alpha]\!]^{alt} = \left\{ \text{EXH}_{C = [\![\alpha]\!]^{alt}}(a) : a \in [\![\alpha]\!]^{alt} \right\}$

(46) a. $[\![[\text{PREEXH}\ [\Diamond\ [\exists\ [\text{I eat which dish}]]]]]\!]^{o}$
$= [\![[\Diamond\ [\exists\ [\text{I eat which dish}]]]]\!]^{o} = \Diamond$ I eat some dish
b. $[\![[\text{PREEXH}\ [\Diamond\ [\exists\ [\text{I eat which dish}]]]]]\!]^{alt}$
$= \left\{ \begin{array}{l} \text{EXH}\ \Diamond\ \text{I eat a,} \\ \text{EXH}\ \Diamond\ \text{I eat b,...} \end{array} \right\} = \left\{ \begin{array}{l} \Diamond\ \text{a} \wedge \neg\Diamond\ \text{b,} \\ \Diamond\ \text{b} \wedge \neg\Diamond\ \text{a,...} \end{array} \right\}$

ONLY applied to (45) results in the free choice inference:

(47) $[\![[\text{ONLY}\ [\text{PREEXH}\ [\Diamond\ [\exists\ [\text{I eat which dish}]]]]]]\!]^{o}$
$= \neg(\Diamond\ \text{a} \wedge \neg\Diamond\ \text{b}) \wedge \neg(\Diamond\ \text{b} \wedge \neg\Diamond\ \text{a}) = \underline{\Diamond\ \text{a} \wedge \Diamond\ \text{b}}$ (given ◇ some)
$\rightsquigarrow \Diamond$ I eat some dish

Without PREEXH, ONLY will (again) result in a triviality, as there are no Innocently Excludable alternatives.[18]

But (47) predicts the free choice inference to be the at-issue content. This requires further investigation.

[18]Under this formulation, without the modal, PREEXH and ONLY will grammatically strengthen the sentence to 'I eat every dish.' To avoid this, the original domain of alternatives may have to be closed under conjunction.

Appendix B: Tibetan *wh*-COP-COND-EVEN FCI

(41) **Tibetan *wh*-COP-COND-EVEN FCI:** (Erlewine 2019)

Mo.rang [*su* **yin-na**]-**yang**-la skad.cha bshad-gi-red.
she who COP-COND-EVEN-DAT speech talk-IMPF-AUX
[Pema is very friendly.] 'She talks to anyone.'

First, <u>a syntactic puzzle:</u> *wh-yin-na-yang* formally is a conditional clause (with EVEN) but in argument position. See especially the dative case in (41).

► I propose to adopt the Shimoyama 1999 E-type anaphora approach for (Japanese) head-internal relatives:[19] The clause is adjoined above LF, with the argument position interpreted with an E-type pronoun.

(48) a. <u>Literal (41):</u> She talks to [even if it's who] ⇒
b. <u>LF:</u> [even if it's who$_i$], she talks to *them*$_i$
⇒ EVEN(if it's who$_i$, she talks to *them*$_i$)

(49) <u>LF for (41):</u> EVEN[$_\alpha$ if ∃[they$_i$'re *who*], she talks(HABITUAL) to them$_i$]
$[\![\alpha]\!]^{o}$ = ^if it's *someone*$_i$, she talks to them$_i$
$[\![\alpha]\!]^{alt}$ = {^if it's x_i, she talks to them$_i$: x human}

- EVEN(α) asserts $[\![\alpha]\!]^{o}$: she talks to everyone (as long as they exist).
- Notice that the prejacent $[\![\alpha]\!]^{o}$ asymmetrically entails every proposition in $[\![\alpha]\!]^{alt}$. The presupposition of EVEN is thus satisfied.
- In addition, I propose that the assertion of $[\![\alpha]\!]^{o}$ instead of a more specific alternative in $[\![\alpha]\!]^{alt}$ yields a conversational implicature that 'someone' in the conditional clause can be verified by multiple (all?) individuals. This derives the free choice inference.

(50) * <u>Episodic LF:</u> EVEN[$_\alpha$ if ∃[it$_i$'s what], he's eating *it*$_i$ right now]

In this episodic situation, either the speaker knows what specifically is being eaten right now (maybe multiple things) — and therefore should be able to say a more specific alternative in $[\![\alpha]\!]^{alt}$, contra the implicature above — or they can't be certain (and therefore shouldn't say, by Quality) that everything is <u>being eaten right now ($[\![\alpha]\!]^{o}$).</u>[20]

[19]Tibetan also generally has head-internal relatives (DeLancey 1999).
[20]This might also help explain "subtrigging" — the exceptional licensing of FCI when their domain is further restricted, for example with a relative clause. Making the domain of alternatives much smaller could help avoid these issues which block the use of a FCI.

Wh-quantification in Alternative Semantics

Michael Yoshitaka Erlewine (mitcho), August 2019

> Why are focus particles and disjunctors commonly involved in *wh*-quantification?

A principle and a definition

Every clause must be *Interpretable* (from Rooth's Focus Interpretation Principle, among others):

(7) **Interpretability:** To interpret α, $[\![\alpha]\!]^{\text{o}}$ must be defined and $\in [\![\alpha]\!]^{\text{alt}}$.

Focus particles are (generally) *resetting*:

(8) **Reset:** *Op* is "resetting" if it specifies $[\![Op\ \alpha]\!]^{\text{alt}} := \{[\![Op\ \alpha]\!]^{\text{o}}\}$.

Alternative introducers

(10) a. $[\![wh]\!]^{\text{o}}$ undefined
b. $[\![wh]\!]^{\text{alt}} = \{...\}$

(14) a. $[\![\text{J}\ \{x_i\}]\!]^{\text{o}}$ undefined
b. $[\![\text{J}\ \{x_i\}]\!]^{\text{alt}} = \bigcup\{[\![x_i]\!]^{\text{o}}\}$

	$[\![wh]\!]$ / $[\![\text{J}\ \{\text{a, b, c}\}]\!]$
o(rdinary value):	undefined
alt(ernative set):	{a, b, c}

A *wh*/J-containing clause has no ordinary semantic value and will violate Interpretability (7).

The only three operators that define an ordinary semantic value where there is none

(12) a. $[\![[\text{AltShift}\ \alpha]]\!]^{\text{o}} = [\![\alpha]\!]^{\text{alt}}$
b. $[\![[\text{AltShift}\ \alpha]]\!]^{\text{alt}} = \{[\![\alpha]\!]^{\text{alt}}\}$

	$[\![\alpha]\!]$		$[\![\text{AltShift}\ \alpha]\!]$
o:	undefined	↗	{a, b, c}
alt:	{a, b, c}	(unchanged)	{{a, b, c}} ↓ reset

(17) a. $[\![\exists\ \alpha]\!]^{\text{o}} = \bigvee[\![\alpha]\!]^{\text{alt}}$
b. $[\![\exists\ \alpha]\!]^{\text{alt}} = [\![\alpha]\!]^{\text{alt}}$

	$[\![\alpha]\!]$		$[\![\exists\ \alpha]\!]$
o:	undefined	$\vee$ ↗	$a \vee b \vee c$
alt:	{a, b, c}	→ (unchanged)	{a, b, c}

(19) a. $[\![\exists_{\text{reset}}\ \alpha]\!]^{\text{o}} = \bigvee[\![\alpha]\!]^{\text{alt}}$
b. $[\![\exists_{\text{reset}}\ \alpha]\!]^{\text{alt}} = \{\bigvee[\![\alpha]\!]^{\text{alt}}\}$

	$[\![\alpha]\!]$		$[\![\exists_{\text{reset}}\ \alpha]\!]$
o:	undefined	$\vee$ ↗	$a \vee b \vee c$
alt:	{a, b, c}		$\{a \vee b \vee c\}$ ↓ reset

- All three only apply to α where $[\![\alpha]\!]^{\text{o}}$ is undefined. (Don't destroy the prejacent!)
- If we apply AltShift (12) or $\exists_{\text{reset}}$ (19) to a *wh*/J-containing clause, we yield an Interpretable result — a question or existential/disjunctive proposition, respectively.
- If we apply $\exists$, we get a defined ordinary semantic value but it still violates Interpretability!

> Focus particles are common in *wh*-quantification because (a) they are unique in being able to access and quantify over alternative sets ($[\![...]\!]^{\text{alt}}$) and (b) they are resetting (8), fixing violations of Interpretability following $\exists$ (17).