Indeterminates & Unconditionals

Logic and Conversation 2022

Outline

Indefinites (Indo-European)

(1a) is a typical example of an indefinite determiner phrase. What about the other cases?

(1) English

a. Somebody
b. Anybody
c. Nobody

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(1) English

a. Somebody
b. Anybody
c. Nobody

(2) Russian

a. Kto-to (WHO-to, somebody).
b. Kto-nibud (WHO-nibud, somebody).
c. Ni-kto (ni-WHO, nobody).

Haspelmath (1997): overview of **Indo-European** indefinite pronouns:

(a) They tend to be formed from a generic-noun (e.g., *somebody*);

(b) Or from interrogative pronouns (e.g., *who* as in Russian *kto-to* 'who-to', 'somebody');

(c) They are morphologically complex: different morphemes are associated with different functional uses.

Indefinites (Japanese)

Japanese does not exhibit morphologically complex indefinites, but it builds them from basic expressions called ‘indeterminates’:

dare	‘who’	*doko*	‘where’
nani	‘what’	*itu*	‘when’
dore	‘which (one)’	*naze*	‘why’
dono	‘which (Det)’	*doo*	‘how’

Japanese Indeterminates

The phrases above combine with other **particles** to yield existential, universal, negative polarity, or interrogative **interpretations**.

The Japanese Case

Unlike the Indo-European case, these operators do not need to be adjacent to the expressions they relate to:

(3)

Dare**-**mo	*nemutta*
who-mo	slept

'Everybody slept'

(4)

*[[**Dono***	*hon-o*	*yonda]*	*kodomo]*	***-mo***	*yoku*	*nemutta.*
which	book-acc	read	child	-MO	well	slept

'For every book x, the child who read x slept well.'

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(3) ***Dare**-**mo*** *nemutta*
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'Everybody slept'

(4) *[[**Dono** hon-o yonda] kodomo]* ***-mo*** *yoku nemutta.*
which book-acc read child -MO well slept

'For every book x, the child who read x slept well.'

⇒ Is a uniform analysis for the the Indo-European and the Japanese cases possible?

Outline

Alternative Semantics: Key Ideas

An indeterminate introduces a set of **individual alternatives**.

$[\![dare]\!]^{w,g} = \{x \mid \mathbf{human}(x)(w)\} = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \ldots\} =$

a	*b*	*c*	...

Alternative Semantics: Key Ideas

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These alternatives keep ‘expanding’ with the other elements in the clause, . . .

$[\![\mathit{dare\ nemutta}]\!]^{w,g} =$

a slept	*b slept*	*c slept*	...

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a	*b*	*c*	...

These alternatives keep ‘expanding’ with the other elements in the clause, ...

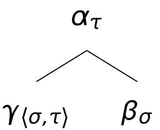
$[\![dare\ nemutta]\!]^{w,g} =$

a slept	*b slept*	*c slept*	...

...until they meet an **operator** that selects them.

Alternative Semantics: Basics

Pointwise-Functional Application: If α is a branching node with daughters β and γ, $[\![\beta]\!]^{w,g} \subseteq D_\sigma$ and $[\![\gamma]\!]^{w,g} \subseteq D_{\langle\sigma,\tau\rangle}$:



$$[\![\alpha]\!]^{w,g} = \{c(b) \mid b \in [\![\beta]\!]^{w,g}, c \in [\![\gamma]\!]^{w,g}\}$$

Sentential Quantifiers:

$$[\![\alpha]\!]^{w,g} = S \subseteq D_{\langle s,t\rangle}$$

$$[\exists](S) = \{\bigcup(S)\}$$
$$[\forall](S) = \{\bigcap(S)\}$$
$$[\text{Neg}](S) = \{W \setminus \bigcup(S)\}$$
$$[Q](S) = S$$

Generalized Quantifiers:

$$[\![\alpha]\!]^{w,g} = A \subseteq D_e$$

$$[\exists](A) = \{\lambda P \lambda w(\bigvee_{x\in A} P(x))\}$$
$$[\forall](A) = \{\lambda P \lambda w(\bigwedge_{x\in A} P(x))\}$$
$$[\text{Neg}](A) = \{\lambda P \lambda w(\bigwedge_{x\in A} \neg P(x)\})$$

Example derivation: sentence radical

(5) *dare* *nemutta*
who slept

$[\![dare]\!]^{w,g} = \{x \mid \textbf{human}(x)(w)\} = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \ldots\}$

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$$[\![\textit{nemutta}]\!]^{w,g} = \{\lambda x \lambda w'.\mathbf{slept}(x)(w')\}$$

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Pointwise Functional Application (PFA):
$[\![\beta_{\{\sigma\}}\ \gamma_{\langle\sigma,\tau\rangle}]\!] = \{c(b) \mid b \in [\![\beta]\!], c \in [\![\gamma]\!]\}$

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$[\![(5)]\!]^{w,g} =$
$\{\lambda w'(\mathbf{slept}(\mathbf{a})(w')), \lambda w'(\mathbf{slept}(\mathbf{b})(w')), \lambda w'(\mathbf{slept}(\mathbf{c})(w')), \ldots\}$

This generated set of propositions can then be the closed off by various operators.

Example derivation: question

$[\![(5)]\!]^{w,g} =$
$\{\lambda w'(\textbf{slept}(\textbf{a})(w')), \lambda w'(\textbf{slept}(\textbf{b})(w')), \lambda w'(\textbf{slept}(\textbf{c})(w')), \ldots\}$

(6) *Dare-ga nemutta ka?*
who-top slept Q

‘Who slept?’

$[Q][\![(5)]\!]^{w,g} = [\![(5)]\!]^{w,g} =$
$\{\lambda w'(\textbf{slept}(\textbf{a})(w')), \lambda w'(\textbf{slept}(\textbf{b})(w')), \lambda w'(\textbf{slept}(\textbf{c})(w')), \ldots\}$

Example derivation: existential

$[\![(5)]\!]^{w,g} =$
$\{\lambda w'(\textbf{slept}(\textbf{a})(w')), \lambda w'(\textbf{slept}(\textbf{b})(w')), \lambda w'(\textbf{slept}(\textbf{c})(w')), \ldots\}$

(7) *Dare-ka nemutta*
who-ka slept

'Somebody slept'

$[\exists][\![(5)]\!]^{w,g}$

$= \{\bigcup[\![(5)]\!]^{w,g}\}$

$= \{\lambda w'(\textbf{slept}(\textbf{a})(w') \lor \textbf{slept}(\textbf{b})(w') \lor \textbf{slept}(\textbf{c})(w') \lor \ldots)\}$

Example derivation: universal

$[\![(5)]\!]^{w,g} =$
$\{\lambda w'(\textbf{slept}(\textbf{a})(w')), \lambda w'(\textbf{slept}(\textbf{b})(w')), \lambda w'(\textbf{slept}(\textbf{c})(w')), \ldots\}$

(8) *Dare-mo nemutta*
who-mo slept

'Everybody slept'

$[\forall][\![(5)]\!]^{w,g} =$

$= \{\bigcap [\![(5)]\!]^{w,g}\}$

$= \{\lambda w'(\textbf{slept}(\textbf{a})(w') \wedge \textbf{slept}(\textbf{b})(w') \wedge \textbf{slept}(\textbf{c})(w') \wedge \ldots)\}$

Outline

Locality

(9) The child who read every book slept well.
$\not\Rightarrow$ 'For every book x, the child who read x slept well.'

(10)

[[Dono	*hon-o*	*yonda]*	*kodomo]*	***-mo***	*yoku*	*nemutta.*
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Alternative Semantics automatically derives the **locality conditions** for the association between the indefinite and the quantificational operators:

$[\ldots[\ldots \mathbf{ind}_i \ldots \mathbf{ka}_{i/*j}\ ]\ldots]\text{-}\mathbf{ka}_{*i/j}$ '

Locality

(11) *John-wa* *[Mary-ga* ***nani****-o* *katta* ***ka****]* *shirimasu* ***ka****?*
John-TOP Mary-NOM what-ACC bought Q known Q
Embedded: 'Does John know what Mary bought?'
Matrix: 'What *x* does John known whether Mary bought x?'

Given the locality constraint, alternatives do not have access to the higher *ka* and only the embedded reading is possible.

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Kratzer (2005), based on data from Hirotani (2003) proposes covert local movement:

(12) [. . . [. . . ind . . . **-ka**]$_{C'}$]$_{CP}$ . . . **-ka**

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Champollion and Alsop (2019) argue that movement cannot be the whole story. Check out their work!

Indo-European Indefinites: Concord

Japanese indeterminates exhibit great functional variability, and in this sense they are **unselective**.

The distinctive morphology of Indo-European indefinites suggests a different story.

They are not unselective, but they must relate to a more restricted range of operators via some notion of **concord** (Kratzer 2005). As a first approximation:

Someone - [$\exists$] (note on quantificational variability)
Nobody - [*Neg*]
Who - [*Q*]

A unified analysis of Japanese and the Indo-European case is thus possible within an Alternative Semantics framework!

Multiple *wh*-phrases

Kratzer (2005) argues that this could explain various phenomena of **concord**. For instance, ‘question concord’. *Wh*-phrases give rise to sets of alternative. Successive applications of PFA create a set of propositional alternatives, which bound by a single question operator $[Q]$.

(13) **What** gift did John give to **whom**?
$[\text{C}_{[wh]} \ldots [\text{wh}]\text{at} \ldots [\text{wh}]\text{om}]$

What would be the denotation of (13) in Alternative Semantics? Can we account for all the readings of (13)?

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But what about the pair-list reading?

Intervention Effects

This proposal readily accounts for so-called **intervention effects**:[1]

(14) a. *****Was*** *hat sie nicht wem gezeigt?*
What has she not who-dat shown

b. ***Was*** *hat sie wem nicht gezeigt?*
What has she who-dat not shown

'What didn't she show to whom?'
(Kratzer and Shimoyama 2002)

In (14a), the interrogative pronoun *wem* is trapped by *nicht*, and it is thus in the scope of [*Neg*], a non-matching operator for *wem*.

[1] *Wem* in (14a) can also be interpreted existentially, but it cannot be equivalent to (14b).

Existential Concord

Kratzer and Shimoyama (2002) argue for the case of '[$\exists$] concord' for the German *irgendein* or the Spanish *algún*.

They then show how existential concord together with domain widening leads to free choice inferences. We will not focus on this aspect of the paper today.

Existential Concord

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They then show how existential concord together with domain widening leads to free choice inferences. We will not focus on this aspect of the paper today.

Next Monday, we will make the case for another case of concord.

Some Techinical Issues

Alternative Semantics has been applied to a variety of natural language phenomena (questions, quantificational variability, scope, focus, polarity, evidentials, . . .).

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Alternative Semantics has been applied to a variety of natural language phenomena (questions, quantificational variability, scope, focus, polarity, evidentials, . . .).

But it comes with some technical issues. For instance, **predicate abstraction** (Bumford 2022; Romero and Novel 2013; Shan 2004).

The standard abstraction rule we are used to:

$[\![i\beta]\!]^g = \lambda x [\![\beta]\!]^{g[x/i]}$

Predicate predicate abstraction is a powerful tool to model several phenomena (scope, binding, de re/de dicto, . . .). We would like to maintain it even in Alternative Semantics.

Predicate Abstraction and Alternatives

A naive predicate abstraction rule would not work: it would derive incorrect types.

$[\![i\beta_\sigma]\!]^g = \{\lambda x [\![\beta]\!]^{g[x/i]}\}$

This has type $\{\langle e, \{\sigma\}\rangle\}$. But what we are after is $\{\langle e, \sigma\rangle\}$. In other words, we need a set of functions from D_e to D_σ and not a singleton function from D_e to subsets of D_σ.

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Kratzer and Shimoyama (2002)'s solution is to reduce the alternatives via a choice function:

$$[\![i\beta]\!]^{w,g} = \{f : \forall x (f(x) \in [\![\beta]\!]^{w,g[x/i]})\}$$

But this overgenerates! (Shan 2004)

Overgeneration

$[\![x \text{ read a book}]\!]^g = \{read(g(x), a), read(g(x), b)\}$

What we are after is

$[\![i\ x \text{ read a book}]\!]^g = \{\lambda x\ read(x, a), \lambda x\ read(x, b)\}$.

Overgeneration

$[\![x \text{ read a book}]\!]^g = \{read(g(x), a), read(g(x), b)\}$

What we are after is

$[\![i\ x \text{ read a book}]\!]^g = \{\lambda x\ read(x, a), \lambda x\ read(x, b)\}$.

But these are not the only functions we could generate:

$$[\![i\beta]\!]^{w,g} = \{f : \forall x(f(x) \in [\![\beta]\!]^{w,g[x/i]})\}$$

Take f s.t. $f(d_1) \mapsto read(d_1, a)$ and $f(d_2) \mapsto read(d_2, b)$.

And Some Solutions

Two main solutions to this problem. In both of them, standard predicate abstraction is preserved.

Keep FA, and lift the types to **inquisitive types**. (Champollion, Ciardelli, and Roelofsen 2015; Ciardelli, Roelofsen, and Theiler 2017; Theiler 2014)

Keep FA, and add **type-shifting** rules to enrich the type-system **when needed**. (Charlow 2014, 2020)

Outline

Unconditionals: Basic Data

(15) Standard *if*-conditional
If John comes to the party, it will be fun.

(16) Unconditionals (variety)

a. Whether Alfonso comes to the party or not, it will be fun.

b. Whether Alfonso or Joanna comes to the party, it will be fun.

c. Whoever comes to the party, it will be fun.

Unconditionals as Lists of Conditionals

Unconditionals can be paraphrased as a list of conditionals (Haspelmath and König 1998; König 1986):

(17) Whoever comes to the party, it will be fun.

a. If Alfonso comes to the party, it will be fun.

b. If Sue comes to the party, it will be fun.

c. . . .

Unconditionals convey **indifference** (it does not matter who comes to the party / the speaker does not care who comes to the party).

Unconditionals **entail their consequent**: (17) entails the consequent ‘the party will be fun’.

Main Idea of Rawlins's Analysis

The adjunct of an unconditional is interrogative, and it denotes a set of alternatives.

Conditional triggers restrictions on the domain of an operator in its scope.

Domain restriction operates pointwise on the set of alternatives, yielding a set of conditional statements.

A universal [∀] operator requires that all elements in this are true, resulting in the 'list of conditionals' interpretation.

The Adjunct

(18) **Whoever comes to the party**, it will be fun.

The *wh*-morphology gives rise to a set of alternatives and the adjunct denotes a set of propositions:

$$\left\{ \begin{array}{c} \lambda v \text{ John comes to the party}(v), \\ \lambda v \text{ Sue comes to the party}(v), \\ \ldots \end{array} \right\}$$

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(The role of *-ever* is rarely spelled out in the analyses of unconditionals. It probably contributes to domain widening, Dayal 1997).

Rawlins argues comes with an exhausitive interpretation. But how is this characterized?

There are different options, which gives different results. (Groenendijk and Stokhof 1984; Schulz and Van Rooij 2006; Zeevat 1994)

Option 1: Exhaustivity + Empty Alternative

With $D = \{d_1, d_2\}$.

only d_1 comes
only d_2 comes
only d_1 & d_2 comes
nobody comes

Option 2: Exhaustivity

With $D = \{d_1, d_2\}$.

only d_1 comes
only d_2 comes
only d_1 & d_2 comes

Option 3: Exhaustivity + Exclusivity

With $D = \{d_1, d_2\}$.

only d_1 comes
only d_2 comes

Rawlins argues for exhaustivity + exclusivity.

For the former:

(19) a. # Whether John is good or mediocre, he should be admitted to the club.

b. Whether John is good or bad, he should be admitted to the club.

For the latter:

Context: We are planning a potluck, and we need two more dishes to have enough food, but just one more won't be enough.

(20) Whether Alfonso brings a salad or an entree, we won't have enough food.

(20) is true in the scenario, but it is false if the 'both alternative' is considered (according to Rawlins).

Exhaustivity + Mutual Exclusivity

Rawlins requires that the alternatives are exhaustive and mutually exclusive.

Exhaustivity:

$$Exh(\alpha) = \forall w \exists p \in [\![\alpha]\!] : p(w) = 1$$

Mutual Exclusivity:

$$Excl(\alpha) = \forall w \forall p, q \in [\![\alpha]\!] : p = q \text{ or } \neg(p(w) \wedge q(w))$$

Conditionals

Different theoretical choices are possible even here. Rawlins assumes a resctrictor analysis of conditionals, where conditional antecedents restrict the domain of a modal in the main clause.

(21) a. If John comes, the party should be fun.

b. $\lambda w \forall w' \in (R[w] \cap |\lambda v\ C(John)(v)|)$: the party is fun(w')

This restriction could be mediated by a binding operation. In the case of ‘the party *should* be fun’, an antecedent p restricts the worlds in which the clause is evaluated by evaluating the consequent only in p-worlds:

$\lambda p \lambda w \forall w' \in (R[w] \cap |p|)$: the party is fun(w')

Unconditionals

When the adjunct is a set of (exhaustified) propositions, we obtain a set of conditional claims by pointwise functional application

(22) Whoever comes, the party should be fun.

$$\left\{\begin{array}{l} \lambda w \forall w' \in (R[w] \cap |\lambda v \text{ Only John comes to party in } v|): \\ \text{the party is fun in } w' \\ \lambda w \forall w' \in (R[w] \cap |\lambda v \text{ Only Sue comes to party in } v|): \\ \text{the party is fun in } w' \\ \vdots \end{array}\right\}$$

This treatment of conditionals and the exhaustified propositions is responsible for the **indifference reading**: no matter how we restrict the modal base, the main clause comes out true.

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This treatment of conditionals and the exhaustified propositions is responsible for the **indifference reading**: no matter how we restrict the modal base, the main clause comes out true.

(Non-Triviality presupposition: $R[w] \cap |p| \neq \emptyset$.)

Universal Closure [∀]

Rawlins argues that the set of conditionalized alternatives is closed by a universal [∀] operator, requiring that all conditional statements are true.

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What is the motivation for [∀]? We have already seen that unconditionals can be paraphrased as conjunctions of conditionals.

Unconditionals do not exhibit the typical quantificational variability of conditionals:

(23) a. Whatever city Paul visits, he always takes a postcard.

b. ?Whatever city Paul visits, he sometimes takes a postcard.

Unconditionals

In principle, we can also avoid adopting a particular stance on conditionals, and exploit the pointwise composition of alternative semantics.

We can assume that an unconditional of the form $\Rightarrow(A, B)$ is really a set of conditional claims based on the alternatives given by A and B, whatever analysis of $p \rightarrow q$ we adopt.

$$[\![\Rightarrow(A, B)]\!]^{w,g} = \{p \rightarrow q | p \in [\![A]\!]^{w,g} \text{ and } q \in [\![B]\!]^{w,g}\}$$

(24) a. Whoever comes, it should be fun

b. $[\forall]$ ($[Q]$ **exh** (whoever, come) $\Rightarrow \Box$(it is fun))

c. $[\forall] \left(\begin{array}{|c|} \hline \text{only } d_1 \text{ comes} \\ \hline \text{only } d_2 \text{ comes} \\ \hline \ldots \\ \hline \end{array} \Rightarrow \Box(\text{it is fun}) \right)$

Unconditionals and Questions

Ciardelli (2016) adopts a similar lifting strategy to deal with conditional and questions:

$$s \models \varphi \Rightarrow \psi \iff \forall a \in alt(\varphi) \exists b \in alt(\psi) \text{ such that } s \subseteq a \rightarrow b$$

This analysis provides indeed a uniform treatment for combination of declaratives and questions:

(25) a. If Alice comes, it should be fun.

b. Whoever comes, it should be fun.

c. If Alice comes, will Mary or Bob come?

(26) If John comes, Mary or John will be happy.

Outline

Conclusion

We have examined how indeterminates/indefinites are treated in Alternative Semantics.

We have outlined how the association with different propositional operators explain a variety of phenomena associated with indefinites.

Lastly, we have seen how alternative semantics can help us to deal with unconditionals, which exhibit interrogative adjuncts.

Next time, we will see how these two ideas (the association of propositional operator, and an alternative-based treatment of (un)conditionals) will play a role in so-called free choice indefinites (e.g., the English *anyone*).

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