Indefinites: Exceptional Scope and Marked Indefinites

Marco Degano Maria Aloni

Team Semantics and Dependence
13 January 2022

Plan for today

- Remarks on yesterday's exercise
- What is an indefinite?
- Indefinites and exceptional scope
- Marked indefinites
  - Desiderata
  - Two-sorted team semantics
  - Applications

Yesterday's exercise

(1) a. Exactly one student can take Spanish or Calculus.

b. ⇝ One student can choose between the two and each of the others can take neither of them.

(2) a. Exactly one student cannot take Spanish or Calculus.

b. ⇝ One student can take neither Calculus nor Spanish and each of the others can choose between them.

Different definitions of implication are possible in state-based systems. In inquisitive semantics:
$M, s \models A \rightarrow B$ iff for all $t \subseteq s : M, t \models A \Rightarrow M, t \models B$

What is an indefinite? (1)

(1) a. Sue likes *a book, some book, a certain book*.

b. Sue likes *this book, these books, the book*.

(1a) contains examples of determiner phrases which are headed by an **indefinite** determiner.

(1b) contains examples of determiner phrases which are headed by an **definite** determiner.

What is an indefinite? (1)

(1) a. Sue likes *a book, some book, a certain book*.

b. Sue likes *this book, these books, the book*.

(1a) contains examples of determiner phrases which are headed by an **indefinite** determiner.

(1b) contains examples of determiner phrases which are headed by an **definite** determiner.

(1a) and (1b) are treated as existentials as opposed to universal DPs (e.g. *every book*).

What is an indefinite? (2)

Determining what counts as an indefinite has led to important turning points in formal semantics.

What is an indefinite? (2)

Determining what counts as an indefinite has led to important turning points in formal semantics.

In the classical *generalized quantifier theory* (Montague 1973, Barwise and Cooper 1981, Keenan and Stavi 1986), indefinites are a subtype of GQ which are **non-unique**, as opposed to definites, which are **unique**:

(2) a. a book $\mapsto \lambda P \exists (B(x) \wedge P(x)$

b. the book $\mapsto \lambda P \exists x \mathbf{\forall y((B(y) \leftrightarrow x = y)} \wedge P(x))$

What is an indefinite? (3)

In the dynamic tradition (Karttunen 1976, Kamp 1981, Heim 1982, Dekker 1993), indefinites introduce new discourse variables. Indefinites are thus **novel**, while definites are **familiar**:

(3) a. A book$_x$ is on the table. It$_x$/The book$_{x/y}$/A book$_{\#x/y}$ is called 'War and Peace'.

b. Every book$_x$ on the table. It$_{\#x/y}$ is called 'War and Peace'.

What is an indefinite? (3)

In the dynamic tradition (Karttunen 1976, Kamp 1981, Heim 1982, Dekker 1993), indefinites introduce new discourse variables. Indefinites are thus **novel**, while definites are **familiar**:

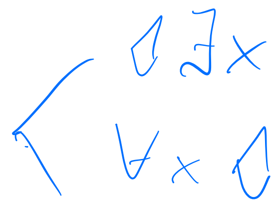
(3) a. A book$_x$ is on the table. It$_x$/The book$_{x/y}$/A book$_{\#x/y}$ is called 'War and Peace'.

b. Every book$_x$ on the table. It$_{\#x/y}$ is called 'War and Peace'.

What about *any book* or *no book*?

(4) a. You can take any book.

b. You read no book.



No unique answer: *any book* can be an indefinite existential interpreted within the scope of the modal *can*; or a universal with a modal in its scope. Similarly, *no book* can be an existential within the scope of a covert negation; or a negative universal quantifier.

Indefinites and Freedom of Scope

A salient property of indefinites is their ability to take **scope freely** over several operators:

(5) a. Sue likes every book which concerns an important war.

$\forall x \exists y$; $\exists y \forall x$

b. Sue likes a book which concerns every important war.

(6) a. If a panda comes to the party, Kola the bear will be happy.

b. If every panda comes to the party, Kola the bear will be happy.

In (5a) and (6a), the indefinite can take scope freely (even outside its syntactic boundaries). By contrast, universals are clause bound.

Exceptional Scope: Ambiguity Thesis

Fodor & Sag (1982) treat wide-scope indefinites as referring expressions (e.g. like a proper name):

(7) If a panda comes to the party, Kola the bear will be happy.

a. $\exists x(P(x) \wedge C(x,p)) \rightarrow H(k)$ [quantificational]

b. $\mathbf{P}(\mathbf{x}) \wedge C(x,p) \rightarrow H(k)$ [referential]

Indefinites are **ambiguous** between a referential and a quantificational reading, as opposed to universals.

Exceptional Scope: Ambiguity Thesis

Fodor & Sag (1982) treat wide-scope indefinites as referring expressions (e.g. like a proper name):

(7) If a panda comes to the party, Kola the bear will be happy.

a. $\exists x(P(x) \wedge C(x, p)) \rightarrow H(k)$ [quantificational]

b. $\mathbf{P}(\mathbf{x}) \wedge C(x, p) \rightarrow H(k)$ [referential]

Indefinites are **ambiguous** between a referential and a quantificational reading, as opposed to universals.

But what about intermediate readings (Farkas 1981)?

(8) Every$_x$ student read every$_y$ paper that a$_z$ professor recommended.

a. Narrow Scope (NS): $\forall x / \forall y / \exists z$

b. Intermediate Scope (IS): $\forall x / \exists z / \forall y$

c. Wide Scope (WS): $\exists z / \forall x / \forall y$

Choice Functional Approaches

In choice-functional approaches (Reinhart 1997, Winter 1997) an indefinite denotes a variable ranging over **choice functions**.

Choice Functional Approaches

In choice-functional approaches (Reinhart 1997, Winter 1997) an indefinite denotes a variable ranging over **choice functions**.

This variable is then bound by an existential quantifiers which can be **freely inserted** in the interpretation procedure.

Choice Functional Approaches

In choice-functional approaches (Reinhart 1997, Winter 1997) an indefinite denotes a variable ranging over **choice functions**.

This variable is then bound by an existential quantifiers which can be **freely inserted** in the interpretation procedure.

(9) Every$_x$ student read every$_y$ paper that a$_z$ professor recommended.

a. Narrow Scope (NS):
$\forall x \forall y \exists f((S(x) \wedge A(y) \wedge W(f(P), y)) \rightarrow R(x, y))$

b. Intermediate Scope (IS):
$\forall x \exists f \forall y((S(x) \wedge A(y) \wedge W(f(P), y)) \rightarrow R(x, y))$

c. Wide Scope (WS):
$\exists f \forall x \forall y((S(x) \wedge A(y) \wedge W(f(P), y)) \rightarrow R(x, y))$

Other accounts

- Kratzer (1998), Matthewson (1999): the value of the choice function is unique (as in Fodor & Sag); intermediate readings are obtained by relativizing the choice function to other variables (e.g. a Skolem function f_x).
- Abusch (1994): indefinites analyzed enter the semantic composition in a free way (implemented via a quantifier Cooper storage mechanism)
- Schwarzschild (2002): Indefinites are quantificational existentials. Exceptional scope is obtained by pragmatic restriction of the denotation of the existential to a singleton.
- Charlow (2019): Alternative Semantics analysis of indefinites and scope taking.

Brasoveanu and Farkas (2011)

Brasoveanu and Farkas (2011) use tools from IF logic to analyze scope effects as **relations between variables**.

Brasoveanu and Farkas (2011)

Brasoveanu and Farkas (2011) use tools from IF logic to analyze scope effects as **relations between variables**.

Indefinites are interpreted **in-situ** and they can be interpreted **independently** of other variables.

Brasoveanu and Farkas (2011)

Brasoveanu and Farkas (2011) use tools from IF logic to analyze scope effects as **relations between variables**.

Indefinites are interpreted **in-situ** and they can be interpreted **independently** of other variables.

Syntactic configuration is relevant to determine the variables which an existential can covary with.

Brasoveanu and Farkas (2011)

Brasoveanu and Farkas (2011) use tools from IF logic to analyze scope effects as **relations between variables**.

Indefinites are interpreted **in-situ** and they can be interpreted **independently** of other variables.

Syntactic configuration is relevant to determine the variables which an existential can covary with.

The interpretation function is of the form $[[-]]^{M,G,V}$, where G is a **set of assignments** and V the set of variables introduced by previous operators.

Brasoveanu and Farkas (2011)

(10) Every$_x$ student read every$_y$ paper that a$_z$ professor recommended.

a. Narrow Scope (NS): $\forall x \forall y \exists^{x,y} z \phi(x,y,z)$

b. Intermediate Scope (IS): $\forall x \forall y \exists^{x} z \phi(x,y,z)$

c. Wide Scope (WS): $\forall x \forall y \exists^{\emptyset} z \phi(x,y,z)$

$\exists^U z$ means the values of z are (possibly) different for any different value assigned to the variables in U. If $U = \emptyset$, then the choice of values for z is independent.

Quiz

How do Brasoveanu and Farkas (2011) deal with binder roof configurations like (11) below?

(11) Every man$_x$ read a paper$_y$ which he$_x$ had written.

Varieties of Indefinites

So far we have seen approaches which mostly deal with the scope proprieties of plain indefinites (e.g. *a book*).

Varieties of Indefinites

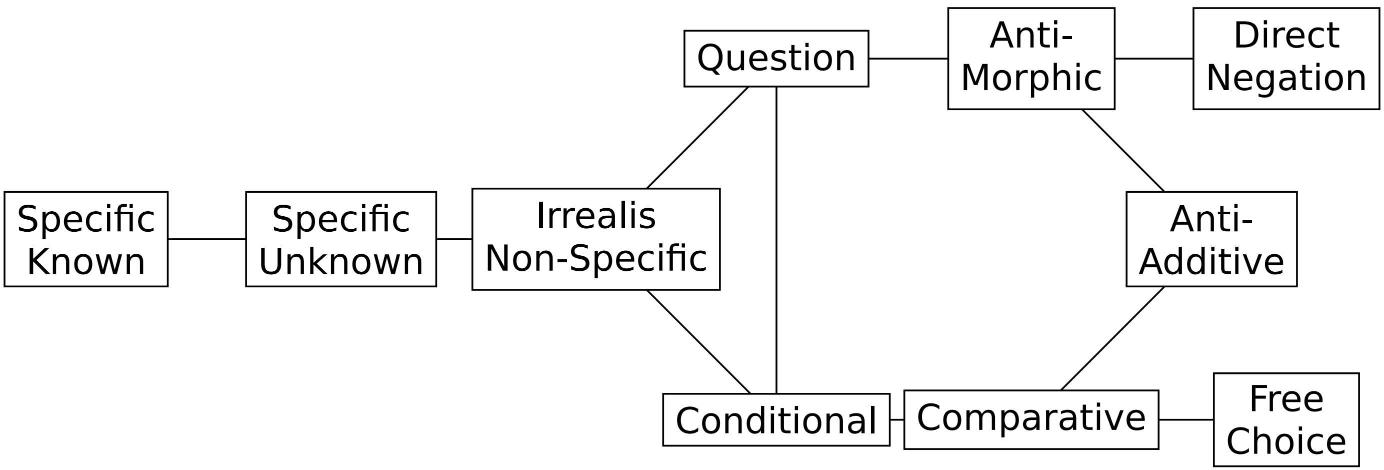
So far we have seen approaches which mostly deal with the scope proprieties of plain indefinites (e.g. *a book*).

Indefinites constitute a **functionally rich** linguistic environment and display a significant cross-linguistic variety (Haspelmath 1997):

- English: *some*, *any*, *no*, . . .
- Italian: *qualcuno*, *qualunque*, *nessuno*, *(un) qualche*, . . .
- Dutch: *iets*, *enig*, *wie dan ook*, *niets*, . . .
- Russian: *koe-*, *-to*, *-nibud*, *ni-*, . . .
- . . .

Haspelmath Map

Haspelmath (1997) proposed a map capturing the functional distribution of indefinites:



What is an indefinite pronoun?

We distinguish between indefinite pronouns (or determiners) like *someone* and lexical indefinite expressions like *a book*.

What is an indefinite pronoun?

We distinguish between indefinite pronouns (or determiners) like *someone* and lexical indefinite expressions like *a book*.

Pronouns may have particular phonological or morphological **features** which mark them (e.g. a particular suffix).

What is an indefinite pronoun?

We distinguish between indefinite pronouns (or determiners) like *someone* and lexical indefinite expressions like *a book*.

Pronouns may have particular phonological or morphological **features** which mark them (e.g. a particular suffix).

They often occur in a series: *some-body, some-thing, some-where*, ...

What is an indefinite pronoun?

We distinguish between indefinite pronouns (or determiners) like *someone* and lexical indefinite expressions like *a book*.

Pronouns may have particular phonological or morphological **features** which mark them (e.g. a particular suffix).

They often occur in a series: *some-body, some-thing, some-where*, ...

Indefinites which have a functionally restricted distribution are called **marked indefinites**.

What is an indefinite pronoun?

We distinguish between indefinite pronouns (or determiners) like *someone* and lexical indefinite expressions like *a book*.

Pronouns may have particular phonological or morphological **features** which mark them (e.g. a particular suffix).

They often occur in a series: *some-body, some-thing, some-where*, ...

Indefinites which have a functionally restricted distribution are called **marked indefinites**.

Preliminaries

Here we focus on the *specific known*, *specific unknown* and *non-specific* functions:

(12) a. Specific known: Someone called. I know who.

b. Specific unknown: Someone called. I do not know who.

c. Non-specific: John wants to talk with someone.

Preliminaries

Here we focus on the *specific known*, *specific unknown* and *non-specific* functions:

(12) a. Specific known: Someone called. I know who.

b. Specific unknown: Someone called. I do not know who.

c. Non-specific: John wants to talk with someone.

Possible **marked indefinites** based on these functions:

type	functions			example
	sk	su	ns	
(i) unmarked	✓	✓	✓	Italian *qualcuno*
(ii) specific	✓	✓	✗	Georgian *-ghats*
(iii) non-specific	✗	✗	✓	Russian *-nibud*
(iv) epistemic	✓	✓	✗	German *irgend*
(v) specific known	✓	✗	✗	Russian *koe*
(vi) SK + NS	✓	✗	✓	unattested
(vii) specific unknown	✗	✓	✗	Kannada *-oo*

Our Goals

We develop a two-sorted team semantics which accounts for:

(a) the specific known, specific unknown and non-specific readings;
(b) the variety of marked indefinites mentioned before;
(c) the licensing of non-specific indefinites;
(d) the relationship between scope and marked indefinites;
(e) the diachronic pathway from non-specific to epistemic;
(f) the fine-grained analysis of epistemic indefinites (*irgend-*).

Break

Keukenhof, Lisse

Licensing of non-specific indefinites

Non-specific indefinites are **ungrammatical in episodic sentences** and they need an operator (e.g. a universal quantifier or a modal) which licenses them:

(13) *	*Ivan*	*včera*	*kupil*	*kakuju-nibud’*	*knigu.*
	Ivan	yesterday	bought	which-indef.	book.

‘Ivan bought some book [non-specific] yesterday.’

Licensing of non-specific indefinites

Non-specific indefinites are **ungrammatical in episodic sentences** and they need an operator (e.g. a universal quantifier or a modal) which licenses them:

(14) ***Ivan včera kupil kakuju-nibud' knigu.*

Ivan yesterday bought which-indef. book.

'Ivan bought some book [non-specific] yesterday.'

From non-specific to epistemic

Frequent diachronic tendency of **non-specific** to acquire specific unknown uses (i.e. they become **epistemic** indefinites). Examples are French *quelque* and German *irgendein*.

From non-specific to epistemic

Frequent diachronic tendency of **non-specific** to acquire specific unknown uses (i.e. they become **epistemic** indefinites). Examples are French *quelque* and German *irgendein*.

Haspelmath (1997) proposed that indefinites might change due to weakening of functions from the right (non-specific) of the functional map to the left (specific).

(15) **Weakening of functions**
(a) specific known < (b) specific unknown < (c) non-specific

From non-specific to epistemic

Frequent diachronic tendency of **non-specific** to acquire specific unknown uses (i.e. they become **epistemic** indefinites). Examples are French *quelque* and German *irgendein*.

Haspelmath (1997) proposed that indefinites might change due to weakening of functions from the right (non-specific) of the functional map to the left (specific).

(15) **Weakening of functions**
(a) specific known < (b) specific unknown < (c) non-specific

But then why diachronically we do not observe the acquisition of (a) ?

Interaction with scope

Specific indefinites have only wide-scope readings, while indefinites which admit non-specific readings allow for all scope configurations:

$\forall x \; \forall y \; \exists x$

	WS	IS	NS
unmarked	✓	✓	✓
specific	✓	✗	✗
non-specific	✗	✓	✓
epistemic	✓	✓	✓
specific known	✓	✗	✗
specific unknown	✓	✗	✗

Epistemic Indefinites (Irgendein)

Irgend- indefinites, unlike other epistemic indefinites (e.g. Spanish *algún* or Italian *un qualche*) admit also free choice readings:

(16) *Mary musste irgendeinen Mann heiraten.*
Mary had-to irgend-one man marry.

a. Specific unknown: There was some man Mary had to marry, the speaker doesn't know or care who it was.

b. Free choice: Mary had to marry a man, any man was a permitted marriage option for her.

	episodic	epistemic modal	root modal
specific unknown	✓	✓	✓
non-specific	✗	✓	✓
free choice	✗	✓-✗	✓

The Framework: Language & Team

Language:

$t ::= c|v$

$\phi ::= P(\vec{t}) \mid \phi \vee \psi \mid \phi \wedge \psi \mid \exists v \phi \mid \forall v \phi$

Team:

Given a first-order model $M = \langle D, I \rangle$ and a sequence of variables $\vec{v}$, a team T over M with domain $Dom(T) = \vec{v}$ is a set of variable assignments from $\vec{v}$ to $Dom(M) = D$.

The Framework: Semantic Clauses

$M, T \models P(x_1, \ldots, x_n)$	$\Leftrightarrow$	$\forall i \in T : \langle [\![x_1]\!]_{M,i}, \ldots, [\![x_n]\!]_{M,i} \rangle \in I(P^n)$
$M, T \models \phi \wedge \psi$	$\Leftrightarrow$	$M, T \models \phi$ and $M, T \models \psi$
$M, T \models \phi \vee \psi$	$\Leftrightarrow$	there is a team $T = T_1 \cup T_2$ s.t. $M, T_1 \models \phi$ and $M, T_2 \models \psi$
$M, T \models \forall y \phi$	$\Leftrightarrow$	$M, T[/y] \models \phi$, where $T[/y] = \{i[x/d] \| i \in T$ and $d \in D\}$
$M, T \models \exists_{\text{strict}} y \phi$	$\Leftrightarrow$	there is a function $h : T \to D$ s.t. $M, T[h/y] \models \phi$, where $T[h/y] = \{i[h(i)/y] : i \in T\}$
$M, T \models \exists_{\text{lax}} y \phi$	$\Leftrightarrow$	there is a function $f : T \to \wp(D) \setminus \{\varnothing\}$ s.t. $M, T[f/y] \models \phi$, where $T[f/y] = \{i[d/y] : i \in T, d \in f(i)\}$

Illustrations (1)

$M, T \models \forall y \phi \Leftrightarrow M, T[/y] \models \phi$, where $T[/y] = \{i[x/d] | i \in T$ and $d \in D\}$

$D = \{d_1, d_2\}$

T	x
i_1	d_1
i_2	d_2

$T[/y]$	x	y
i_{11}	d_1	d_1
i_{12}	d_1	d_2
i_{21}	d_2	d_1
i_{22}	d_2	d_2

Illustrations (2)

$M, T \models \exists_{\text{strict}} y\phi \Leftrightarrow$ there is a function $h : T \rightarrow D$ s.t. $M, T[h/y] \models \phi$, where $T[h/y] = \{i[h(i)/y] : i \in T\}$

T	x
i_1	d_1
i_2	d_2

$T[h/y]$	x	y
i_{12}	d_1	d_2
i_{21}	d_2	d_1

Illustrations (3)

$M, T \models \exists_{\text{lax}} y \phi \Leftrightarrow$ there is a function $f : T \to \wp(D) \backslash \{\emptyset\}$ s.t. $M, T[f/y] \models \phi$, where $T[f/y] = \{i[d/y] : i \in T, d \in f(i)\}$

T	x
i_1	d_1
i_2	d_2

$T[f/y]$	x	y
i_{12}	d_1	d_2
i_{21}	d_2	d_1
i_{22}	d_2	d_2

Dependence Atoms

Dependence atoms impose conditions of dependence on the variable's values across different assignments:

Dependence Atom:

$$M, T \models dep(\vec{x}, \vec{y}) \Leftrightarrow \text{ for all } i, j \in T : i(\vec{x}) = j(\vec{x}) \Rightarrow i(\vec{y}) = j(\vec{y})$$

Variation Atom:

$$M, T \models var(\vec{x}, \vec{y}) \Leftrightarrow \text{ there is } i, j \in T : i(\vec{x}) = j(\vec{x}) \;\&\; i(\vec{y}) \neq j(\vec{y})$$

T	x	y	z	l
i	a_1	b_1	c_1	d_1
j	a_1	b_1	c_2	d_1
k	a_3	b_2	c_3	d_1

Dependence Atoms

Dependence atoms impose conditions of dependence on the variable's values across different assignments:

Dependence Atom:

$$M, T \models dep(\vec{x}, \vec{y}) \Leftrightarrow \text{ for all } i, j \in T : i(\vec{x}) = j(\vec{x}) \Rightarrow i(\vec{y}) = j(\vec{y})$$

Variation Atom:

$$M, T \models var(\vec{x}, \vec{y}) \Leftrightarrow \text{ there is } i, j \in T : i(\vec{x}) = j(\vec{x}) \;\&\; i(\vec{y}) \neq j(\vec{y})$$

T	x	y	z	l
i	a_1	b_1	c_1	d_1
j	a_1	b_1	c_2	d_1
k	a_3	b_2	c_3	d_1

Is it always the case that $\phi \vee \phi$ is equivalent to ϕ?

$dep(\emptyset, x) \vee dep(\emptyset, x)$

$\exists x$ — $dep(\emptyset, x)$

Exceptional Scope

Similarly to B&F (2011), we interpret indefinites *in-situ* and we assume that an indefinite $\exists x$ in syntactic scope of $O_{\vec{z}}$ allows all $dep(\vec{y}, x)$, with $\vec{y}$ included in $\vec{z}$.

Exceptional Scope

Similarly to B&F (2011), we interpret indefinites *in-situ* and we assume that an indefinite $\exists x$ in syntactic scope of $O_{\vec{z}}$ allows all $dep(\vec{y}, x)$, with $\vec{y}$ included in $\vec{z}$.

(17) Every student$_x$ read every book$_z$ that a professor$_y$ recommended.

a. WS [$\exists y/\forall x/\forall z$]: $\forall x \forall z \exists y(\phi \wedge dep(\emptyset, y))$

b. NS [$\forall x/\forall z/\exists y$]: $\forall x \forall z \exists y(\phi \wedge dep(xz, y))$

c. IS [$\forall x/\exists y/\forall z$]: $\forall x \forall z \exists y(\phi \wedge dep(x, y))$

x	z	y
...	...	b_1
...	...	b_1
...	...	b_1
...	...	b_1

WS: $dep(\emptyset, y)$

x	z	y
a_1	c_1	b_1
a_1	c_2	b_2
a_2	c_1	b_3
a_2	c_2	b_4

NS: $dep(xz, y)$

x	z	y
a_1	...	b_1
a_1	...	b_1
a_2	...	b_2
a_2	...	b_2

IS: $dep(x, y)$

Known vs Unknown

The distinction between specific vs non-specific can already be captured by

Known vs Unknown

The distinction between specific vs non-specific can already be captured by $dep(\varnothing, x)$ and $var(\varnothing, x)$ respectively.

Known vs Unknown

The distinction between specific vs non-specific can already be captured by $dep(\varnothing, x)$ and $var(\varnothing, x)$ respectively.

But what about the known vs unknown distinction?

Known vs Unknown

The distinction between specific vs non-specific can already be captured by $dep(\varnothing, x)$ and $var(\varnothing, x)$ respectively.

But what about the known vs unknown distinction?

We use a **two-sorted** framework with v as variable for the actual world: in the specific known, the referent is constant across all epistemically possible worlds; in the specific unknown it will vary across epistemically possible worlds.

Known vs Unknown

The distinction between specific vs non-specific can already be captured by $dep(\emptyset, x)$ and $var(\emptyset, x)$ respectively.

But what about the known vs unknown distinction?

We use a **two-sorted** framework with v as variable for the actual world: in the specific known, the referent is constant across all epistemically possible worlds; in the specific unknown it will vary across epistemically possible worlds.

Initial Team: A team T is *initial* iff $Dom(T) = \{v\}$.

A sentence is **felicitous/grammatical** if there is an initial team which supports it.

Specific Known, Specific Unknown, Non-specific

constancy	$dep(\emptyset, x)$	v	x
		$\ldots$	d_1
		$\ldots$	d_1
variation	$var(\emptyset, x)$	v	x
		$\ldots$	d_1
		$\ldots$	d_2
v-constancy	$dep(v, x)$	v	x
		w_1	d_1
		w_2	d_2
v-variation	$var(v, x)$	v	x
		w_1	d_1
		w_1	d_2

Specific Known: constancy

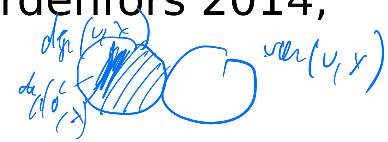
Specific Unknown: v-constancy + variation

Non-specific: v-variation

Variety of Indefinites

type	functions			requirement	example
	sk	su	ns		
(i) unmarked	✓	✓	✓	none	Italian *qualcuno*
(ii) specific	✓	✓	✗	$dep(v, x)$	Georgian *-ghats*
(iii) non-specific	✗	✗	✓	$var(v, x)$	Russian *-nibud*
(iv) epistemic	✓	✓	✗	$var(\varnothing, x)$	German *irgend*
(v) specific known	✓	✗	✗	$dep(\varnothing, x)$	Russian *-koe*
(vi) SK + NS	✓	✗	✓	$dep(\varnothing, x) \vee var(v, x)$	unattested
(vii) specific unknown	✗	✓	✗	$dep(v, x) \wedge var(\varnothing, x)$	Kannada *-oo*

(vi) SK + NS: violation of connectedness (Gardenfors 2014; Enguehard and Chemla 2021)



(vii) specific unknown: increased complexity

(We will revise these requirements in light of our discussion about scope)

Licensing of non-specific indefinites

Non-specific indefinites cannot occur freely in episodic sentences, but they need an operator to be licensed.

Recall that non-specific indefinites trigger v-variation: $var(v, x)$.

v
w_1
w_2

Licensing of non-specific indefinites

Non-specific indefinites cannot occur freely in episodic sentences, but they need an operator to be licensed.

Recall that non-specific indefinites trigger v-variation: $var(v, x)$.

$$\exists x\ \phi$$

v
w_1
w_2

v	x
w_1	a_1
w_2	a_2

Licensing of non-specific indefinites

Non-specific indefinites cannot occur freely in episodic sentences, but they need an operator to be licensed.

Recall that non-specific indefinites trigger v-variation: $var(v, x)$.

$$\forall y\ \phi$$

v
w_1
w_2

v	y
w_1	b_1
w_1	b_2
w_2	b_1
w_2	b_2

Licensing of non-specific indefinites

Non-specific indefinites cannot occur freely in episodic sentences, but they need an operator to be licensed.

Recall that non-specific indefinites trigger v-variation: $var(v, x)$.

$$\forall y \exists x \ \phi$$

v
w_1
w_2

v	y
w_1	b_1
w_1	b_2
w_2	b_1
w_2	b_2

v	y	x
w_1	b_1	a_1
w_1	b_2	a_2
w_2	b_1	a_1
w_2	b_2	a_2

Licensing of non-specific indefinites

Non-specific indefinites cannot occur freely in episodic sentences, but they need an operator to be licensed.

Recall that non-specific indefinites trigger v-variation: $var(v, x)$.

$$\forall y \exists x\ \phi$$

v
w_1
w_2

v	y
w_1	b_1
w_1	b_2
w_2	b_1
w_2	b_2

v	y	x
w_1	b_1	a_1
w_1	b_2	a_2
w_2	b_1	a_1
w_2	b_2	a_2

Note: Indefinites can also be licensed by modals, which are analyzed via the lax existential.

Interaction with Scope

We have assumed that marked indefinites trigger the activation of particular atoms. But dependency atoms also account for scope.

- **Plain:** $dep(\vec{y}, x)$
- **SK:** $dep(\vec{y}, x)$ with $\vec{y} = \emptyset$
- **Specific:** $dep(\vec{y}, x)$ with $\vec{y} \subseteq \{v\}$
- **Epistemic:** $dep(\vec{y}, x) \wedge var(\vec{z}, x)$ with $\vec{z} \subseteq Var(W)$
- **Non-specific:** $dep(\vec{y}, x) \wedge var(\vec{z}, x)$ with $\vec{z} \subseteq Var(W)$ and $\vec{z} \neq \emptyset$

Illustration

$$\forall z \forall y \exists z\, \phi$$

	wide scope $dep(v, x)$	intermediate scope $dep(vyz, x)$	narrow scope $dep(vy, x)$
unmarked	✓	✓	✓
specific $dep(v, x)$	✓	✗	✗
non-specific $var(v, x)$	✗	✓	✓
epistemic $var(\varnothing, x)$	✓	✓	✓
specific known $dep(\varnothing, x)$	✓	✗	✗
specific unknown $dep(v, x) \wedge var(\varnothing, x)$	✓	✗	✗

From non-specific to epistemic

(18) **Weakening of functions**
(a) specific known < (b) specific unknown < (c) non-specific

This framework makes the notion of weakening precise in terms of **logical entailment**.

We have weakening from non-specific to epistemic: $var(\emptyset, x)$ implies $var(v, x)$, but no further weakening triggering the acquisition of SK.

Epistemic Indefinites (1)

We generalize the variation atom to express the cardinality of the variation and splitting:

$M, T \models var_n(\vec{y}, x)$ iff $\forall d \in D^* \subseteq D$ with $|D^*| \geq n,$ for all $i \in T,$ there is a $j \in T_{i,\vec{y}}$ s.t. $j(x) = d,$ where $T_{i,\vec{y}} = \{j \in T | i(\vec{y}) = j(\vec{y})\}$

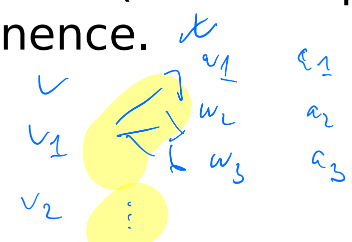
Epistemic Indefinites (1)

We generalize the variation atom to express the cardinality of the variation and splitting:

$M, T \models var_n(\vec{y}, x)$ iff $\forall d \in D^* \subseteq D$ with $|D^*| \geq n,$ for all $i \in T,$ there is a $j \in T_{i,\vec{y}}$ s.t. $j(x) = d,$ where $T_{i,\vec{y}} = \{j \in T | i(\vec{y}) = j(\vec{y})\}$

We assume that *irgend* associate with $var_2(\emptyset, x)$. Non-specific readings are obtained via dependency atoms assuming a domain ≥ 2.

$var_{|D|}(x, v)$ models **free choice** (full non-specificity), triggered by prosodic prominence.



Epistemic Indefinites (2)

(19) *Jeder*$_y$ *Student hat irgendein*$_x$ *Buch gelesen.*
every student has irgendein book read.

a. specific unknown:
$\forall y \exists x\, (\phi \wedge dep(v, x) \wedge var_2(\emptyset, x))$

b. non-specific:
$\forall y \exists x\, (\phi \wedge dep(vy, x) \wedge var_2(\emptyset, x))$

Epistemic Indefinites (2)

(19) *Jeder$_y$ Student hat irgendein$_x$ Buch gelesen.*
every student has irgendein book read.

a. specific unknown:
$\forall y \exists x \, (\phi \wedge dep(v, x) \wedge var_2(\varnothing, x))$

b. non-specific:
$\forall y \exists x \, (\phi \wedge dep(vy, x) \wedge var_2(\varnothing, x))$

(20) *Mary musste$_y$ irgendeinen Mann heiraten.*
Mary had-to irgend-one man marry.

a. specific unknown:
$\forall w \exists x \, (\phi \wedge dep(v, x) \wedge var_2(\varnothing, x))$

b. free choice:
$\forall w \exists x \, (\phi \wedge var_{|D|}(v, x))$

Exercise

Prove that the generalized variation atom models free choice:

$$\Diamond_w \exists x\, (\phi(x, v) \wedge var_{|D|}(v, x)) \rightsquigarrow \forall x(\Diamond_w\, \phi(x, v))$$