Modal inferences in marked indefinites

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Modal inferences in indefinites

- Use of unmarked indefinites can give rise to pragmatic effects:

(1) Somebody arrived late. (Guess who?/Namely Mary)

a. Conventional meaning: Somebody arrived late
b. **Ignorance implicature**: The speaker doesn't know who

(2) You may bring a friend. (Don't bring John though)

a. Conventional meaning: The addressee may bring a friend
b. **Free choice implicature**: Every friend is a permissible option

- Many languages have developed specialized marked forms for such enriched meanings:
  - **Epistemic indefinites**: ignorance inference conventionalized
    - Russian *to*-series, Finnish *kin*-series, Spanish *algún*-series, ...
    - Jayez & Tovena 2006, Alonso-Ovalle & Menéndez-Benito 2010, Falaus 2010, Giannakidou & Quer 2011, ...

      [aka modal or referentially vague]
  - **Free choice indefinites**: free choice inference conventionalized
    - Italian *-unque*-series, Czech *koli*-series, Greek *dhípote*-series, ...
    - Dayal 1998, Giannakidou 2001, Sæbø 2001, Jayez & Tovena 2005, Menéndez-Benito 2010, Chierchia 2010, ...

- **Today**: two epistemic indefinite determiners

(3) German *irgendein* [Haspelmath 1997, Kratzer & Shimoyama 2002]

a. **Irgendein** Student hat angerufen. #Rat mal wer?
Some student has called guess prt who

b. Conventional meaning: Some student called – the speaker doesn't not know who

(4) Italian *un qualche* [Zamparelli 2007]

a. Maria ha sposato **un qualche** professore, #cioè Vito.
Maria has married a some professor namely Vito

b. Conventional meaning: Maria married some professor – the speaker doesn't know who

Outline of the talk

- Data:
  - Functions for marked indefinites
  - Cross-linguistic variation
- Previous accounts
- Proposal: Dynamics with Conceptual Covers (CC) & +I
- Conclusions

Four functions for marked indefinites

- At least four functions (context/meaning) for marked indefinites:
  - **spMV**: ignorance (MV) effect in specific uses
  - **epiMV**: ignorance (MV) effect under epistemic modals
  - **NPI**: narrow scope existential meaning in negative contexts
  - **deoFC**: free choice effect under deontic modals
- Function: useful notion for crosslinguistic research (Haspelmath 97)
- In order for an indefinite to qualify for a function, it must
  - be grammatical in the context the function specifies. E.g. no **spMV** for *any*:

    (5) #Mary married *any* doctor. [#**spMV**]

  - have the meaning that the function specifies. E.g. no **deoFC** for *some*:

    (6) You may marry *some* doctor. [#**deoFC**]
    ($\not\Rightarrow$ any doctor is a permissible option)

Modal Variation effect in specific uses (spMV)

- Ignorance inference in episodic sentences:

(7) Irgendein Student hat angerufen. (#Rat mal wer?)
Some student has called (guess prt who)
'Some student called, I don't know who'

(8) Maria ha sposato un qualche professore, (#cioè Vito).
Maria has married a some professor (#namely Vito)
'Maria married some professor, I don't know who'

- Free Choice (FC) or Modal Variation (MV) effect?

(9) a. FC: It might be anyone $\mapsto \forall x \Diamond \phi$
b. MV: I don't know who $\mapsto \neg \exists x \Box \phi$

- Modal Variation (MV) rather than Free Choice (FC):

(10) Hide-and-seek scenario [A&M 2010]: we don't know where John is, but we know that he is not in the bedroom or in the bathroom

a. #John might be in any room of the house.
b. John is in *irgendein/una qualche* room of the house.

Modal Variation under epistemic modals (epiMV)

- Ignorance effect under epistemic modals:

(11) Maria muss irgendeinen Dokter geheiratet haben.
Maria must some doctor married have
'Maria must have married some doctor, I don't know who'

(12) Maria deve aver sposato un qualche professore.
Maria must have married a some professor
'Maria must have married some professor, I don't know who'

- Modal Variation effect rather than Free Choice:

(13) Hide-and-seek situation [A&M 2010]:

a. #John might be in any room of the house.
b. John must be in *irgendein/una qualche* room of the house.

Agent-oriented epistemic effects (epiMV)

- Agent-oriented epistemic effects under propositional attitude verbs:

(14) Andy glaubt, dass Maria irgendeinen Dokter geheiratet hat.
Andy believes that Maria some doctor married had

a. 'Andy believes that Maria married some doctor, I don't know who' [**spMV**]

b. 'Andy believes that Maria married some doctor, *Andy* doesn't know who' [agent-oriented **epiMV**]

(15) Antonio crede che Maria abbia sposato un qualche
Antonio believes that Maria has$_{subj}$ married a some
professore.
professor

a. 'Antonio believes that Maria married some professor, I don't know who' [**spMV**]

b. 'Antonio believes that Maria married some professor, *Antonio* doesn't know who' [agent-oriented **epiMV**]

Negative polarity uses (NPI)

- *Irgendein*: narrow scope existential meaning in negative contexts

(16) Niemand hat irgendeine Frage beantwortet. [**NPI**]
Nobody has some question answered
'Nobody answered any question'

- *Un qualche*: deviant in negative contexts

(17) ??Nessuno ha risposto a una qualche domanda. [#**NPI**]
Nobody has answered to a some question
#'Nobody answered any question'

Free Choice uses under deontic or other modals (deoFC)

- *Irgendein*: Free choice effect under deontic modals

(18) Maria muss/darf *irgendeinen* Professor heiraten. [K&S 2002]
Maria must/can some professor marry

a. 'There is some professor Maria must/can marry, I don't know who' [**spMV**]
b. 'Maria must/can marry a professor, any professor is a permissible option' [**deoFC**]

- *Un qualche*: no free choice effects under deontic modals

(19) Maria deve/può sposare un qualche professore.
Maria must/can marry a some professor

a. 'There is some professor Maria must/can marry, I don't know who' [**spMV**]
b. #'Maria must/can marry a professor, any professor is a permissible option' [#**deoFC**]

Variety of marked indefinites

- Four functions (context/meaning) for marked indefinites:
  - **spMV**: ignorance (MV) effect in specific uses
  - **epiMV**: ignorance (MV) effect under epistemic modals
  - **NPI**: narrow scope existential meaning in negative contexts
  - **deoFC**: free choice effect under deontic modals
- Marked indefinites cross-linguistically:

	spMV	**epiMV**	**NPI**	**deoFC**
irgendein	yes	yes	yes	yes
algún (Sp)	yes	yes	yes	no
un qualche	yes	yes	no	no
-si (Cz)	yes	no	no	no
vreun (Ro)	no	yes	yes	no
any	no	no	yes	yes
qualunque (It)	no	no	no	yes

- Hypothesis: function contiguity. Examples of impossible combinations:

	spMV	**epiMV**	**NPI**	**deoFC**
#	yes	no	yes	yes
#	no	yes	no	yes

Pragmatic accounts of epistemic indefinites

- Main idea: MV and FC effects in EIs are conversational implicatures:
  - Derivable by Gricean reasoning
  - Defeasible/Reinforceable
- Defended in various forms:
  - Kratzer & Shimoyama, 2002, Kratzer 2005, Chierchia 2006, 2010
  - Alonso-Ovalle & Menéndez-Benito 2010, Falaus 2010
  - Schulz 2005, Aloni 2007, Aloni & van Rooij 2007
- Parsimonious, but
  - Doubts on defeasibility and reinforceability of MV/FC effects in EIs
  - Empirical problem: difference epistemic *vs* deontic modals
    1. Epistemic: $\Box_e$ (. . . irgend . . .) $\Rightarrow$ MV: $\neg\exists x \Box_e \phi$
    2. Deontic: $\Box_d$ (. . . irgend . . .) $\Rightarrow$ FC: $\forall x \Diamond_d \phi$
  - One option for pragmatic accounts: manipulate alternatives
    1. MV via singleton domain alternatives [A&M 2010]
    2. FC via all domain alternatives [Fox, Chierchia]
  - But why would *irgend*-indefinites select different sets of alternatives under different types of modals?

Other accounts of epistemic indefinites

- Ignorance inference in EIs captured in terms of a felicity condition (Jayez & Tovena 2006, Giannakidou & Quer 2011):

  (20) *Referential Vagueness condition*
  A sentence of the form [*s* α]ϕ, where α is a singular indefinite containing a referential vagueness marker, expresses a proposition only in those contexts *c* where the following felicity condition is fulfilled: the speaker *s* in *c* does not intend to refer to exactly one individual *d* in *c*. [Giannakidou & Quer 2011, p.23]

- At first sight correct, but
  - Unclear how contrast epiMV *vs* deoFC can be derived;
  - Reference to individuals is a complex phenomenon:

  (21) Ich muss **irgendeinen bestimmten** Professor treffen.
  I must some certain professor meet
  'I must meet a certain professor, but I don't know who he is'
  [Ebert et al. 2009]

  a. **bestimmt** $\mapsto$ speaker intends to refer to exactly one individual [specific]
  b. **irgend** $\mapsto$ speaker doesn't know who [but unknown]

Our proposal

- Epistemic indefinites $\mapsto$ existentials with two characteristics
  [cf. Kadmon & Landman 1993]
  1. **Domain Shift**: induce an obligatory domain shift
  2. **Felicity Condition**: express conditions that must be satisfied for the indefinite to be felicitous
- Different strategies for MV and FC:
  - Ignorance (MV) inference as result of lexically encoded felicity condition rather than Gricean reasoning (cf. dynamics of presupposition)
  - FC inference derived via Gricean reasoning, but made obligatory as consequence of felicity condition
- MV & FC effects in EIs as fossilized implicatures: inferences, pragmatic in origin, now part of lexically encoded meaning
  $\Rightarrow$ *derivable by Gricean means*
  $\Rightarrow$ *??defeasible/??reinforceable*
- Difference between different indefinites in terms of different domain shifts they can induce $\Rightarrow$ *variety of EIs*

Domain shift triggered by epistemic indefinites

- Epistemic indefinites block context induced domain selections [cf. Zamparelli 2007]
- Two ways in which context determine quantificational domains:
  - Contextual domain restriction (Westerståhl 1984):

    (22) Everybody passed the exam. [e.g. everybody in my class]

    Blocking $\mapsto$ **domain widening** (DW)
  - Pragmatic selection of a method of identification (Aloni 2001):

    (23) **The card scenario:** Two face-down cards, the ace of hearts and the ace of spades. You know that the winning card is the ace of hearts, but you don't know whether it's the card on the left or the one on the right.

    (24) You know which card is the winning card. [True or False?]

    Blocking $\mapsto$ Shift of identification method or **conceptual cover shift** (CC-shift)

Conceptual Covers

- Identification methods can be formalized as *conceptual covers*:

  (25) A conceptual cover *CC* is a set of concepts such that in each world, every individual instantiates exactly one concept in *CC*.

- In the cards scenario, there are three salient covers/ways of identifying the cards:

  (26)
  a. {on-the-left, on-the-right} [ostension]
  b. {ace-of-spades, ace-of-hearts} [naming]
  c. {the-winning-card, the-losing-card} [description]
  d. #{on-the-left, ace-of-spades}

- Evaluation of (27) depends on which of these covers is adopted:

  (27) You know which$_n$ card is the winning card.

  a. False, if $n \mapsto$ {on-the-left, on-the-right}
  b. True, if $n \mapsto$ {ace-of-spades, ace-of-hearts}
  c. Trivial, if $n \mapsto$ {the-winning-card, the-losing-card}

  $\mapsto$ CC-indices n added to logical form, their value is contextually supplied

Epistemic indefinites & identification methods

- Puzzle of specific unknown uses:

  (28) Ich muss **irgendeinen bestimmten** Professor treffen.
  I must some certain professor meet
  'I must meet a certain professor, but I don't know who he is'

  - Specific: speaker has someone in mind ⇒ speaker can identify
  - But unknown: speaker doesn't know who ⇒ speaker cannot identify

- Different identification methods are at play:
  - Speaker can identify on one method (e.g. description) (specific)
  - But not on another (e.g. naming) (unknown)

- Main intuition: referents of EIs typically identified via a method different from the one required for knowledge ↦ **CC-shift**

EIs & identification methods: Romance *vs* Germanic

- Ranking on methods of identification (Aloni 2001):

  (29) ostension $>$ naming $>$ description

- Hypothesis (Aloni & Port 2010):

  (30) In Romance, but not in Germanic, the identification method required for knowledge must be higher in order than the identification method required for specific uses of EIs

- Prediction: if referent identified by ostension, EI infelicitous in Romance

  Lambada example [Alonso-Ovalle & Menéndez-Benito 2003]:

  (31) a. Look! **Some**/**Irgendein** professor is dancing on his table!
  b. *Speaker-can-identify* $\mapsto$ [Ostension], *unknown* $\mapsto$ [Naming]

  (32) a. ??Look! **Algún**/**Un qualche** professor is dancing on his table!
  b. ??*Speaker-can-identify* $\mapsto$ [Ostension], *unknown* $\mapsto$ [Naming]

Ostension, Naming and Description

- Prediction: if description required for knowledge, EIs could be felicitous in German even though referent identified by ostension and naming

  Context: At a medical practice with inter-phone with monitor at the entrance. A secretary to his boss:

  (33) a. Hier ist **irgendein** Pharmavertreter für Dich. Er heisst Frank Schulz. Kann ich ihn zu Dir schicken?
  'There is some pharma rep for you. His name is Frank Schulz. Can I let him in?'
  b. *Speaker-can-identify* $\mapsto$ [Ost/Nam], *unknown* $\mapsto$ [Descr]

  (34) a. ??C'è qui **un qualche** rappresentante farmaceutico per te. Si chiama Schulz. Posso farlo entrare?
  'There is some pharma rep for you. His name is Schulz. Can I let him in?'
  b. ??*Speaker-can-identify* $\mapsto$ [Ost/Nam], *unknown* $\mapsto$ [Descr]

Proposal [Aloni & Port, NELS 2010]

- Epistemic indefinites: existentials with two characteristics:
  1. Induce obligatory domain-shift ($D \rightarrow D'$):
     - *un qualche*: CC-shift
     - *irgendein*: CC-shift + DW
  2. Are felicitous in context σ iff domain-shift is for a reason:

     (i) CC-shift $\mapsto$ Necessary weakening

     (35) $\sigma \models \ldots \exists x_{D'} \ldots$, but $\sigma \not\models \ldots \exists x_{D} \ldots$ [Quality]

     CC-shift justified only if otherwise speaker's information state would not support the statement

     (ii) DW $\mapsto$ Strengthening

     (36) $\ldots \exists x_{D'} \ldots \models \ldots \exists x_{D} \ldots$ [Quantity]

     DW justified only if it creates a stronger statement

- Implementation in Dynamic Semantics with Conceptual Covers (Aloni 2001, chapter 3)

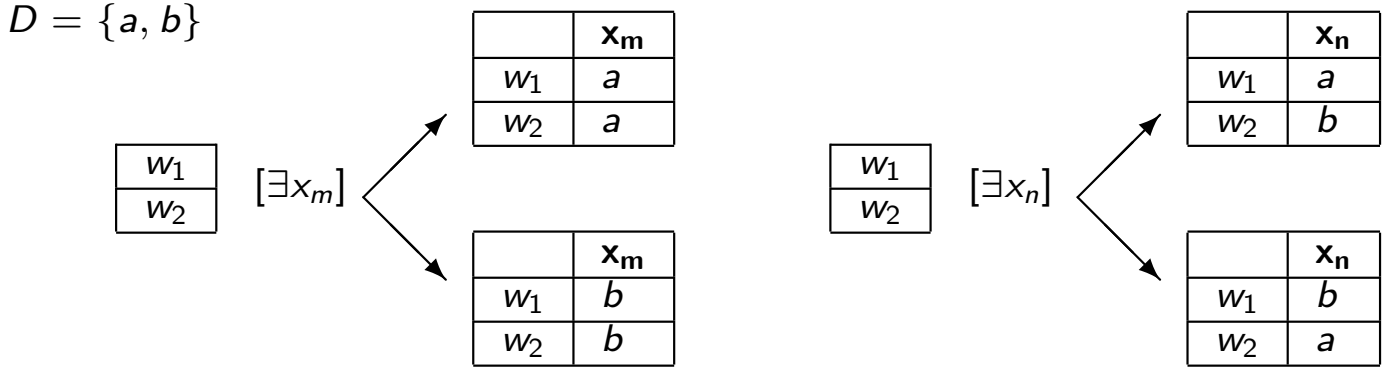
Predictions [Aloni & Port 2010]

	spMV	**epiMV**	**NPI**	**deoFC**
un qualche (only CC-shift)	yes	yes	no	no
irgendein (CC-shift + DW)	yes	yes	yes	no [problem!]

1. CC-shift:
   - 1.1 When justified yields ignorance (MV) effects
   - 1.2 Non trivial (can be justified) in specific uses and under epistemic modals $\Rightarrow$ **spMV** & **epiMV** for both EIs
   - 1.3 Trivial (never justified) under negation and deontic modals $\Rightarrow$ #**NPI** & #**deoFC** for *un qualche*
2. DW:
   - 2.1 creates stronger statements (justified) in negative contexts $\Rightarrow$ **NPI** for *irgendein*
   - 2.2 creates weaker statements (unjustified) in specific uses, under epistemic modals, but also under deontic modals $\Rightarrow$ #**deoFC** for *irgendein* [problem!]

(Epistemic) Indefinites in Dynamic Semantics with CC

- Specific uses of indefinites introduce discourse referents [Heim 1982]
- In dynamic semantics with CC, discourse referents are elements of a pragmatically determined conceptual cover
- Specific uses compatible with non-rigid covers (require definite method of identification)

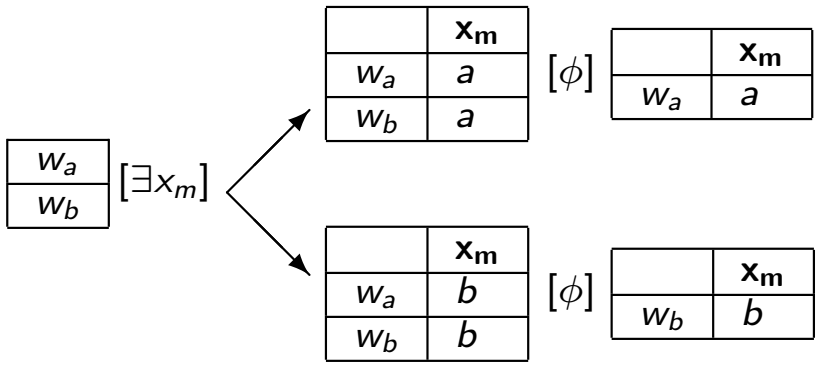


under rigid cover m under non-rigid cover n

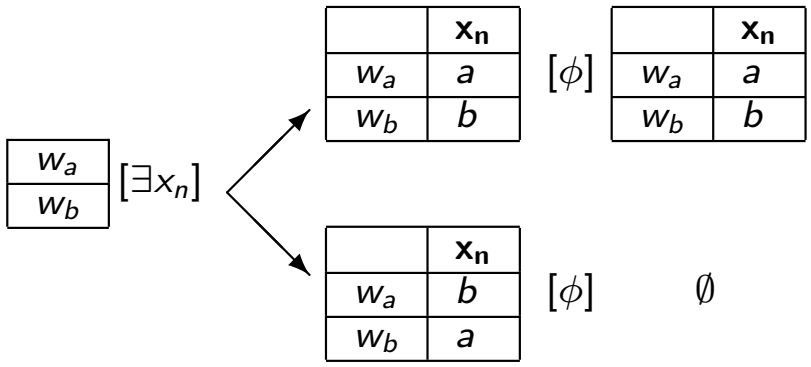
- Main intuition: Referents of EIs typically introduced under a cover different from the one required for knowledge
  - Suppose m is the cover contextually required for knowledge
  - EIs signal obligatory shift to a cover n different from $m \mapsto$ introduce discourse referents elements of $n \neq m$ **[CC-shift]**
  - Whenever CC-shift justified, we predict an ignorance effect

Justified and unjustified CC-shifts

1. A justified CC-shift from m to n: $\Rightarrow$ not knowing who$_m$

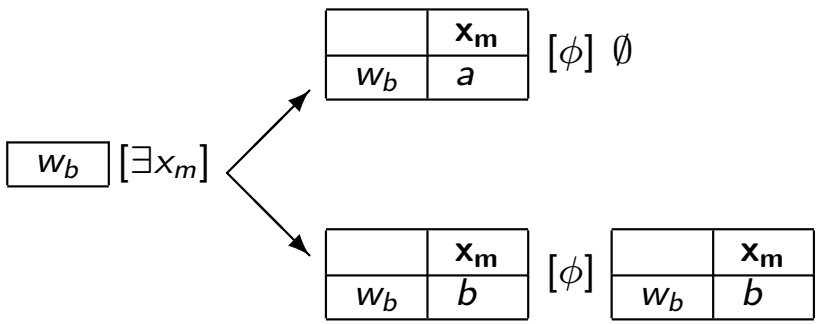


$\exists x_m \phi$ true, but **not supported**

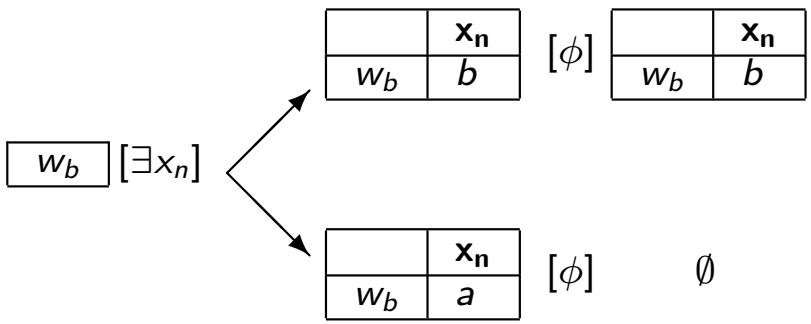


$\exists x_n \phi$ true and supported

2. An unjustified CC-shift:



$\exists x_m \phi$ true and supported

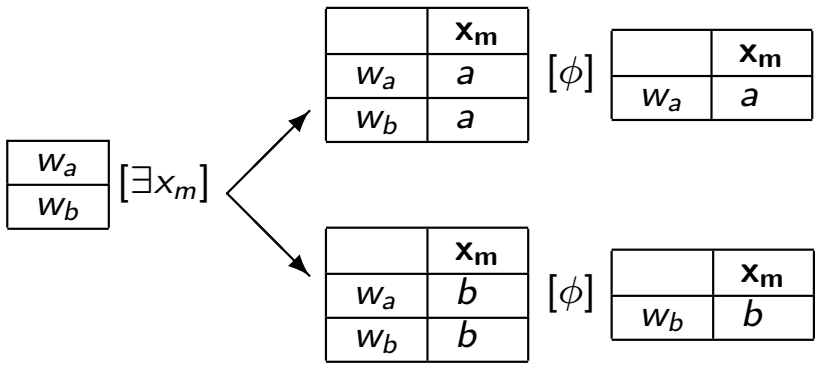


$\exists x_n \phi$ true and supported

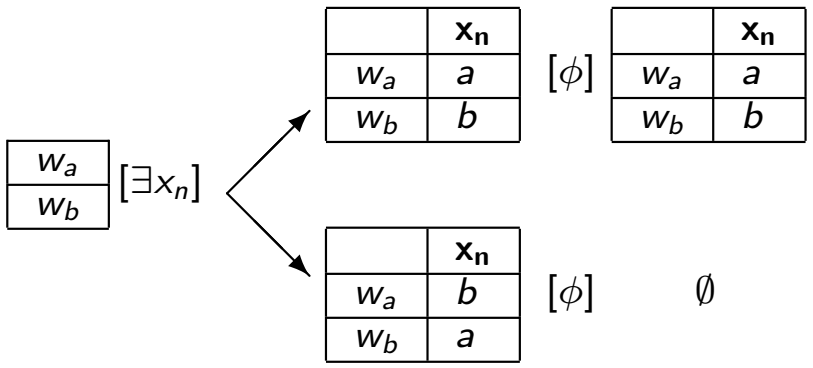
- NECESSARY WEAKENING: CC-shift justified only if otherwise speaker's state would not *support* the statement
- σ *supports* ψ iff all possibilities in σ survive simultaneously in one and the same output state after update with ψ

Justified and unjustified CC-shifts

1. A justified CC-shift from m to n: $\Rightarrow$ not knowing who$_m$

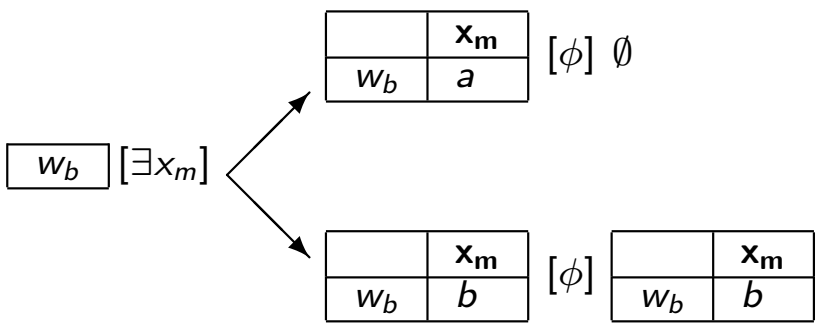


$\exists x_m \phi$ true, but **not supported**

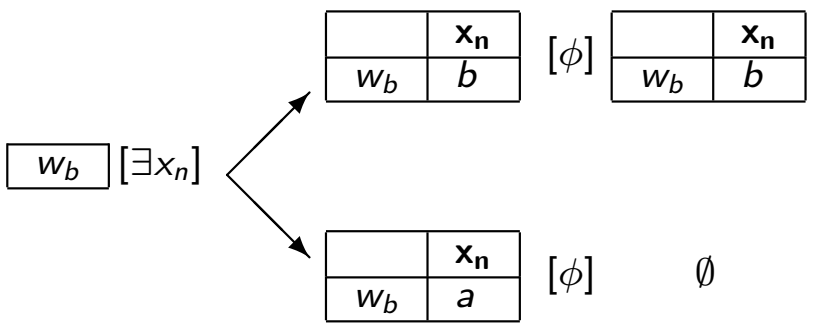


$\exists x_n \phi$ true and supported

2. An unjustified CC-shift:



$\exists x_m \phi$ true and supported

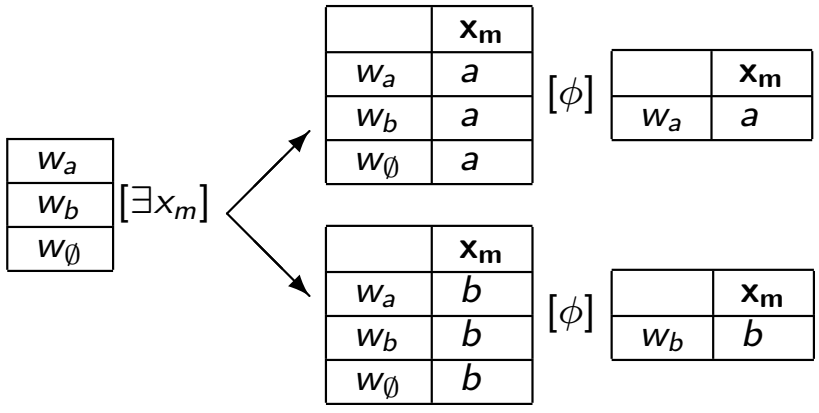


$\exists x_n \phi$ true and supported

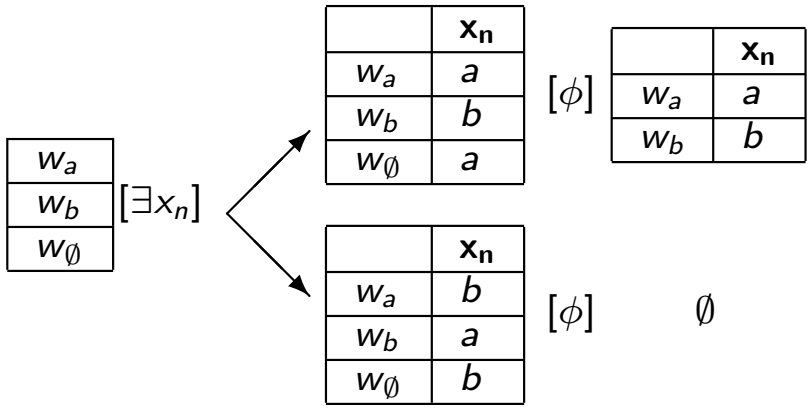
- Intuitively, $\exists x_{cc} \phi$ supported in σ only if in σ we can identify the witness under cc
- *CC*-shift from m to n justified only if referent identified under n, but not under m
- Ignorance effect (not knowing who$_m$) derived whenever CC-shift is justified

CC-shift trivial under negation

- Suppose

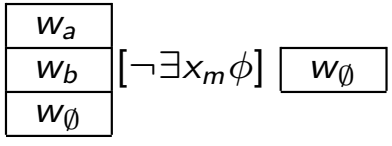


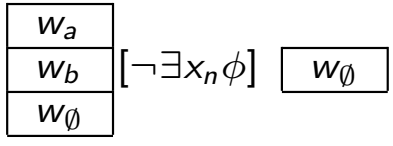
$\exists x_m \phi$ not true, not supported



$\exists x_n \phi$ not true, not supported

- Then

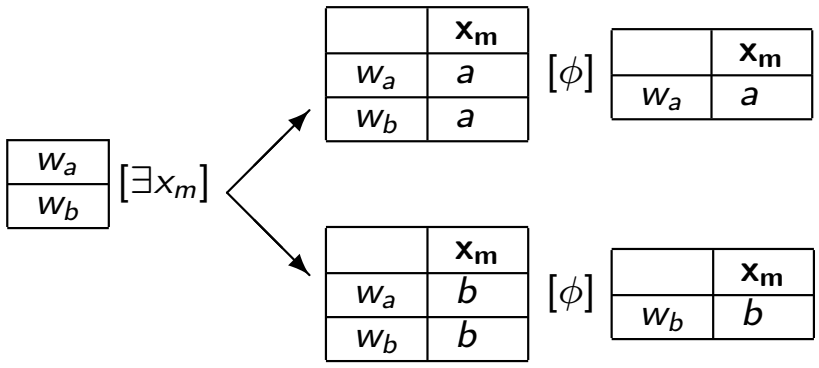




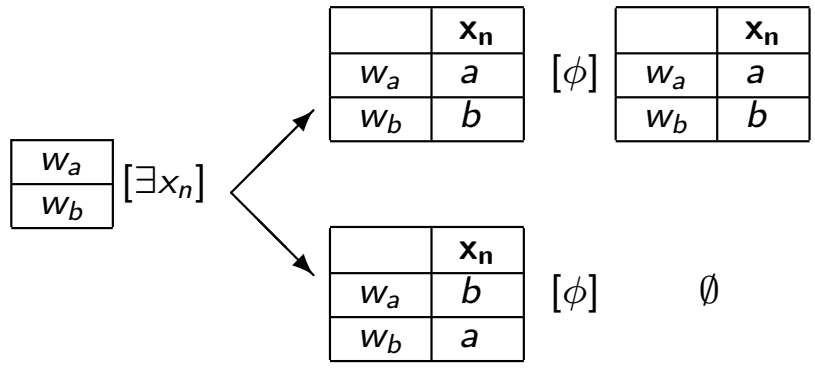
- **Negation**: $\neg\psi$ eliminates all possibilities that survive after update with ψ (no matter whether simultaneously or not)

CC-shift trivial under deontic $\Box_d$, not under epistemic $\Box_e$

- Suppose



$\exists x_m \phi$ true, not supported



$\exists x_n \phi$ true and supported

- Then

Epistemic: $\boxed{w_a \mid w_b}\ [\Box_e \exists x_m \phi]\ \emptyset$ $\qquad$ $\boxed{w_a \mid w_b}\ [\Box_e \exists x_n \phi]\ \boxed{w_a \mid w_b}$

Deontic: $\boxed{i_1 \longrightarrow w_a, w_b \mid i_2 \longrightarrow w_a, w_\emptyset}\ [\Box_d \exists x_m \phi]\ \boxed{i_1 \longrightarrow w_a, w_b}$ $\qquad$ $\boxed{i_1 \longrightarrow w_a, w_b \mid i_2 \longrightarrow w_a, w_\emptyset}\ [\Box_d \exists x_n \phi]\ \boxed{i_1 \longrightarrow w_a, w_b}$

- **Epistemic**: $\Box_e \psi$ test input state σ: if ψ supported, returns σ; otherwise $\emptyset$ [Veltman 1997]
- **Deontic**: $\Box_d \psi$ keeps a possibility i only if ψ true in all worlds accessible from i

Un qualche (only CC) & *irgendein* (CC+DW): spMV

- Via CC-shift + NECESSARY WEAKENING
- Assume knowledge requires cover m:

(37) a. Speaker does not know who Maria married.
b. $\neg\exists y_m \Box_e \phi(y_m)$

- By CC-shift, epistemic indefinites induce shift to n different from m (DW would be trivial here):

(38) a. Maria married *un qualche/irgendein* professor.
b. $\underline{\exists x_n}\phi(x_n)$ $\underline{n \neq m}$

- Whenever CC-shift is for a reason, we predict an ignorance effect (technically: modal variation as *pragmatic entailment*)

(39) a. Maria married *un qualche/irgendein* professor $\Rightarrow$ S does not know who
b. $\underline{\exists x_n}\phi(x_n) \models_P \neg\exists y_m \Box_e \phi(y_m)$
c. $\phi \models_P \psi$ iff $\forall\sigma$: ϕ, ψ felicitous in σ & $\sigma \models \phi \Rightarrow \sigma \models \psi$

Un qualche (only CC) & *irgendein* (CC+DW): epiMV

- Via CC-shift + NECESSARY WEAKENING
- epiMV speaker-oriented:

(40) a. Maria must have married *un qualche/irgendein* professor ⇒ *Speaker* doesn't know who
b. $\Box_e \underline{\exists x_n} \phi(x_n) \models_P \neg \exists y_m \Box_e \phi(y_m)$
c. $\sigma[\Box_e \phi]\{i \in \sigma \mid \sigma \models \phi\}$ [Veltman 1997]

- epiMV agent-oriented:

(41) a. Antonio believes that Maria married *un qualche/irgendein* professor ⇒ *Antonio* doesn't know who
b. $\Box_a \underline{\exists x_n} \phi(x_n) \models_P \neg \exists y_m \Box_a \phi(y_m)$
c. $\sigma[\Box_a \phi]\{i \in \sigma \mid F(i)_a \models_P \phi\}$
d. $F(\langle g, w \rangle)_a = \{\langle g, w' \rangle \mid wR_a w'\}$

Un qualche (only CC): #NPI & #deoFC

- CC-shifts are trivial in negative and deontic contexts:

(42) a. $\forall n, m$: $\neg\exists x_n\phi \equiv \neg\exists x_m\phi$ (if ϕ is truth-distributive)
b. $\forall n, m$: $\Box_d\exists x_n\phi \equiv \Box_d\exists x_m\phi$

- We correctly predict #NPI & #deoFC (no reason here for CC-shift):

(43) a. ??Non ho risposto a una qualche domanda. [#NPI]
b. #I didn't answer any question
c. $\neg\underline{\exists x_n}\phi$
d. $\sigma[\neg\phi]\{i \in \sigma \mid \neg\exists\sigma' : \sigma[\phi]\sigma' \;\&\; i \prec \sigma'\}$

(44) a. Maria deve sposare un qualche professore. [#deoFC]
b. #Maria must marry a professor, any professor is a permissible option
c. $\Box_d\underline{\exists x_n}\phi$
d. $\sigma[\Box_d\phi]\{i \in \sigma \mid F(i)_d \vdash \phi\}$

- Other readings of (44-a) captured via *de re* CC-representations:

(45) a. Maria deve sposare un qualche professore.
b. Maria must marry some professor or other
c. $\underline{\exists x_n}\Box_d\phi$

Irgendein (CC+DW): NPI & deoFC

- NPI: via DW + STRENGTHENING:

(46)
a. Niemand hat *irgendjemanden* angerufen.
b. Nobody called anybody
c. $\neg\exists x_m \underline{\exists x_n} \phi$
d. Prediction: *irgend* felicitous, no epistemic effect

- DeoFC: problem!

(47)
a. Marie muss *irgendeinen* Doktor heiraten.
b. Mary has to marry *irgend*-one doctor
c. $\underline{\exists x_n} \Box_d \phi$ $\Rightarrow$ [spMV]
d. $\Box_d \underline{\exists x_n} \phi$ (neither CC+WE nor DW+ST)
e. Prediction: spMV, #deoFC

Summary of predictions [Aloni & Port 2010]

	spMV	**epiMV**	**NPI**	**deoFC**
un qualche (only CC-shift)	yes	yes	no	no
irgendein (CC-shift + DW)	yes	yes	yes	no [problem!]

- **spMV** $\equiv$ **epiMV**: via CC-shift + Necessary Weakening
- #**NPI** & #**deoFC** for *un qualche*: CC-shift vacuous under negation or deontic modals
- **NPI** for *irgendein*: via DW + Strengthening
- #**deoFC** for *irgendein*: neither CC-shift+NecWe nor DW+St [problem!]

The role of accent

- In free choice uses, *irgend*-indefinites are typically stressed:

  (48) Dieses Problem kann IRGEND JEMAND lösen. [**deoFC**]
  'This problem can be solved by anyone' [from Haspelmath 97]

- Stressed *irgendein* felicitous in negative contexts and in comparative clauses where it conveys universal meaning:

  (49) Niemand hat IRGENDEINE Frage beantwortet. [**NPI**]
  'Nobody answered any question'

  (50) Hans ist größer als IRGENDEIN Mitschüler in seiner Klasse. [**CO**]
  'Hans is taller than any of his classmates' [⇒ universal meaning]

- But infelicitous in episodic sentences and under epistemic modals:

  (51) #IRGENDJEMAND hat angerufen. [#**spMV**]
  'Someone called, I don't know who'

  (52) #Maria muss IRGENDEINEN Dokter geheiratet haben. [#**epiMV**]
  'Maria must have married some doctor, I don't know who'

The role of accent

- Hypothesis: stress in EIs signals DW
- Predictions: #UN QUALCHE

	spMV	**epiMV**	**NPI**	**CO**	**deoFC**
un qualche (only CC)	yes	yes	no	no	no
irgendein (CC+DW)	yes	yes	yes	yes	no [problem!]
IRGENDEIN (only DW)	no	no	yes	yes	no [problem!]

- Next:
  - Explain predictions wrt **CO** (via NOT/PI theories of comparatives)
  - Solve problem wrt **deoFC**

NOT/PI theories of comparatives

- Place a scoping DE operator ($\neg/\Pi$) within *than*-clause. E.g.

(53) a. John is taller than Mary is. [Seuren 1978]
b. $\exists d[T(j,d) \wedge \neg T(m,d)]$
c. there is a degree d of tallness that John reaches and Mary doesn't reach.

- Quantifiers must scope over DE operator:

(54) a. John is taller than every girl is.
b. $\exists d[T(j,d) \wedge \forall x[G(x) \rightarrow \neg T(x,d)]]$
c. there is a d of tallness that John reaches and no girl reaches.

- Universal meaning when indefinite scopes under DE operator:

(55) a. John is taller than any girl is.
b. $\exists d[T(j,d) \wedge \neg\exists x[G(x) \wedge T(x,d)]]$
c. there is a d of tallness that John reaches and no girl reaches.

- Existential meaning when indefinite scopes over DE operator:

(56) a. John is taller than some girl is.
b. $\exists d[T(j,d) \wedge \exists x[G(x) \wedge \neg T(x,d)]]$
c. there is a d of tallness that John reaches and some girl doesn't reach.

Irgendein and *un qualche* in comparatives

- Universal (CO) and existential (spMV) readings for *irgend*-indefinites in comparatives:

(57) Hans ist größer als irgendein Mitschüler in seiner Klasse.

a. $\exists d[T(h,d) \wedge \neg \underline{\exists x_n}[C(x) \wedge T(x,d)]]$ **[CO]**
'Hans is taller than any of his classmates' (via DW+ST)

b. $\exists d[T(h,d) \wedge \underline{\exists x_n}[C(x) \wedge \neg T(x,d)]]$ **[spMV]**
'Hans is taller than some of his classmates, I don't know who' (via CC+WE)

- Only existential reading for *un qualche* in comparatives:

(58) Gianni è più alto di un qualche suo compagno di classe.

a. $\#\exists d[T(g,d) \wedge \neg \underline{\exists x_n}[C(x) \wedge T(x,d)]]$ **[#CO]**
'Gianni is taller than any of his classmates'

b. $\exists d[T(g,d) \wedge \underline{\exists x_n}[C(x) \wedge \neg T(x,d)]]$ **[spMV]**
'Gianni is taller than some of his classmates, I don't know who'

Heim's conjecture and the role of accent

- Heim's conjecture: scope of $\neg/\Pi$ partly 'determined by the need for negative polarity items to be licensed' [Heim 2006: p.21]
- Hypothesis: indefinites and quantifiers by default take scope over $\neg/\Pi$, NPIs violate this default rule in order to be licensed.
- Stressed *irgend*-indefinites are NPIs, unstressed ones are not.
- Prediction: *irgend*-indefinites must be stressed to have universal meaning in comparative clauses (Haspelmath 97):

(59) a. Hans ist größer als IRGENDEIN Mitschüler in seiner Klasse.
b. $\exists d[T(h,d) \wedge \neg \underline{\exists x_n}[C(x) \wedge T(x,d)]]$ **[CO]**
'Hans is taller than any of his classmates' (via DW+ST)

(60) a. Hans ist größer als irgendein Mitschüler in seiner Klasse.
b. $\exists d[T(h,d) \wedge \underline{\exists x_n}[C(x) \wedge \neg T(x,d)]]$ **[spMV]**
'Hans is taller than some of his classmates, I don't know who' (via CC+WE)

Problem: **deoFC**

	spMV	**epiMV**	**NPI**	**CO**	**deoFC**
un qualche (only CC)	yes	yes	no	no	no
irgendein (CC+DW)	yes	yes	yes	yes	no [problem!]

Accent facts + functional map suggest to solve problem via DW

Possible strategies:

- Performative analysis of deontic modals (Lewis 1979):
  - FC inference under deontic modals as semantic entailment
  - Felicity via DW + non-weakening (rather than strengthening)
  - Problem: what about non-performative cases, and **deoFC** uses wrongly predicted for plain indefinites as well
- Chierchia's (2010) obligatory implicatures:
  - FC inference as obligatory higher order implicature (Fox 2007)
  - Felicity via DW + non-weakening
  - Problem: obligatory FC effects wrongly predicted for *irgendein* under epistemic modals as well

Proposal: obligatory uptake of FC implicatures via novel operation +I

Our solution for **deoFC** problem

- From strengthening to *non-weakening*:

  (61) DW justified only if it doesn't create a weaker statement:

  $$\ldots \exists x \cdots \not\models \ldots \exists x_{DW} \ldots$$

- DW leads to a weaker statement both under epistemic and deontic modals:

  (62) a. $\Box_e \exists x \phi \models \Box_e \exists x_{DW} \phi$ [epistemic]
  b. $\Box_d \exists x \phi \models \Box_d \exists x_{DW} \phi$ [deontic]

- If we uptake FC implicatures via $+I$, this will only hold for the epistemic case:

  (63) a. $\Box_e \exists x \phi + I \models \Box_e \exists x_{DW} \phi + I$ [epistemic]
  b. $\Box_d \exists x \phi + I \not\models \Box_d \exists x_{DW} \phi + I$ [deontic]

- Conclusions:

  1. DW never justified in the epistemic case
     $\Rightarrow$ CC-shift must apply, ignorance (MV) effect obligatory for *irgendein* under epistemic modal
  2. DW justified in the deontic case only if we uptake FC implicatures
     $\Rightarrow$ FC implicatures obligatory for *irgendein* under deontic modals

Deriving implicatures in dynamic semantics

- Implicatures of ϕ: what is supported in any state in $opt(\phi)$
- $opt(\phi)$: set of states considered optimal for a speaker of ϕ
- Algorithms to compute $opt(\phi)$ based on Gricean principles and game theoretical concepts (Schulz 2005, Aloni 2007, Franke 2009)
- Illustrations (building on Aloni 2007 and Franke 2009):

[assume $W = \{w_a, w_b, w_{ab}, w_\emptyset\}$]

(64) a. $a \vee b$ [plain disjunction]
b. $opt(a \vee b) = \{\{w_a, w_b\}\}$
c. predicted implicatures: $\Diamond_e a \wedge \Diamond_e b$, $\neg(a \wedge b)$

$\Rightarrow$ Clausal and scalar implicatures derived for plain disjunctions

- Illustrations: [assume $W = \{w_a, w_b, w_{ab}, w_\emptyset\}$]

(65) a. $\Diamond_e(a \vee b)$ [epistemic possibility]
b. $opt(\Diamond_e(a \vee b)) = \{\{w_a, w_b, w_\emptyset\}\}$
c. pred. implicatures: $\Diamond_e a \wedge \Diamond_e b$, $\neg\Diamond_e(a \wedge b)$, $\neg\Box_e(a \vee b)$

(66) a. $\Box_e(a \vee b)$ [epistemic necessity]
b. $opt(\Box_e(a \vee b)) = \{\{w_a, w_b\}, \{w_a, w_b, w_{ab}\}\}$
c. predicted implicatures: $\Diamond_e a \wedge \Diamond_e b$, $\neg\Box_e(a \wedge b)$

(67) a. $\Diamond_d(a \vee b)$ [deontic possibility]
b. $opt(\Diamond_d(a \vee b)) = \{\{w \rightarrow [w_a, w_b, w_\emptyset] \mid w \in W\}\}$
c. pr. implicatures: $\Diamond_d a \wedge \Diamond_d b$, $\neg\Diamond_d(a \wedge b)$, $\neg\Box_d(a \vee b)$

(68) a. $\Box_d(a \vee b)$ [deontic necessity]
b. $opt(\Box_d(a \vee b)) = \{\{w \rightarrow [w_a, w_b] \mid w \in W\},$
$\{w \rightarrow [w_a, w_b, w_{ab}] \mid w \in W\}\}$
c. predicted implicatures: $\Diamond_d a \wedge \Diamond_d b$, $\neg\Box_d(a \wedge b)$

$\Rightarrow$ FC implicatures derived for disjunctions/existentials under epistemic and deontic modals

Uptaking implicatures via $+I$

- Definition: [propositional, easy to extend to 1st order case]

(69) $\sigma[\phi + I] = \sigma[\phi] \cap \bigcup(opt(\phi))$

- Illustration: uptaking implicatures of plain disjunction

(70) $\{w_a, w_b, w_{ab}, w_\emptyset\}[(a \vee b) + I] = \{w_a, w_b, w_{ab}\} \cap \{w_a, w_b\} = \{w_a, w_b\}$

$\Rightarrow$ scalar implicature $\neg(a \wedge b)$ holds in output state

- Crucial fact: uptaking of epistemic FC implicatures is vacuous, uptaking of deontic FC implicature is not:

(71) a. $\{w_a\}[\Box_e(a \vee b) + I] = \{w_a\} \cap \{w_a, w_b, w_{ab}\} = \{w_a\}$

b. $\{w_\emptyset \rightarrow [w_a]\}[\Box_d(a \vee b) + I] = \{w_\emptyset \rightarrow [w_a]\} \cap \{w_\emptyset \rightarrow [w_a, w_b], w_\emptyset \rightarrow [w_a, w_b, w_{ab}], \dots\} = \emptyset$

- When uptaking implicatures, DW justified in the *deontic* case, but not in the *epistemic* case:

(72) a. $\Box_e \exists x \phi + I \models \Box_e \exists x_{DW} \phi + I$

b. $\Box_d \exists x \phi + I \not\models \Box_d \exists x_{DW} \phi + I$

- Normally optional, $+I$ becomes obligatory in deoFC uses of *irgendein*, otherwise DW unjustified.

Summary of predictions

	spMV	**epiMV**	**NPI**	**CO**	**deoFC**
un qualche (only CC)	yes	yes	no	no	no
irgend (CC+DW)	yes	yes	yes	yes	yes

- **spMV** $\equiv$ **epiMV**: via CC-shift + Necessary Weakening
- #**NPI**, #**CO** & #**deoFC** for *un qualche*: CC-shift vacuous under negation or deontic modals
- **NPI**, **CO** & **deoFC** for *irgendein*: via DW + Non-weakening
- **CO**: via NOT/PI theories of comparatives (Seuren, Heim, Schwarzschild)
- **epi** $\not\equiv$ **deo**: via dynamic analysis of epistemic modality (Veltman 1997)
- Crucial for **deoFC**: obligatory uptaking of FC implicatures via +I

Conclusions

- Variety of marked indefinites: CC-shift *vs* DW

	spMV	**epiMV**	**NPI**	**CO**	**deoFC**
irgendein	yes	yes	yes	yes	yes
algún (Sp)	yes	yes	yes	no	no
un qualche	yes	yes	no	no	no
si (Cz)	yes	no	no	no	no
vreun (Ro)	no	yes	yes	no	no
any	no	no	yes	yes	yes
qualunque (It)	no	no	no	yes	yes

- **Future plans**
  - sp $\not\equiv$ epi: the case of Czech *-si*, and Romanian *vreun*
  - npi $\not\equiv$ deo: the case of Spanish *algún*, and Romanian *vreun*
  - EIs *vs* FCIs: German *irgendein vs* Italian *qualunque*

Illustration future plans: *vreun* [Falaus 2010]

- Episodic sentences:

  (73) a. Mary married un qualche/#vreun professor.
  b. $\underline{\exists x_n}\phi$

- Epistemic modals:

  (74) Mary must have married un qualche/vreun professor.
  a. $\underline{\exists x_n}\Box_e\phi$
  b. $\Box_e\underline{\exists x_n}\phi$

- Deontic modals:

  (75) Mary must marry un qualche/#vreun professor.
  a. $\underline{\exists x_n}\Box_d\phi$
  b. $\#\Box_d\underline{\exists x_n}\phi$

- Difference *un qualche vs vreun* captured by assuming *vreun* disallows wide scope representations

Appendix – Semantics

(building on Aloni 2001, chapter 3)

$$
\begin{array}{rll}
\sigma[Rt_1, ..., t_n]^{\wp}\sigma' & \text{iff} & \sigma' = \{i \in \sigma \mid \langle i(t_1), ..., i(t_n)\rangle \in i(R)\} \\
\sigma[\neg\phi]^{\wp}\sigma' & \text{iff} & \sigma' = \{i \in \sigma \mid \neg\exists\sigma'' : \sigma[\phi]^{\wp}\sigma'' \;\&\; i \prec \sigma''\} \\
\sigma[\phi \wedge \psi]^{\wp}\sigma' & \text{iff} & \exists\sigma'' :\ \sigma[\phi]^{\wp}\sigma''[\psi]^{\wp}\sigma' \\
\sigma[\exists x_n\phi]^{\wp}\sigma' & \text{iff} & \sigma[x_n/c][\phi]^{\wp}\ \sigma' \text{ for some } c \in \wp(n) \\
\sigma[\Box_e\phi]^{\wp}\sigma' & \text{iff} & \sigma' = \{i \in \sigma \mid \sigma \models^{\wp} \phi\} \\
\sigma[\Box_a\phi]^{\wp}\sigma' & \text{iff} & \sigma' = \{i \in \sigma \mid F(i)_a \models^{\wp}_P \phi\} \\
\sigma[\Box_d\phi]^{\wp}\sigma' & \text{iff} & \sigma' = \{i \in \sigma \mid F(i)_d \vdash^{\wp} \phi\}
\end{array}
$$

where

- $\sigma[x_n/c] = \{i[x_n/c] \mid i \in \sigma\}$
- $i(x_n) = (g_i(x_n))(w_i)$
- $F(\langle g, w\rangle)_x = \{\langle g, w'\rangle \mid wR_xw'\}$

Logical notions

Support:

$$\sigma \models^{\wp} \phi \quad \text{iff} \quad \exists \sigma' : \ \sigma[\phi]^{\wp}\sigma' \ \& \ \forall i \in \sigma : i \prec \sigma'$$

$$\sigma \models^{\wp}_{P} \phi \quad \text{iff} \quad \sigma \models^{\wp} \phi \ \& \ \phi \text{ felicitous in } \sigma$$

Truth:

$$\sigma \vdash^{\wp} \phi \quad \text{iff} \quad \forall i \in \sigma : \exists \sigma' : \ \sigma[\phi]^{\wp}\sigma' \ \& \ i \prec \sigma'$$

Entailment:

$$\phi \models \psi \quad \text{iff} \quad \forall \sigma, \wp : \ \sigma \models^{\wp} \phi \Rightarrow \sigma \models^{\wp} \psi$$

$$\phi \models_{P} \psi \quad \text{iff} \quad \forall \sigma, \wp : \phi \ \& \ \psi \text{ felicitous in } \sigma : \ \sigma \models^{\wp} \phi \Rightarrow \sigma \models^{\wp} \psi$$

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