

## Epistemic Indefinites Cross-Linguistically

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The use of plain indefinites like *somebody* can give rise to an ignorance implicature:

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

Epistemic indefinites are indefinites in which this ignorance inference is conventionalized. Examples of epistemic indefinite determiners are German *irgendein* and Italian *un qualche*. Sentences (2) and (3) make an existential claim, and additionally convey that the speaker does not know who the witness of this claim is. Hence, adding the continuation 'Guess who?' results in oddity. In contrast, the plain indefinite *somebody* allows for this type of continuation, as illustrated in (4).

- (2) a. *Irgendein* Student hat angerufen. #Rat mal wer?  
some student has called Guess prt who?  
b. Conventional meaning: Some student called, speaker doesn't know who
- (3) a. Anna ha sposato *un qualche* dottore. #Indovina chi?  
Anna has married a some doctor Guess who?  
b. Conventional meaning: Anna married some doctor, speaker doesn't know who
- (4) Somebody arrived late. Guess who?

In this article we provide an account of epistemic indefinites cross-linguistically, focusing on German *irgendein* and Italian *un qualche*. The next section discusses the meaning and distribution of these two indefinite determiners.

### 1. Functions of Epistemic Indefinites

In this section we identify four main functions/uses for Epistemic Indefinites (henceforth EIs). When used specifically (sp) or under an epistemic modal (epi) EIs give rise to an ignorance effect (**spMV** and **epiMV**). Under deontic or other non-epistemic modals they

trigger a free choice inference (**deoFC**), if licensed. Finally, under downward entailing operators they receive a plain existential interpretation (**NPI** use), if licensed.

The present notion of a function as a context-meaning pair is based on Haspelmath's (1997) typological survey. In order for an indefinite to qualify for a function, it must (i) be grammatical in the context the function specifies, and (ii) have the meaning that the function specifies. For example, *any* does not exhibit the **spMV** function, because it is ungrammatical in episodic sentences, cf. (5); and *some* does not have deontic Free Choice uses, because under a root modal, although being grammatical, it does not convey the universal free choice meaning specified by **deoFC**, cf. (6).

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

(6) You may marry *some* doctor ( $\neq$  any doctor is a permissible option) [deoFC]

We turn now to the meaning and distribution of *irgendein* and *un qualche*.

**The specific Modal Variation function (spMV)** When used specifically, *irgendein* and *un qualche* trigger an ignorance inference, as illustrated by the following sentences:

(7) *Irgendein* Student hat angerufen, (#nämlich Peter).  
Some student has called (#namely Peter)  
'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'

One question that arises is whether this ignorance inference has the quantificational force of a Free Choice inference or it is a weaker Modal Variation effect:

- (9) a. Free Choice (FC):  $\forall x \diamond \phi$   
b. Modal Variation (MV):  $\neg \exists x \square \phi$

If the former, (7) and (8) would imply that *any* student might have called and Maria might have married *any* professor. On the weaker MV interpretation, instead, (7) and (8) would be compatible with excluding some of the epistemic possibilities. The following scenario from Alonso-Ovalle and Menéndez-Benito (2010) will help us tear the two readings apart:

(10) SCENARIO: María, Juan, and Pedro are playing hide-and-seek in their country house. Juan is hiding. Pedro believes that Juan is inside the house, but not in the bathroom or in the kitchen. (Alonso-Ovalle and Menéndez-Benito 2010, p. 6)

In this scenario, Pedro cannot truthfully utter (11), because not all the rooms are epistemic possibilities for him. Crucially, however, he could felicitously use (12) and (13), showing that *irgendein* and *un qualche* do not trigger here a FC inference, but only a weaker MV effect.

(11) # Juan might be in *any* room of the house.

- (12) Juan ist in *irgendeinem* Zimmer im Haus.  
 Juan is in some room in-the house  
 ‘Juan is in some room of the house’ [spMV]
- (13) Juan è in *una qualche* stanza della casa.  
 Juan is in a some room of-the house  
 ‘Juan is in some room of the house’ [spMV]

**The epistemic Modal Variation function (epiMV)** A similar ignorance effect arises when *irgendein* and *un qualche* are used under epistemic modals:

- (14) Maria muss *irgendeinen* Arzt geheiratet haben.  
 Maria must some doctor married have  
 ‘Maria must have married some doctor, I don’t know who’
- (15) 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’

The compatibility with the hide-and-seek scenario shows again that this effect is of the Modal Variation kind rather than of the stronger Free Choice kind:

- (16) Juan muss in *irgendeinem* Zimmer im Haus sein.  
 Juan must in some room in-the house be.  
 ‘Juan must be in some room of the house’ [epiMV]
- (17) Juan deve essere in *una qualche* stanza della casa.  
 Juan must be in a some room of-the house  
 ‘Juan must be in some room of the house’ [epiMV]

Interestingly, when *irgendein* and *un qualche* occur under propositional attitude verbs we may find agent-oriented ignorance effects, as illustrated by the following examples:

- (18) Andy glaubt, dass Maria *irgendeinen* Arzt 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]
- (19) Gianni crede che Maria abbia sposato *un qualche* professore.  
 Gianni believes that Maria has<sub>subj</sub> married a some professor  
 a. ‘Gianni believes that Maria married some professor, I don’t know who’ [spMV]  
 b. ‘Gianni believes that Maria married some professor, *Gianni* doesn’t know who’  
 [agent-oriented epiMV]

In all the cases discussed so far, *irgendein* and *un qualche* showed a similar behavior. We turn now to cases where their behavior departs.

**The Negative Polarity function (NPI)** *Irgendein* expresses a narrow scope existential meaning in negative contexts, as illustrated in (20):

- (20) Niemand hat *irgendeine* Frage beantwortet.  
 Nobody has some question answered  
 ‘Nobody answered any question’ [NPI]

In contrast, *un qualche* is deviant under negation, as shown by (21) from Zamparelli (2007), and therefore does not exhibit the NPI function.

- (21) ??Non ho risposto a *una qualche* domanda.  
 Not I-have answered to a some question  
 # ‘I didn’t answer any question’ [#NPI]

**The deontic Free Choice function (deoFC)** Finally, example (22) from Kratzer and Shimoyama (2002) shows that *irgendein* does trigger a FC inference under deontic modals:

- (22) Maria muss *irgendeinen* Arzt heiraten.  
 Mary must some doctor marry  
 a. ‘There is some doctor Mary must marry, I don’t know who’ [spMV]  
 b. ‘Mary must marry a doctor, any doctor is a permissible option’ [deoFC]

In contrast, *un qualche* never triggers a free choice inference. Under a deontic modal, *un qualche* must be read specifically and triggers an ignorance (MV) effect.

- (23) Maria deve/può sposare *un qualche* dottore.  
 Mary must/can marry a some doctor  
 a. ‘There is some doctor Mary must/can marry, I don’t know who’ [spMV]  
 b. #‘Mary must/can marry a doctor, any doctor is a permissible option’ [#deoFC]

To summarize, we have identified four functions an EI can exhibit:

- **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.

As we observed in this section, German *irgendein* and Italian *un qualche* exhibit different functions. The following table shows the variety of EIs cross-linguistically:<sup>1</sup>

|                           | spMV | epiMV | NPI | deoFC |
|---------------------------|------|-------|-----|-------|
| German <i>irgendein</i>   | yes  | yes   | yes | yes   |
| Spanish <i>algún</i>      | yes  | yes   | yes | no    |
| Italian <i>un qualche</i> | yes  | yes   | no  | no    |
| Czech <i>si</i>           | yes  | no    | no  | no    |
| Romanian <i>vreun</i>     | no   | yes   | yes | no    |
| English <i>any</i>        | no   | no    | yes | yes   |

<sup>1</sup>The table is based on data from Alonso-Ovalle and Menéndez-Benito (2010) for *algún*, Falaus (2009) for *vreun*, and Radek Šimík (p.c.) for Czech *si*.

## 2. Pragmatic analyses of EIs

In the recent literature a number of pragmatic analyses of EIs have been proposed (e.g. Kratzer and Shimoyama 2002, Aloni 2007, Aloni and van Rooij 2007, Chierchia 2010, Alonso-Ovalle and Menéndez-Benito 2010).<sup>2</sup> The main idea of a pragmatic account is that the modal inferences triggered by an EI are derived as conversational implicatures based on Gricean reasoning. Pragmatic accounts are parsimonious – plain indefinites do give rise to ignorance and free choice implicatures, and therefore appealing. One way to derive the variety of indefinites in such frameworks is to assume that different forms differ with respect to their quantificational domain. For example, Alonso-Ovalle and Menéndez-Benito (2010) assume that *irgendein* is a maximal domain widener (as in Kratzer and Shimoyama 2002) whereas *algún* is a minimal domain widener which comes with an antisingleton constraint. Assuming a maximal domain widening gives rise to a FC inference, assuming a minimal domain widening derives the weaker MV effect. The main shortcoming of such account, however, is that it predicts a **uniform behavior** under epistemic and deontic modals. For example, *irgendein*, which induces maximal domain widening, will trigger a FC effect not only under deontic modals, as desired, but also under epistemic modals, contrary to the observed facts. Thus such pragmatic account is empirically insufficient. Furthermore, the status of the FC and MV effects in EIs as conversational implicatures is controversial. Tests on their cancelability or reinforceability give inconclusive results. For example, Alonso-Ovalle and Menéndez-Benito (2010) report that for *algún* the ignorance effect is reinforceable without leading to redundancy, e.g. (24) (their example (45d)), but the German case with *irgendein*<sup>3</sup> is less than clear, e.g. (25):

- (24) María sale con *algún* estudiante, pero no sé con quién.  
Maria goes out with some student, but not I know with whom.  
Maria is dating some student, but I don't know who.
- (25) *Irgendein* Student hat angerufen, (?aber) ich weiss nicht wer.  
Some student has called, (but) I know not who  
'Some student has called, (but) I don't know who'

To summarize, pragmatic accounts, although parsimonious, have empirical and theoretical deficiencies. In the next section we propose an alternative analysis.

## 3. Epistemic Indefinites and Conceptual Covers

Along the lines of Kadmon and Landman's (1993) analysis of *any*, we will assume that EIs are existentials with two additional characteristics: (i) they induce an obligatory **domain shift**; and (ii) they express conditions on the input context that must be satisfied for the

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<sup>2</sup>See Jayez and Tovená (2006) for an example of a non pragmatic account of EIs. A proper comparison must be left to another occasion.

<sup>3</sup>*Irgendein* can also give rise to an indifference effect: the speaker does not care who the referent of the indefinite is. In some contexts reinforcement like in (25) might not lead to redundancy because the speaker wants to signal that she is not indifferent, but ignorant about the referent.

indefinite to be felicitous (**felicity condition**). The ignorance (MV) effect will obtain as a result of the felicity condition (rather than from Gricean reasoning) in a way similar to standard dynamic accounts to presupposition. We like to think of ignorance effects in EIs as ‘fossilized implicatures’: inferences, pragmatic in origin, that are now part of a lexically encoded meaning. Differences between different indefinites will be accounted for in terms of different domain shifts they can induce. Let us have a closer look.

**Domain shifts triggered by EIs** Along the line of Zamparelli (2007) we will assume that EIs block context induced domain selections. Expanding from Zamparelli, however, we would like to propose that there are at least two ways in which contexts can determine a quantificational domain.

The first way is the standard contextual domain restriction illustrated by (26). When using (26) we don’t mean to quantify over the whole universe, but only over a salient set of individuals, e.g. the students in my class.

(26) Everybody passed the exam.

In this case the blocking induced by an EI is the well known **domain widening** (henceforth DW) from Kadmon and Landman (1993).

There is, however, another way in which context may determine a quantificational domain, namely by the selection of a method of identification as illustrated by example (27). The blocking induced by an EI in this case will be a shift of identification method or, as we will call it, a **conceptual cover shift** (henceforth CC-shift). Consider the following scenario. In front of you lie two face-down cards, one is the Ace of Hearts, the other is 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. Now consider (27):

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

Would sentence (27) be true or false in the described scenario? Intuitively, there are two different ways in which the cards can be identified here: by their position (the card on the left, the card on the right) or by their suit (the Ace of Hearts, the Ace of Spades). Our evaluation of (27) seems to depend on which of these identification methods is adopted.

**Conceptual Covers** Identification methods can be formalized as conceptual covers:

(28) A conceptual cover *CC* is a set of individual concepts (i.e. functions from worlds to individuals) such that in each world, every individual instantiates exactly one concept in *CC*. (Aloni 2001)

In the card scenario there are at least three salient covers representing ways of identifying the cards: (29-a) representing identification by ostension, (29-b) identification by name, and (29-c) identification by description. The set of concepts in (29-d) is not an example of a conceptual cover because it does not satisfy the conditions expressed in (28).

(29) 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}

In the semantics for knowing-wh constructions proposed in Aloni (2001), the evaluation of (30) depends on which of these covers is adopted. Technically this dependence is captured by letting the wh-phrase range over concepts in a conceptual cover rather than over plain individuals. Cover indices  $n$  are added to logical form, their value is contextually supplied.

- (30) You know which <sub>$n$</sub>  card is the winning card.
- a. False, if  $n \mapsto \{\text{on-the-left, on-the-right}\}$
  - b. True, if  $n \mapsto \{\text{ace-of-spades, ace-of-hearts}\}$
  - c. Trivial, if  $n \mapsto \{\text{the-winning-card, the-losing-card}\}$

**The puzzle of specific unknown uses** Consider now example (31) where the indefinite is specific but the use of an EI conveys that the speaker doesn't know who the referent is:

- (31) Devo incontrare *un qualche* professore.  
 I-must meet a some professor  
 'I must meet a certain professor, but I don't know who he is.'

Why is this example puzzling? On the one hand, the indefinite is used specifically. Traditionally, this means that the speaker has someone in mind, therefore she can identify. On the other hand, the use of an EI conveys that the speaker doesn't know who the referent of the indefinite is, therefore she cannot identify.

One natural way out of this puzzle is to recognize that two identification methods are at play here: the speaker can identify on one method (for example by description) but not on another (for example naming). The main intuition of our proposal is that referents of EIs are typically identified via a method different from the one required for knowledge. Technically this intuition is formalized by the notion of a CC-shift. Suppose  $m$  is the cover contextually required for knowledge. Then EIs signal an obligatory shift to a cover  $n$  different from  $m$ . In the formalization in dynamic semantics, this means that EIs introduce as discourse referents elements of  $n \neq m$ . If such CC-shift is not trivial, then the use of an EI implies that the speaker doesn't know who the referent is.

Before turning to the formalization, let us briefly discuss how EIs do interplay with different methods of identification.

**Methods of Identification** A typical situation in which EIs are used is one in which the speaker can identify the referent by description, but not by name. Another quite typical situation is one in which she can identify by name, but not by ostension. Both cases are illustrated in the following examples.

*Description and Naming:* At a workshop.

- (32) a. Ich muss hier *irgendeinen* Professor treffen. Er ist der Direktor vom Institut, aber ich weiss nicht wie er heisst.  
 'I have to meet some professor here. He is the Head of the Department, but I don't know his name'

- b. *Speaker-can-identify*  $\mapsto$  [Description], *unknown*  $\mapsto$  [Naming]
- (33) a. Devo incontrare *un qualche* professore. È il capo del dipartimento, ma non so come si chiama.  
‘I have to meet some professor. He is the Head of the Department, but I don’t know his name’
- b. *Speaker-can-identify*  $\mapsto$  [Description], *unknown*  $\mapsto$  [Naming]

In this scenario, the method of identification contextually required for knowledge is naming. The speaker can only identify by description. The indefinite introduces a non-rigid discourse referent element of a descriptive conceptual cover.

*Naming and Ostension* Again at a workshop.

- (34) a. Ich muss hier *irgendeinen* Professor treffen. Er heisst John Smith, aber ich weiss nicht wie er aussieht.  
‘I have to meet some professor here. His name is John Smith, but I don’t know what he looks like’
- b. *Speaker-can-identify*  $\mapsto$  [Naming], *unknown*  $\mapsto$  [Ostension]
- (35) a. Devo incontrare *un qualche* professore. Si chiama John Smith, ma non so che aspetto abbia.  
‘I have to meet some professor. His name is John Smith, but I don’t know what he looks like’
- b. *Speaker-can-identify*  $\mapsto$  [Naming], *unknown*  $\mapsto$  [Ostension]

In this scenario, the method of identification required for knowledge is ostension. The speaker can only identify by name. The indefinite introduces a non-rigid discourse referent element of the naming cover.

In both considered scenarios the German and the Italian EIs were felicitous. The latter was a case where the speaker was able to identify by name, but not by ostension. What about the other way around? Suppose the speaker can identify by ostension, but not by name, could she still use these EIs? Consider the following scenario.

*Ostension and Naming* Suppose you are watching a soccer match and tell your friends:

- (36) a. Guck mal! Da ist *irgendein* Fussballspieler verletzt. Weisst Du wer das ist?  
‘Look! Some player got injured. Do you know who he is?’
- b. *Speaker-can-identify*  $\mapsto$  [Ostension], *unknown*  $\mapsto$  [Naming]
- (37) a. ??Guarda! *Un qualche* giocatore si è fatto male. Sai chi è?  
‘Look! Some player got injured. Do you know who he is?’
- b. ??*Speaker-can-identify*  $\mapsto$  [Ostension], *unknown*  $\mapsto$  [Naming]

In this scenario, the speaker is able to identify the referent by ostension, but not by name. Interestingly, only the German *irgendein* seems appropriate in this case, the Italian *un qualche* is odd. This contrast motivates the hypothesis we formulate in the following section.

**EIs & identification methods: Romance vs Germanic** Consider the following ranking of methods of identification discussed in Aloni (2001):

(38) ostension > naming > description

The preliminary observations in the previous paragraphs, in particular the contrast between (36) and (37), suggest the following hypothesis:

(39) HYPOTHESIS: In Romance, but not in Germanic, the identification method required for knowledge must be higher in order than the identification method required for specific EIs

A first consequence of (39) is that if a referent is identified by ostension, then EIs should be infelicitous in Romance, as *un qualche* was infelicitous in (37). This first prediction seems to be borne out as illustrated by the ‘Lambada’ examples from Alonso-Ovalle and Menéndez-Benito (2003):

(40) a. Look! *Somellrgendein* professor is dancing on his table! [Germanic]  
 b. *Speaker-can-identify*  $\mapsto$  [Ostension], *unknown*  $\mapsto$  [Naming]

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

Another prediction of (39) is that if identification by description is required for knowledge, then EIs could be felicitous in German even though the referent is identified by ostension or naming. Again this prediction seems to be borne out as illustrated by the following example.

*Ostension, Naming and Description* Suppose you are a secretary in a medical practice and you have interphone with a monitor at the entrance.<sup>4</sup> Then you say:

(42) a. Hier ist *irgendein* Pharmavertreter fuer 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*  $\mapsto$  [Ostension/Naming], *unknown*  $\mapsto$  [Description]

(43) 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*  $\mapsto$  [Ostension/Naming], *unknown*  $\mapsto$  [Description]

This scenario seems again to support our hypothesis. Italian *un qualche* seems to be sensitive to the ranking in (38), German *irgendein* does not.<sup>5</sup>

<sup>4</sup>We have to make sure that the pharma rep can not hear the secretary speaking to the doctor, using *irgendein* in front of him would be very impolite.

<sup>5</sup>However, if *irgendein* is combined with *bestimmt* (‘certain’), its behavior is much more similar to the Romance case. See Port (2010) for some datas on this issue, which requires further investigation.

#### 4. The Proposal

EIs are existentials with two additional characteristics:

- (i) they induce an obligatory **domain shift**  $[D \rightarrow D']$ : *un qualche* only allows for CC-shift, *irgendein* allows for CC-shift and DW;
- (ii) they express a **felicity condition**: EIs are felicitous in a context  $\sigma$  iff the domain-shift they induce is for a reason:
  - a) CC-shift is justified only if otherwise the speaker state would not have (dynamically) supported the statement:

$$(44) \quad \sigma \models \dots \exists x_{D'} \dots, \text{ but } \sigma \not\models \dots \exists x_D \dots \quad [\text{Necessary weakening}]$$

- b) DW is justified only if it creates a stronger statement:

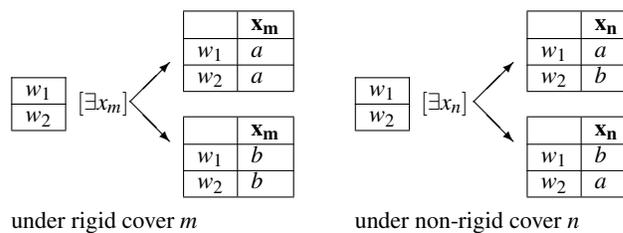
$$(45) \quad \dots \exists x_{D'} \dots \models \dots \exists x_D \dots \quad [\text{Strengthening}]$$

The analysis is implemented in a Dynamic Semantics with Conceptual Covers (Aloni 2001, chapter 3). In such framework, meanings are relations over information states (sets of world-assignment pairs), relativized to conceptual perspectives  $\wp$  (functions from CC-indices to conceptual covers). See Appendix for details. Table (46) summarizes our predictions.

|                        | spMV | epiMV | NPI | deoFC       |
|------------------------|------|-------|-----|-------------|
| (46) <i>un qualche</i> | yes  | yes   | no  | no          |
| <i>irgendein</i>       | yes  | yes   | yes | no (wrong!) |

**spMV & epiMV** First of all we correctly predict for both *irgendein* and *un qualche* a modal variation effect in specific uses and under epistemic modals (interpreted à la Veltman 1997). This follows from CC-shift in combination with the necessary weakening condition, because, as it is easy to see, necessary weakening, when it obtains, implies that the speaker doesn't know who the referent of the indefinite is.

In Dynamic Semantics with CC, specific indefinites, represented by existential sentences, introduce as discourse referents elements of a contextually supplied CC. The following picture represents this operation with respect to covers  $m$  and  $n$ :



Consider now example (47). Assume knowledge requires cover  $m$ . By CC-shift, the EI (represented here by the underlined existential) induces an obligatory shift to a cover different from  $m$ . For example, cover  $n$ :

- (47) a. Maria married *un qualche*irgendein professor.  
 b.  $\exists x_n \phi(x_n)$  [ $n \neq m$ ]

Whenever such a shift is for a reason, we predict an ignorance effect.

- (48) a. Speaker does not know who Maria married.  
 b.  $\neg \exists y_m \Box \phi(y_m)$

Intuitively, (48) follows because the discourse referent in  $n$  introduced by the EI does not correspond to any element of  $m$  (otherwise the shift from  $m$  to  $n$  would have been trivial). Technically, modal variation obtains as a *pragmatic entailment*,  $\models_P$ .

- (49)  $\exists x_n \phi(x_n) \models_P \neg \exists y_m \Box \phi(y_m)$

MV effects under epistemic modals or attitude verbs follow in a similar fashion.

- (50) **epiMV** speaker-oriented:  
 a. Maria must have married *un qualche*irgendein doctor  $\Rightarrow$  S doesn't know who  
 b.  $\Box \exists x_n \phi(x_n) \models_P \neg \exists y_m \Box \phi(y_m)$

- (51) **epiMV** agent-oriented:  
 a. Antonio believes that Maria married *un qualche*irgendein doctor  $\Rightarrow$  Antonio doesn't know who  
 b.  $\Box_a \exists x_n \phi(x_n) \models_P \neg \exists y_m \Box_a \phi(y_m)$

**NPI & deoFC: the case of *un qualche*** We further predict that *un qualche*, which only allows for CC-shift, is infelicitous under negation ( $\neg$ ) and under deontic modals ( $\Delta$ ). This obtains because, as shown in (52), CC-shifts are trivial in these contexts, so necessary weakening never obtains.

- (52) a.  $\forall n, m: \neg \exists x_n \phi \equiv \neg \exists x_m \phi$  (if  $\phi$  is truth-distributive)<sup>6</sup>  
 b.  $\forall n, m: \Delta \exists x_n \phi \equiv \Delta \exists x_m \phi$

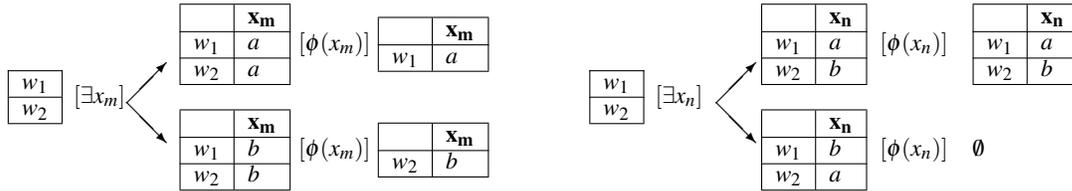
- (53) a. ??Non ho risposto a *una qualche* domanda. [#NPI]  
 # 'I didn't answer any question'  
 b.  $\neg \exists x_n \phi(x_n)$  (no reason here for CC-shift)

- (54) a. Maria deve sposare *un qualche* professore. [#deoFC]  
 # 'Maria must marry a professor, any professor is a permissible option'  
 b.  $\Delta \exists x_n \phi(x_n)$  (no reason here for CC-shift)

Under epistemic modals, *un qualche* is felicitous and triggers an ignorance inference. Under deontic modals it is predicted to be odd. Crucial here is the different analysis of epistemic and deontic modals that we endorse: the former are treated as Veltman's tests, as standard in dynamic semantics. The latter instead receive a more classical static interpretation. Technically, their difference is captured in terms of the different notions of support and truth. A sentence  $\phi$  is *true* in a state  $\sigma$ ,  $\sigma \vdash \phi$  iff each possibility in  $\sigma$  survives in at

<sup>6</sup> $\phi$  is truth-distributive iff  $\forall \sigma, \wp: \sigma \vdash^{\wp} \phi$  iff  $\forall i \in \sigma: \{i\} \vdash^{\wp} \phi$ .

least one of the states resulting from updating  $\sigma$  with  $\phi$ . A state  $\sigma$  *supports*  $\phi$ ,  $\sigma \models \phi$  iff all possibilities in  $\sigma$  survive simultaneously in one and the same output state. As it is easy to see, support is stronger than truth. E.g. in the following illustration, if  $\sigma = \{w_1, w_2\}$ , then  $\sigma \vdash \exists x_m \phi(x_m)$ , but  $\sigma \not\models \exists x_m \phi(x_m)$ .



Only support is a CC-sensitive notion, e.g.  $\sigma \not\models \exists x_m \phi$ , but  $\sigma \models \exists x_n \phi$ . Necessary weakening and the epistemic modal  $\Box$  are both defined in terms of support. Other modals (notably deontic  $\Delta$ ) are defined in terms of truth.

**NPI & deoFC: the case of *irgendein*** NPI uses are predicted for *irgendein* via DW and the strengthening condition, because in negative contexts DW creates a stronger statement.

- (55) a. Niemand hat *irgendjemanden* angerufen.  
 b. Nobody called anybody  
 c.  $\neg \exists x_m \exists x_n \phi$  (DW+ST)  
 d. Prediction: *irgend* felicitous, no epistemic effect

Deontic FC uses, however, are not predicted for *irgendein*. If deontic modals are treated classically, as in the adopted implementation, neither DW nor CC-shift are justified in their scope. We wrongly predict only a spMV use for *irgendein* in these contexts.

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

There are several possible solutions to this problem that need further investigation. Here we only sketch one solution, which takes seriously the crucial role of accent in these constructions. As observed by Haspelmath (1997), in free choice uses and in comparatives, the *irgend*-indefinite must be stressed:

- (57) Dieses Problem kann IRGEND JEMAND lösen.  
 ‘This problem can be solved by anyone’  
 (58) Joan Baez sang besser als IRGEND JEMAND JE zuvor.  
 ‘Joan Baez sang better than anyone ever before’

Let’s assume that stress signals focus, and that focus has two semantic effects: (i) it introduces a set of focus alternatives (as in Rooth 1985), and (ii) it flattens the ordinary alter-

native set (as in Roelofsen and van Gool 2010). Assumption (i) would allow us to derive the free choice inferences of stressed *irgend*-indefinites under deontic modals as obligatory implicatures à la Chierchia 2010, and (ii) would yield an account of the universal meaning of stressed *irgend*-indefinites in comparatives like (58).

## 5. Conclusion

The main problem of the pragmatic approach was its inability to account for the different modal inferences (MV or FC) that EIs produce in specific uses and under epistemic modals, on one side, and under deontic modals, on the other. We have seen how our analysis solves this problem by using conceptual covers and a typically dynamic treatment of modality. In our future plans we want (i) to have a closer look at the free choice use of *irgendein* and connect it to its use in comparatives; (ii) extend the analysis to other EIs in other languages.

**Appendix** Let  $\mathcal{L}$  be a predicate logical *language* with CC-indexed variables  $x_n, y_m, \dots$ , and two modal operators, the epistemic  $\Box_{(a)}$  and the deontic  $\Delta$ . A *model*  $M$  for  $\mathcal{L}$  is a quadruple  $\langle W, D, R_a, R_\Delta \rangle$  where  $W$  is a non-empty set of interpretation functions for the non-logical constants in  $\mathcal{L}$ ,  $D$  is a non-empty set of individuals, and  $R_a$  and  $R_\Delta$  are accessibility relations over  $W$ . Let  $M = \langle D, W, R_a, R_\Delta \rangle$  be a model for  $\mathcal{L}$ . Let  $\mathcal{V}$  be the set of individual variables in  $\mathcal{L}$ . The set  $\Sigma_M$  of *information states* based on  $M$  is defined as:  $\Sigma_M = \bigcup_{X \subseteq \mathcal{V}} \mathcal{P}(D^X \times W)$ . Let  $i = \langle g, w \rangle$  be a possibility in a state  $\sigma \in \Sigma_M$ , then (i)  $i(\alpha) = w(\alpha)$ , if  $\alpha$  is a non-logical constant; (ii)  $i(\alpha) = g(\alpha)$ , if  $\alpha$  is a variable in  $\text{dom}(g)$ , undefined otherwise.

### Semantics

$$\begin{aligned}
\sigma[Rt_1, \dots, t_n]^{\delta} \sigma' & \text{ iff } \sigma' = \{i \in \sigma \mid \langle i(t_1), \dots, i(t_n) \rangle \in i(R)\} \\
\sigma[\neg\phi]^{\delta} \sigma' & \text{ iff } \sigma' = \{i \in \sigma \mid \neg\exists\sigma'' : \sigma[\phi]^{\delta} \sigma'' \ \& \ i \prec \sigma''\} \\
\sigma[\phi \wedge \psi]^{\delta} \sigma' & \text{ iff } \exists\sigma'' : \sigma[\phi]^{\delta} \sigma'' [\psi]^{\delta} \sigma' \\
\sigma[\exists x_n \phi]^{\delta} \sigma' & \text{ iff } \sigma[x_n/c][\phi]^{\delta} \sigma' \text{ for some } c \in \mathcal{D}(n) \\
\sigma[\Box\phi]^{\delta} \sigma' & \text{ iff } \sigma' = \{i \in \sigma \mid \sigma \models^{\delta} \phi\} \\
\sigma[\Box_a \phi]^{\delta} \sigma' & \text{ iff } \sigma' = \{i \in \sigma \mid F_a(i) \models_P^{\delta} \phi\} \\
\sigma[\Delta\phi]^{\delta} \sigma' & \text{ iff } \sigma' = \{i \in \sigma \mid F_\Delta(i) \vdash^{\delta} \phi\}
\end{aligned}$$

### Auxiliary notions

$$\begin{aligned}
i[x/d] & = \langle g_i \cup \{x, d\}, w_i \rangle \quad (\text{if } x \notin \text{dom}(g), \text{undefined otherwise}) \\
c\text{-extension: } \sigma[x_n/c] & = \{i[x/c(w_i)] \mid i \in \sigma\} \\
F_X(\langle g, w \rangle) & = \{\langle g, w' \rangle \mid w R_X w'\} \\
\text{Survival: } i \prec \sigma & \text{ iff } \exists j \in \sigma : w_i = w_j \ \& \ g_i \subseteq g_j \\
\text{Support: } \sigma \models^{\delta} \phi & \text{ iff } \exists\sigma' : \sigma[\phi]^{\delta} \sigma' \ \& \ \forall i \in \sigma : i \prec \sigma' \\
\sigma \models_P^{\delta} \phi & \text{ iff } \sigma \models^{\delta} \phi \ \& \ \phi \text{ felicitous in } \sigma \\
\text{Truth: } \sigma \vdash^{\delta} \phi & \text{ iff } \forall i \in \sigma : \exists\sigma' : \sigma[\phi]^{\delta} \sigma' \ \& \ i \prec \sigma' \\
\text{Entailment: } \phi \models \psi & \text{ iff } \forall\sigma, \mathcal{D} : \sigma \models^{\delta} \phi \Rightarrow \sigma \models^{\delta} \psi \\
\phi \models_P \psi & \text{ iff } \forall\sigma, \mathcal{D} : \phi \ \& \ \psi \text{ felicitous in } \sigma : \sigma \models^{\delta} \phi \Rightarrow \sigma \models^{\delta} \psi
\end{aligned}$$

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