

# Some news about *irgend-* and *algún*

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## 1 *irgend-*indefinites: Some (well-known) impressions

- When **irgend-**indefinites occur unembedded, they convey that the speaker is uncertain about, or does not care to identify a witness for the existential claim:<sup>1</sup>

- (1) Irgendjemand hat angerufen.

**IRGEND-one has called.**

*Someone has called and I do not know (care to say) who called.*

- When embedded under a modal, **irgend-**indefinites give rise to a ‘free-choice effect’:

- (2) Maria musste irgendeinen Arzt heiraten.

**Maria had to marry IRGEND-one M.D.**

*There was an M.D. that Maria had to marry, I do not know or care to say which one.*

*OR:*

*Maria had to marry an M.D., any M.D. was a permitted option.*

- **irgend-**indefinites are ‘stubbornly existential’ (Kratzer and Shimoyama 2002): They cannot be ‘unselectively bound’, i.e. (3) does not have a generic reading, and (4) cannot mean that most swedes are tall.

- (3) Irgendein Schwede ist hochgewachsen.

**IRGEND-one Swede is tall.**

- (4) ??Irgendein Schwede is meistens hochgewachsen.

**IRGEND-one swede is usually tall.**

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<sup>1</sup>Throughout, I do not give word-by-word glosses. This is in the interest of clarity. Contact me for a version with glosses.

## Goals for today

1. Argue that recent accounts of **irgend** are insufficient.
  - a. ...because they are conceptually problematic.
  - b. ...because they do not predict the data correctly.
2. Clear up some common misconceptions about the data.
3. Advertise my own analysis of **irgend**-indefinites (& **algún**, & **wh-ever**), which employs **postsuppositions** to capture the meaning of these items.

## 2 **irgend**- and implicatures: Some recent accounts

### 2.1 Kratzer and Shimoyama (2002)

- Assumption: **irgend**- **maximally widens the domain of an existential quantifier** (cf. Kadmon and Landman (1993) for **any**).
- This triggers **implicatures**, accounting for the free-choice effect ('any M.D. was a permitted option')
- In order to account for the ignorance implications, K&S assume a (n otherwise unmotivated) covert 'assertion operator'.
- But: The implicature-computation they outline is problematic in a number of ways. Most seriously, a completely parallel procedure applies to plain indefinites just as well, so it is unclear how these implicatures make the difference between **irgend**-indefinites and plain ones.<sup>2</sup>
- And, preview:
  - Not all **irgend**-implications are created equal, and some of them behave rather un-implicature-like (Section 3.4).
  - The general strategy to employ 'domain-widening' (minimal, maximal, or in-between) to derive implicatures predicts interpretations that are not, in fact, available (Section 5).

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<sup>2</sup>The reason for this is related to the fact that, as Aloni & van Rooij (2007) observe, K&S solution in terms of domain-widening is entirely independent from their use of a 'Hamblin'-semantics for indefinites, contrary to what K&S claim.

## 2.2 Aloni & van Rooij (2007)

- A&vR give an explicit formal account of the implications of **irgend**-indefinites ('existential FCIs') and **any**-like indefinites ('universal FCIs') in terms of a Schulz (2003)-style minimal models analysis
- The implications are treated as **quantity implicatures**.
- It is (again) unclear how this account avoids generate identical predictions for **plain** indefinites
- Their account of the difference between existential and universal FCIs relies on the idea that these items can specify (or at least modify) the alternative sets against which quantity implicatures are calculated.
- Presumably, then, one could account for the difference between **irgend**- and plain indefinites by having them invoke distinct alternative sets
- But that raises a conceptual problem: If conversational implicatures are, as it were, calculated 'post-grammatically', how can the conventional meaning of FCIs specify sets used in their computation?

## 2.3 Chierchia (2004), Fox (2007), Chierchia, Fox and Spector (2008) ('the localists')

- Given the conceptual problem for A&vR's solution, it may seem tempting to simply assume that (quantity) implicatures are, after all, not Gricean in nature, but are part of grammar.
- In one way or another, this move has been made by Chierchia, Fox and Chierchia et al. (among others).
- But this move seems overkill if motivated by the existence of FCIs alone: The more natural conclusion is that their meanings are not (quantity) implicatures after all.
- Other motivations for making this move have been largely shown to be only apparent (e.g. Sauerland (2004), Greenhall (2008)).
- And various versions of the localist proposal have been argued to make highly problematic predictions (e.g. Geurts (2009)).
- This should worry us enough to see whether there is not a more conservative way to account for the behavior of (existential) FCIs.

### 3 A closer look at *irgend-*

#### 3.1 The scopes of *irgend-*

- K&S: “[*irgendein*] doesn’t seem to have exceptional scope properties”
- Kratzer (2005): ‘[. . .] the wide-scope reading, which is likely to come about via standard (island obeying!) scope shift.’
- But that is not true, cf. K&S example (their (22)):
  - (5) Der Lehrer hat gefragt, ob Hans irgendein Buch gelesen hat.  
The teacher asked whether Hans read IRGEND-one book.  
(iii)\**irgendein* scopes out of the ob-clause.
- But (5) has a wide-scope (‘ignorance or indifference’) reading!
- This version becomes the preferred one if we change the example slightly:
  - (6) Der Lehrer hat gefragt, ob Hans irgendein kompliziertes Theorem bewiesen hat.  
**The teacher asked whether Hans proved IRGEND-one complicated theorem.**  
*The teacher asked whether there is some complicated theorem (or other) that Hans proved.*  
OR:  
*There is some complicated theorem, I do not know/remember/care to say which one, such that the teacher asked whether Hans proved it.*
- Similarly, Alonso-Ovalle and Menéndez-Benito (2007) found that **algún** does take exceptional scope quite regularly, though not as easily as **un**.

**Upshot:**

**irgend**-indefinites do not seem to respect scope islands any more than regular indefinites do.

Hence:

- If you want to explain the difference between **ein/irgendein** (**un/algún**) by assuming the latter is a proper quantifier, while the latter are something special (e.g. a free variable, discourse referent, ...) you will have to assume that proper quantifiers can violate scope islands.
- Schwarzschild’s (2002) account of exceptional wide scope as arising through singleton domains is in deep trouble, for neither **irgend** nor **algún** allow for singleton domains.

## 3.2 How wide is ‘maximal’ domain-widening?

### 3.2.1 *irgend* vs. *algún*: Not that different

- K&S claim that **irgend-** induces ‘maximal’ domain widening.
- Something of the kind **does** seem adequate for (2) above, where **irgend-** is embedded under a deontic modal, and we have the impression that **any** doctor should be a ‘live deontic possibility’.
- But the same does not seem to be true for epistemic modals:
  - (7) Peter muss in irgendeinem Raum in diesem Haus sein.  
**Peter must be in IRGEND-one room in this house.**  
‘Peter must be in some room or other in this house.’
- (7) does not require in any way, shape, or form that all of the rooms in the house are a ‘live epistemic option’.
- All that seems to be required for (7) to be adequate is that there is *more than one* live epistemic possibility.
- Alonso-Ovalle and Menéndez-Benito (2008) cite the Spanish equivalent of (7) (with **algún**) as evidence that **algún** is not a ‘free-choice indefinite’ (i.e. not of the **irgend-**kind).
- This claim has to be reevaluated: **irgend-** does behave like **algún** in this case.

### 3.2.2 Epistemic vs. deontic modals

- Why is (7) different from (2)?
- Obvious answer: (2) employs a deontic (more general, *priority*) modal, (7) employs an epistemic modal.
- Can we convince ourselves that this is the relevant difference? Yes:
  - (8) [explaining the rules for hide-and-peek]  
Okay, jeder muss sich innerhalb des Hauses verstecken. Ich zähle laut bis hundert, bevor ich zu suchen anfangen. Ihr dürft rausgehen und die Aussentreppe benutzen, aber wenn ich bei hundert angekommen bin, *muss jeder in irgendeinem Raum im Haus sein.*  
**Okay, everyone must hide inside the house. I will count out loudly up to one hundred before I start searching. You may go outside and use the external staircase, but when I reach one hundred, everyone must be in IRGEND-one room of the house.**

(9) Ich weiß nichts genaues, aber sie muss irgendeinen Arzt geheiratet haben.  
**I don't know the particulars, but she must have married IRGEND-one doctor.**  
*Compatible with speaker/interlocutors being able to exclude a large number of doctors, even topical ones.*

- (8) has the 'any room is fine' implication, and (9) is compatible with us being able to exclude a large number of options.
- Thus the difference seems really have to do with the kind of modal employed.

### 3.2.3 What about *algún* under deontic modals?

- We would expect that **algún** shows the same kind of behavior under deontic modals. Does it?
- Not under possibility modals (but note that (10) is rather weird on the relevant reading, also).

(10) Du darfst irgendeinen Arzt heiraten.  
**You may marry IRGEND-one M. D.**  
*There is an M. D., I do not know or care to say which one, that you may marry.*  
*? OR:*  
*? You may marry an M. D., any M. D. is a permitted option.*

- Spanish has an **any**-style free-choice item, **cualquier** (Quer 1999, Giannakidou 2001), which may block **algún**, because it more directly induces the free-choice effect.
- Like **any**, **cualquier** is out (when not subtrigged) under necessity modals. And:<sup>3</sup>

(11) María tuvo que casarse con algún doctor.  
**María must marry algún doctor.**  
*There is a doctor that María has to marry, (I don't know/recall/care which one) that María had to marry.*  
*OR:*  
*María had to marry a doctor, any doctor was a permitted option.*

### 3.2.4 Do we really have MAXIMAL domain-widening under deontic modals?

- Arguably, no:

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<sup>3</sup>Paula Menéndez-Benito (p.c.) informs me that she cannot reproduce the judgement on (11). If this generalizes to other speakers, it may indicate that there is dialectal variation with respect to the distribution of **algún**. Most of my informants are speakers of Mexican Spanish.

- (12) Ich hab' mit deinen Eltern gesprochen. Natürlich weißt Du dass du, dass sie Dir auf keinen Fall erlauben, Dr. Heintz zu heiraten. Du weißt aber auch, wie sehr sie Mediziner mögen: Du musst also irgendeinen Arzt heiraten.<sup>4</sup>

**I talked to your parents. Of course you know that they won't allow you to marry Dr. Heintz. You also know how fond they are of physicians. So you have to marry IRGEND-one M. D.**

- Also, (8) above could be prefixed with “You know that our parents’ bedrooms and the study are off limits”, thus excluding some possibilities.
- What really seems to happen under deontic modals is that *any option in the current domain of discourse* must be live deontic option.
- The same is not true under epistemic modals, it seems: There, the speaker might have private information that excludes some possibilities.

**Upshot:**

- **Irgend-** does *not*, in general, contribute ‘maximal’ domain widening.
- Both **irgend** and **algún** appear to only impose a minimal ‘variation requirement’ under epistemic modals, but a stronger requirement under deontic modals (‘everything that has not been yet excluded is a live option’).

### 3.3 A ‘link with modality’?

“The connection with modality provides the key to an understanding of the free choice effect. [...] There is currently no compositional account of the link between free choice indefinites and modals, nor an explanation why there should be such a link.”

(Kratzer and Shimoyama 2002)

- But how tight is the ‘link with modality’, really?
- Quantifiers can license **irgend-** without any modal implications:<sup>5</sup>

- (13) Jedes Mädchen hat irgendeinen Jungen eingeladen.  
**Every girl invited IRGEND-one boy.**

<sup>4</sup>Thanks to Daniel Büring for suggesting this kind of example.

<sup>5</sup>Again, the same is true for **algún**, as Alonso-Ovalle and Menéndez-Benito (2007) note. They do not explain, however, how their variant of the Kratzer and Shimoyama reasoning derives this.

*There was one boy such that every girl invited him, but I do not know or care to say which one.*

*OR:*

*Every girl invited a boy, different girls invited distinct boys.*

- So can **when**-conditionals:

- (14) Wenn Susanne etwas vom Abendessen übrig hat, gibt sie es irgendeinem Nachbarn.

**When(ever) Susanne has leftovers from dinner, she gives them to IRGEND-one neighbor.**

*There is one neighbor, I do not know or care to say which, such that when Susanne has leftovers from dinner, she gives them to him*

*OR:*

*Whenever Susanne has leftovers, she gives it to some neighbor, but not always the same one.*

- And adverbs of quantification:

- (15) Normalerweise schenkt Susanne ihre Bilder irgendeinem Verwandten.

**Normally, Susanne gives her paintings to IRGEND-one relative.**

*There is a relative, I don't know or care to say which, such that Susanne normally gives him her paintings.*

*OR:*

*Normally, Susanne gives her paintings to a relative, she does not always give it to the same one.*

### **Upshot**

- There does not seem to be a 'link with modality' per se, but rather a 'link with quantificational operators'
- The correct generalization is: If an **irgend**-indefinite occurs embedded under a quantificational operator, it indicates that the witness(es) for the existential claim are not the same with respect to all members of the domain of the operator.

### 3.4 The nature of *irgend*'s implication

- The implications contributed by **irgend** clearly are not part of the asserted content of an utterance.
- K&S suggest that it is a conversational implicature.
- They support this supposition with two arguments:

1. They claim that the free-choice implication is *cancelable* (their example (11)):

(16) Du musst irgendeinen Arzt heiraten, und das darf niemand anders sein als Dr. Heintz.  
**You must marry IRGEND-one M. D., and that cannot be anyone other than Dr. Heintz.**

But: (16) is acceptable only if the two modals refer to distinct modal bases (e.g. you must marry IRGEND-one doctor according to what you parents want, and according to what I want, it better be Dr. Heintz.)

2. The free-choice implication disappears in downward-entailing contexts:

(17) Niemand musste irgendjemanden heiraten  
**No-one hat to marry IRGEND-one.**  
*No-one had to marry anyone.*  
*NOT: No-one had to marry someone, but had the free option to choose whom.*

But that only shows that the free-choice implication is not part of the asserted context, not that it is an implicature.

#### 3.4.1 Embedded uses: Not implicature-like, but (somewhat) presupposition-like

- We just saw that an embedded use of **irgend** does not allow for cancellation.
  - This is generally the case.
  - We also find effects that look suspiciously like presupposition filtering:
- (18) Wenn Hans nicht wüsste, dass ich *Barriers* gekauft habe, so wüsste er doch, dass ich irgendein Buch gekauft habe.  
**If Hans did not know that I bought Barriers, he still would know that I bought IRGEND-one book.**
- (19) Wenn nicht alle David eingeladen hätten, hätte jedes Mädchen trotzdem irgendeinen Jungen eingeladen.

**If not all of them had invited David, every girl would still have invited IRGEND-one boy.**

*..., then every girl would have invited a boy, not every girl the same boy.*

OR:

*..., then every girl would have invited the same (other) boy, but I don't know which one. [not very accessible here]*

### 3.4.2 Unembedded uses: Not (very) presupposition-like, but implicature-like

- Filtering does not work in unembedded uses:

(20) Hans hat irgendein Buch gekauft. / Ich weiß, dass Hans irgendein Buch gekauft hat.

**(I know that) Hans has bought IRGENDone book.**

*(I know that) Hans bought a book, but I do not know (care to say) which one.*

(21) Wenn ich nicht wüsste, dass Hans *Barriers* gekauft hat, so hätte er doch #irgendein Buch gekauft.

**If I did not know that Hans bought Barriers, he still would have bought #IRGEND-one book.**

- But cancelation works swimmingly:

(22) [Younger brother to older brother]:

Irgendein Mädchen hat angerufen. Also ich weiß, wer es war, aber ich sag's Dir nicht!

**IRGEND-one girl has called. In fact, I know exactly who it was, but I won't tell you!**

#### Upshot:

- The arguments for assuming that the (free-choice) implications are generally implicatures are weak.
- There is a marked difference between *unembedded* and *embedded* uses: The former act implicature-like, the latter act (somewhat) presupposition-like.
- This, obviously, spells trouble for any analysis that *uniformly* tries to derive these effects as implicatures (such as Kratzer and Shimoyama's).

## 4 Free Choice by Postsupposition: A dynamic semantics for **irgend-**

### Descriptive Summary:

- If embedded under a quantificational operator (modal, attitude verb, adverb of quantification, individual quantifier), **irgend** can convey that the witness for the existential statement is not the same with respect to all elements of the domain of the operator.
- If not embedded under such an operator, **irgend** conveys that the speaker is uncertain about, or does not care to identify a witness for his existential statement.
- In the former case, the implication of **irgend** behaves presupposition-like, in the latter it does not.

- The first two clauses in this description sound very much like Farkas's (2002) characterization of English **some/sm**
- An entirely parallel characterization is adequate for English **wh-ever** (see the Appendix B for a statement of the characterization and some motivating examples, taken from Lauer (in preparation)).
- Strategy for a unified treatment:

- Assume that **irgend-** uniformly contributes a presupposition-like definedness requirement.
- Model this satisfaction-style in a dynamic semantics à la Groenendijk, Stokhof and Veltman (1996)/Beaver (2001)
- The quantificational operators create *local information states*, which have to satisfy the requirement if **irgend** is embedded.
- If **irgend** is not embedded, the conversational common ground has to satisfy the variation requirement, triggering conversational implicatures of ignorance/indifference

- Unlike a garden-variety presupposition, which in a satisfaction semantics is treated as a condition on the *input* context, we let **irgend-** impose a condition on the *output* context (for now, we only enforce minimal variation):

$$s[\textit{irgend}Q_x[\phi][\psi]]s' :\Leftrightarrow s[Q_x[\phi \wedge \psi]]s' \\ \&\exists i, j \in s' : i(x) \neq j(x)$$

## 4.1 Embedded occurrences

- Example:

- (23) Hannah glaubt, dass irgendetwas geklingelt hat.  
**Hannah thinks that IRGEND-person rang the doorbell.**  
 $\Box_h \textit{irgend}\exists_x[\textit{person}(x)][\textit{rang}(x)]$

The post-supposition is satisfied if there are at least two worlds among Hannah's doxastic alternatives, such that distinct people rang the doorbell in those two possibilities. That is, if Hannah does not know who rang the doorbell.

- This works similarly for deontic modals and attitude verbs.
- For individual quantifiers, the off-the-shelf dynamic treatments will not give the right results.
- But we can modify them so that they do, without destroying the success of the treatment of presuppositions (see the Appendix A).
- Upshot: Embedded occurrences will pragmatically presuppose the free-choice implication. I assume that global accommodation can freely apply where this is not already taken for granted.

## 4.2 Unembedded occurrences

- For unembedded occurrences, the post-supposition will ensure that, after the sentence has been added to the conversational common ground, there are still multiple possible witnesses for the existential statement.
- A sentence like (24) will therefore pragmatically presuppose something like (25):

- (24) Irgendetwas hat angerufen.  
**Irgend-one has called.**

- (25) Learning that someone called will not let you conclude you who it was.

- The following three conditions still are jointly incompatible with the definedness condition of (24):
  1. **Cooperativity.** The speaker is willing to provide his audience with any relevant information he possesses.
  2. **Relevance.** The identity of the person that called is relevant to the current conversational purposes.
  3. **Feasibility.** The speaker is able to commit the identity of the person who called to the common ground (i.e. he has knowledge of who called, and there are no other hindrances to share this knowledge, such as disagreement with the audience).
- Upon hearing an utterance that is appropriate only if the condition in (25) is met, the hearer will have to conclude that (at least) one of the three conditions does not hold.
  - If he concludes that **Feasibility** does not hold, he will often infer ignorance.
  - If he concludes that **Relevance** does not hold, he will infer (a weak form of) ‘indifference’.
  - He may also conclude that **Cooperativity** does not hold, as is the case if (26) is uttered during a game in which the addressee tries to guess what the speaker is cooking (modeled after an example of von Stechow (2000)).

(26) Ein Tipp: Ich koche irgendwas Vegetarisches ...  
**A hint: I am cooking IRGEND-thing vegetarian ...**

  - Giving up the assumption of **Feasibility** (together with **Relevance**) can also be triggered by manifest disagreement (after an example by Condoravdi (unpublished)).<sup>6</sup>

(27) A: Peter ate the cake.  
 B: No, JOHN ate the cake.  
 A: Okay, irgendjemand hat den Kuchen gegessen, also müssen wir einen neuen besorgen.  
**Okay, IRGEND-person at the cake, so we have to get a new one.**

#### 4.2.1 What about negation?

- Consider (28) and (29):

(28) Es ist nicht der Fall, dass Hans irgendjemanden angerufen hat.  
**It is not the case that Hans called IRGEND-one.**

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<sup>6</sup>Alonso-Ovalle and Menéndez-Benito (2010) provide an analogous **algún** example.

(29) Es ist nicht der Fall, dass Hans jemanden angerufen hat.  
**It is not the case that Hans called someone.**

- The two sentences seem to be virtually identical in meaning.
- Doesn't the account predict that the postsupposition projects out of the negation, leading to an incoherent statement?
- No: While postsuppositions can be filtered, and stopped by plugs, they do not escape (all) holes.
- In the case of (28), the postsupposition has to be satisfied in **the output context of the local info state updated with 'Hans called someone'**.
- Hence, the prediction is: (28) is adequate only if, in the pre-assertion contexts, there were at least two persons of which it was possible that he called them.
- This seems adequate to me: If it was agreed already that Paul could only have called his mother, (28) is odd, but (29) is not.

#### Upshot

- By treating the contribution of **irgend-** as a 'postsupposition', we can state a simple, uniform meaning, and have standard notions of formal semantics ((pre)supposition projection and accommodation, conversational implicatures) do the work.

## 5 Amendments and open issues

- The post-supposition can require more than minimal variation, e.g. that any of a given set of alternatives is a witness in some world or other / any of a given set of alternative descriptions applies to the witness in some world.
- That might us just give the right kind of variation needed to explain the 'any *P* is fine' implication under deontic modals.
- **algún** can be treated entirely parallel, except that **algún** can also imply uncertainty w.r.t number Alonso-Ovalle and Menéndez-Benito (2008):

(30) Hay alguna mosca en la sopa.

**There is ALGUN fly in the soup.**

*There is at least one fly in the soup, and I do not know how many flies are in the soup.*

**irgend** cannot not have this implication. Presumably, this can be accounted for by assuming that **algún** is not marked for number, while **irgend**-indefinites are.<sup>7</sup>

- Another slight difference between **irgend** and **algún**: **algún** appears to be more picky with respect to methods of identification: (31) is fine, but its Spanish equivalent is not:

(31) Schau an: Da klettert irgendetwas die Wand des Hotels hoch.  
**Look at this: IRGEND-one is climbing up the wall of the hotel.**

- In general, the present analysis can account for varying methods of identification by making use of Aloni's (2001) conceptual covers, requiring that the witness for the existential statement does not co-vary with a single concept in the cover.
- An open issue: Are there proper indifference readings of **irgend**? If so, how do they come about? And what has a context to be like to render them possible?

(32) Hans hat irgendein Werkzeug aus dem Kasten genommen.<sup>8</sup>  
**Hans took IRGEND-one tool out of the box.**  
*Hans took some tool out of the box, he could have taken any other.*

#### **We have learned something today:**

- **irgend** is much more similar to **algún** than previously thought.
- **irgend** does not generally (if ever) induce maximal domain-widening.
- **irgend** is more promiscuous than previously thought. It can combine with a variety of quantificational operators, not just modals.
- Postsuppositions are a natural way to state the meanings of free-choice indefinites in a uniform way.
- Postsuppositions are excellent implicature-inducers.

<sup>7</sup>Some care has to be taken to get things to come out right: E.g. the plural indefinite **irgendwelche** does not just require that it is not known which exact group is a witness, but rather that it is not known of anybody whether he is part of the group. Similarly, slight modifications are necessary to correctly deal with **irgendein** where it is not assumed that there is a unique witness per world.

<sup>8</sup>Example (modified) from Condoravdi (unpublished)

## Postscript: A final argument against domain-widening + implicature accounts

- The implicature-derivations in Kratzer and Shimoyama's (and Alonso-Ovalle and Menéndez-Benito's) account start from the question "Why did the speaker use a domain-widener (anti-singleton operator)?"
- One of the possible answers that is considered is: He wanted to avoid to make a false claim (actually, a claim that he does not have evidence for).
- But then, **irgend** should be felicitous in the following context:

(33) Hans knows that Paul believes that someone stole his key. However, Hans does not know whether Paul has a belief as to who stole the key, or whether Paul still has more than one option open.  
Hans (to Frank): Paul glaubt, dass irgendjemand seinen Schlüssel geklaut hat.  
**Paul believes that #IRGEND-one stole his key.**

Hans' utterance should be felicitous—he uses **irgend** to preclude the possibility that the hearer assumes Hans wants to claim that there is a particular person that Paul thinks stole the key.

- But such a reading is **not** available for (33).
- (33) can only mean that there is someone (the speaker does not know who) that Paul takes to have stolen the key; OR that Paul thinks someone stole the key, but does not know who.

## Appendix A: Some formal details

**Definition 0.1.** (Possibilities) Given a language  $L$ , a join-semilattice  $\langle D, \sqsubseteq \rangle$  (the **domain**), a set  $W$  of interpretation functions mapping the logical constants of  $L$  into  $\bigcup_{n \in \mathbb{N}} D^n$  and a set of relations  $R \subseteq \wp(W \times W)$ , **the set of possibilities**,  $I$ , is the set of tuples  $\langle r, g, w \rangle$  such that  $r$  is a referent system,  $g$  is function from the range of  $r$  into  $D$  and  $w \in W$ .<sup>6</sup>

The notion of **descendants** and **subsistence** are as in Groenendijk et al. (1996)

**Definition 0.2.** Given a set of worlds  $W$  referent system  $r$  and an assignment function  $g$ , the **information state given  $r$  and  $g$  based on  $W$** ,  $\text{Inf}_{r,g}(W)$  is defined as  $\{r\} \times \{g\} \times W = \{\langle r, g, w \rangle \mid w \in W\}$

**Definition 0.3.** For  $\Psi$  a class of sets closed under union and  $X$  a set, let  $LS(X, \Psi)$ , **the largest subset of  $X$  satisfying  $\Psi$** , be the  $Y$  such that  $Y \subseteq X \ \& \ \Psi(Y)$  & for all  $Z \subseteq X$ : if  $\Phi(Z)$  then  $Z \subseteq Y$ .

**Definition 0.4.** Let  $s, s' \in I$  and  $\phi, \psi$  formulas. Then

$$\begin{aligned}
 s[Rt_1, \dots, t_n]s' & : \iff s' = \{i \in s \mid \langle i(t_1), \dots, i(t_n) \rangle \in i(R)\} \\
 s[t_1 = t_2]s' & : \iff s' = \{i \in s \mid i(t_1) = i(t_2)\} \\
 s[\neg\phi]s' & : \iff s' = \{i \in s \mid i \text{ does not subsist in } s[\phi]\} \\
 s[\phi \wedge \psi]s' & : \iff \exists s'' : s[\phi]s''[\psi]s' \\
 s[\exists_x \phi]s' & : \iff s' = \bigcup_{i \in s} LS(i[x|D], \lambda X. X \neq \emptyset \ \& \ \exists s'' : X[\phi]s'')[\phi] \\
 s[\diamond_a \phi]s' & : \iff s' = \{\langle r, g, w \rangle \in s \mid \text{Inf}_{r,g}(\{v \in W \mid wR_a v\})[\phi] \neq \emptyset\} \\
 s[\partial\phi]s' & : \iff s[\phi]s' \text{ and for all } i \in s : i \text{ subsists in } s'
 \end{aligned}$$

Other logical vocabulary can be defined using the usual abbreviations. The first four clauses are directly taken from Groenendijk et al. (1996) and are fairly standard.  $\partial$  is Beaver's presupposition operator. The definition for  $\diamond$  imports a standard Kanger/Kripke semantics for modality. The definition for the existential quantifier is novel.

The non-modal part of this language (plus the obvious way to introduce generalized quantification) can be shown to be equivalent to the non-modal part of the language defined in Beaver (1994), and thus reproduces its considerable empirical coverage with respect to the interaction of quantification and presupposition.

We can proceed to define definite descriptions, **-ever** free relatives and **irgend**-indefinites:

**Definition 0.5** (Definite descriptions). Let  $\phi, \psi \in L$ , then

$$\iota_x [\phi(x), \psi(x)] := \partial_{\square} [\exists_x [\phi(x) \wedge \forall_y [\phi(y) \rightarrow y \sqsubseteq x]]] \wedge \psi(x)$$

**Definition 0.6** (everFRs).

$$\begin{aligned}
 s[wh - ever [\phi, \psi]]s' & : \iff s[\iota_x [\phi, \psi]]s' \\
 & \quad \& \ \exists i, j \in s' : i(x) \neq j(x)
 \end{aligned}$$

**Definition 0.7** (Irgend- indefinites). Let  $s, s' \in I$ ,  $\phi, \psi \in L, Q$  an existential quantifier, then:

$$\begin{aligned}
 s[\text{irgend}Q_x[\phi][\psi]]s' & : \iff s[Q_x[\phi \wedge \psi]]s' \\
 & \quad \& \ \exists i, j \in s' : i(x) \neq j(x)
 \end{aligned}$$

<sup>6</sup>See Groenendijk et al. (1996) for the definition of referent systems. All that is important here is that  $g \circ r$  is a mapping from variables into the Domain, i.e. an assignment function.

## Appendix B: Some impressions of *-ever* Free relatives

### Descriptive Summary

- If embedded under a quantificational operator (modal, attitude verb, adverb of quantification, individual quantifier), **wh-ever** can convey that the referent of the free relative is not the same with respect to all elements of the domain of the operator.
- If not embedded under such an operator, **wh-ever** conveys that the speaker is uncertain about, or does not care to identify the referent of the free relative.

- Without embedding:

(26) Whatever Arlo is cooking is vegetarian.  
*Implication: Speaker does not know/care to identify what Arlo is cooking.*

- Attitude verbs/Modals:

(27) a. John thinks that whoever won the race will get lucky tonight.  
*Implication: Speaker or John does not know who won the race.*  
b. Joan wants to marry whoever her parents have selected for her.  
*Implication: Speaker does not know who the parents selected,*  
*OR: Joan's marriage-wishes do not depend on the identity of the person her parents have selected.*

- Outscoping modal operator is required if the ignorance-implication is to apply to a third party (*contra* von Fintel (2000)):

(28) Raja was digging into my pork stew, oblivious to what it was. I had to tell him that #whatever he was eating was not halal.  
*Wh-ever cannot predicate its variation requirement on the set of Raja's epistemic possibilities.*

- Non-episodic aspect, adverbs of quantification:

(29) Whatever Peter wrote was (always) violent.  
*Speaker does not know what Peter wrote*  
*OR: Peter wrote a number of things on different occasions, no modal implication*

- Individual quantifiers:

(30) Every test-eater got assigned a dish randomly. Each of them liked whatever he was eating.  
*They did not all get assigned the same thing, no modal implication.*

- Ignorance-implication can be filtered if **wh-ever** is embedded, but not otherwise:

(31) a. If I did not know what Arlo is cooking, I still would know that whatever he is cooking smells delicious.  
b. If I did not know what Arlo is cooking, what#ever he would be/is cooking would still smell delicious.

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