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Indefinites in comparatives

Maria Aloni · Floris Roelofsen

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Abstract The goal of this paper is to explain the meaning and distribution of indefinites in comparatives, focusing on the case of English *some* and *any* and German *irgend*-indefinites. We consider three competing theories of comparatives in combination with an alternative semantics of *some* and *any*, and a novel account of stressed *irgend*-indefinites. One of the resulting theories, based on Heim's (2006) analysis of comparatives, predicts all the relevant differences in quantificational force, and explains why free choice indefinites are licensed in comparatives.

Keywords Indefinites · comparatives · intonational meaning

1 Introduction

The goal of this paper is to explain the meaning and distribution of indefinites in comparatives. We will focus on the case of English *any* and *some* and German *irgend*-indefinites.

(1) a. Michael is taller than (almost) anyone else in his class. $\forall$
b. Michael is taller than someone else in his class. $\exists$
c. Michael ist größer als IRGENDEIN Mitschüler in seiner Klasse.
Michael is taller than IRGENDEIN schoolmate in his class.
'Michael is taller than anyone in his class.' $\forall$

The data in (1) poses three puzzles. The first concerns the differences in quantificational force: *some* receives an existential interpretation, while *any* receives a universal interpretation. Stressed *irgend*-indefinites (small capitals indicate stress) also receive a universal interpretation in comparatives (Haspelmath 1997, 245). If *irgendein* is not stressed in (1c), the sentence receives a 'specific unknown' interpretation: John is taller than someone else from his class, the speaker doesn't know who.[1]

Institute for Logic, Language, and Computation, University of Amsterdam

[1] Note that plain *a*-indefinites and bare plural indefinites in English only seem to be felicitous in comparatives when receiving a generic interpretation (e.g., *Boys are taller than girls* / **John is taller than girls / a girl*). These constructions will be left out of consideration in this paper.

The second puzzle concerns the licensing of *any* in (1a). Since *any* can be modified by *almost* here, it is arguably a free choice item rather than an NPI (Heim 2006; Giannakidou and Yoon 2010). FCIs have a restricted distribution. They are felicitous in possibility statements, but need a post-nominal modifier to be felicitous in episodic sentences (licensing by a modifier is often called *subtrigging* since Dayal's (1998) revival of this term originally from LeGrand 1975).

(2) a. John may kiss any girl.
b. #John kissed any girl.
c. John kissed any girl with a red hat. subtrigging

There are several accounts of the facts illustrated in (2) (e.g. Dayal 1998; Giannakidou 2001; Jayez and Tovena 2005; Menéndez-Benito 2005; Aloni 2007b,a). However, it is not known why FCIs are licensed in comparatives as well. Can any of the existing accounts of FC indefinites be extended to the case of comparatives?

The third puzzle concerns *irgend*-indefinites. When unstressed, *irgend*-indefinites have a wide distribution and in positive contexts they convey speaker ignorance.[2]

(3) Irgend jemand hat angerufen. #Rat mal wer?
irgend somebody has called guess prt who?
'Somebody called – speaker doesn't know who' (Haspelmath 1997)

When stressed, *irgend*-indefinites have meaning and distribution similar to *any*: they are not licensed in episodic sentences, but they are licensed in negative contexts, under root modals and in comparatives (Port 2010); in the latter two cases they obtain universal interpretations.

(4) Dieses Problem kann IRGEND JEMAND lösen.
'This problem can be solved by anyone' (Haspelmath 1997)

(5) Joan Baez sang besser als IRGEND JEMAND JE zuvor.
'Joan Baez sang better than anyone ever before' (Haspelmath 1997)

How can this be accounted for? And more specifically, what is the role of stress?

If indefinites are simply treated as existential quantifiers, traditional analyses of comparatives (Seuren 1973; von Stechow 1984; Rullmann 1995), but also the more recent account of Beck (2010) wrongly derive a universal reading for all examples in (1). On the other hand, the analyses of Larson (1988) and Schwarzschild and Wilkinson (2002) wrongly predict existential readings in all cases. Finally, the analyses of Heim (2006), Schwarzschild (2004, 2008) and van Rooij (2008) manage to derive both existential and universal meanings, but don't have an obvious way of predicting when and why we get which reading.

Our plan in this paper is as follows. In section 2 we consider three existing theories of comparatives and we show that the contrast between sentences like (1a) and (1b) is problematic for these theories, under the assumption that indefinites are treated as existential quantifiers. In section 3 we specify a more sophisticated analysis of indefinites in the framework of alternative semantics (Kratzer and Shimoyama 2002; Menéndez-Benito 2005), and in section 4 we integrate this treat-

[2] *Irgend*-indefinites, whether stressed or unstressed, are ungrammatical under clausal negation, although they are grammatical in other negative contexts. See Jäger (2008) for a possible explanation of this fact which is compatible with the analysis developed in this article.

ment of indefinites with the three accounts of comparatives discussed in section 2. In section 5, we further enrich the theoretical apparatus in order to account for stressed *irgend*-indefinites. One of the resulting theories, based on Heim's (2006) account of comparatives, will be able to deal with all the relevant data.

2 Three theories of comparatives

In this section we consider three theories of comparatives, which we take to be representative of the most prominent approaches in the literature on comparatives.

2.1 The I-theory

The first account of comparatives that we will consider is meant to capture the insights and predictions of the traditional theories of Seuren, von Stechow and Rullmann. On this account, the comparative morpheme, *-er*, is an operator that takes two degree properties and delivers a truth value.

(6) $[\![\text{-er}]\!] = \lambda P_{(dt)}.\lambda Q_{(dt)}.\ Q \supset P$

A plain comparative is then treated as follows:

(7) a. John is taller than Mary is.
b. [-er [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. λd. John is d tall $\supset \lambda d$. Mary is d tall

The sentence is true iff the set of degrees d such that John is d tall properly includes the set of degrees d such that Mary is d tall. This theory, which we will refer to as the *Inclusion Theory*, or *I-theory* for short, predicts universal meanings for existentials in the *than*-clause. This is correct for *any*, but not for *some*.

(8) a. John is taller than any girl is.
b. λd. John is d tall $\supset \lambda d$. some girl is d tall [**ok**]

(9) a. John is taller than some girl is.
b. λd. John is d tall $\supset \lambda d$. some girl is d tall [**wrong**]

While existentials in *than*-clauses are predicted to get universal readings, universals are predicted to get existential readings. This prediction is clearly problematic.

(10) a. John is taller than every girl is.
b. λd. John is d tall $\supset \lambda d$. every girl is d tall [**wrong**]

To generate the right readings, the I-theory has to assume that quantifiers (and *some*-indefinites) scope out of *than*-clauses. This assumption, however, is problematic since *than*-clauses otherwise behave like scope islands. Thus, the I-theory overgenerates—predicting certain readings that are in fact not attested—and under the assumption that *than*-clauses are scope islands, it also undergenerates—failing to predict certain readings that are in fact attested.

2.2 The N-theory

The second theory we will consider is intended to capture the insights and predictions of the account proposed by Schwarzschild (2008). One prominent feature of this theory is that it assumes a negation operator within the *than*-clause. We therefore refer to it as the *Negation Theory*, or *N-theory* for short.[3] The comparative morpheme is again treated as an operator that takes two degree properties and delivers a truth value.

(11) $[\![\text{-er}]\!] = \lambda P_{(dt)}.\lambda Q_{(dt)}.\ max(Q) \in P$

A plain comparative is analyzed as follows, with ¬ placed within the *than*-clause.

(12) a. John is taller than Mary is.
b. [-er [$\lambda_{1,d}$ ¬[Mary is $t_{1,d}$ tall]]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. $max(\lambda d.$ John is d tall$) \in \lambda d.$ Mary is **not** d tall

Existential readings are now predicted for existentials in *than*-clauses, and universal readings for universals.

(13) a. John is taller than some girl is.
b. $max(\lambda d.$ John is d tall$) \in \lambda d.$ some girl is **not** d tall [**ok**]

(14) a. John is taller than every girl is.
b. $max(\lambda d.$ John is d tall$) \in \lambda d.$ every girl is **not** d tall [**ok**]

The universal interpretation of *any*-indefinites can be obtained in this theory by assuming that *any*-indefinites take scope under negation:

(15) a. John is taller than any girl is. [**ok**]
b. $max(\lambda d.$ John is d tall$) \in \lambda d.$ it is **not** the case that some girl is d tall

Thus, all the attested readings can be derived, which means that the undergeneration problem does not arise anymore. However, as long as the scope of *some* and *any* w.r.t. negation is allowed to vary, the theory also generates readings that are in fact not attested. Thus, the overgeneration problem remains. Below we will discuss to what extent the necessary scope restrictions may be derived from independently motivated principles.

2.3 The Π-theory

The third theory we will consider is that of Heim (2006), to which we will refer (for reasons to become clear shortly) as the Π-theory. We will review this theory in somewhat more detail than the previous two; this will help in understanding some of the arguments to be made later on. First of all, Heim assumes that a simple comparative like (16a) has (16b) as its basic syntactic representation.

(16) a. John is taller than Mary is.
b. [John is [Π [-er than Mary is [Π $\emptyset$] tall]] tall]

[3] Gajewski (2008) calls it the *Maximality Theory*.

Notice that, unlike the theories sketched above, Heim assumes that an adjective's degree argument slot always hosts a special operator, denoted as Π, which combines with whatever is traditionally generated in this slot. For instance, in the *than*-clause, the degree argument position of the adjective is traditionally taken to be occupied by a semantically and phonologically vacuous *wh*-element, here denoted as $\emptyset$. Heim assumes instead that this position is occupied by [Π $\emptyset$]. Similarly, in the main clause of the comparative, where the degree argument position of the adjective is traditionally taken to be occupied by a phrase of the form [-er [*than*-clause]], Heim assumes instead a phrase of the form [Π [-er [*than*-clause]]].

Heim refers to these phrases that occupy the degree arguments slots of adjectives as Π-phrases. The reason why she assumes this more articulated structure of degree argument slots is that it creates more flexibility to account for different scope patterns. More specifically, Π-phrases, treated as generalized quantifiers over degrees, can move out of their base position to take non-local scope and thereby allow us to derive otherwise unexpected scope patterns.

To see more concretely how this works, we need to specify the semantic contribution of each relevant lexical item that Heim assumes:

- *tall* is a relation between individuals and degrees of height, of type $d(et)$:
  $[\![tall]\!] = \lambda d.\lambda x.\ d \leq x$'s height
- *-er* is a relation between degrees, of type $d(dt)$:
  $[\![\text{-}er]\!] = \lambda d.\lambda d'.\ d' > d$
- *than* is a semantically vacuous operator of type (tt):
  $[\![than]\!] = \lambda p.\ p$
- $\emptyset$ is a semantically vacuous operator of type $((dt)t)((dt)t)$:
  $[\![\emptyset]\!] = \lambda Q_{(dt)t}.\ Q$
- Π is a relation between degree properties, of type $(dt)((dt)t)$:
  $[\![\Pi]\!] = \lambda P_{dt}.\lambda Q_{dt}.\ max(Q) \in P$

Given these assumptions concerning the semantic type and contribution of each lexical item, the basic syntactic representation of (16a) in (16b) is uninterpretable, due to several type-mismatches. Heim assumes that this triggers a sequence of movement operations. The complete derivation is given in (17)–(21). At each stage we have underlined the constituent that undergoes movement, and the types of the relevant traces and abstraction operators are given in subscript. We have omitted the semantically vacuous lexical item *than*. The final structure is also given in tree format in figure 1, with type specifications for all non-terminal nodes.

(17) [John is [Π [-er Mary is $\underline{[\Pi\ \emptyset]}$ tall]] tall]

(18) [John is [Π [-er [Π $\underline{\emptyset}$] [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]]] tall]

(19) [John is [Π [-er $\underline{[\emptyset\ [\lambda_{2,dt}\ [[\Pi\ t_{2,dt}]\ [\lambda_{1,d}\ \text{Mary is}\ t_{1,d}\ \text{tall}]]]]}$]] tall]

(20) [$\emptyset$ [$\lambda_{2,dt}$ [[Π $t_{2,dt}$] [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]]]] [$\lambda_{3,d}$ [John is $\underline{[\Pi\ [\text{-er}\ t_{3,d}]]}$ tall]]

(21) [$\emptyset$ [$\lambda_{2,dt}$ [[Π $t_{2,dt}$] [$\lambda_{1,d}$ M is $t_{1,d}$ tall]]]] [$\lambda_{3,d}$ [[Π [-er $t_{3,d}$]] [$\lambda_{4,d}$ J is $t_{4,d}$ tall]]]

Once this interpretable logical form is constructed by the appropriate movement operations, the denotation of the sentence is computed as follows (henceforth, we will use $\boldsymbol{\Pi}$ and **er** as an abbreviation of the meanings of Π and *-er*):

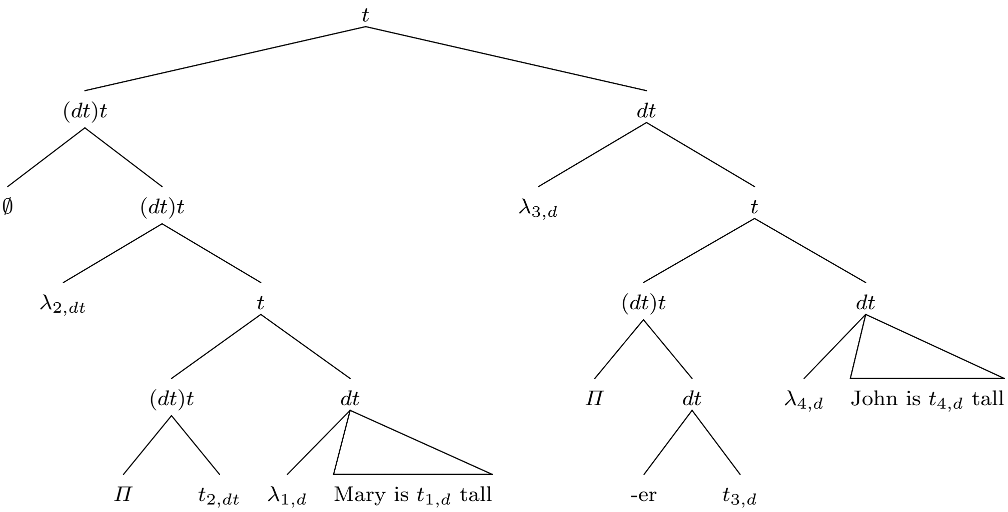


Fig. 1 The assumed logical form of (16a) in the Π-theory.

(22) John is taller than Mary is.

a. $\lambda P.[\boldsymbol{\Pi}(P)(\lambda d.T(m,d))](\lambda d.\boldsymbol{\Pi}(\mathbf{er}(d))(\lambda d'.T(j,d')))$
b. $\lambda P.[P(max(\lambda d.T(m,d)))](\lambda d.\mathbf{er}(d)(max(\lambda d'.T(j,d'))))$
c. $\lambda d.[\mathbf{er}(d)(max(\lambda d'.T(j,d')))](max(\lambda d.T(m,d)))$
d. $\mathbf{er}(max(\lambda d.T(m,d)))(max(\lambda d'.T(j,d')))$
e. $max(\lambda d'.T(j,d')) > max(\lambda d.T(m,d))$

Thus, (16a) is correctly predicted to be true just in case John's height exceeds Mary's height. A parallel derivation also delivers the right truth-conditions for comparatives with *any*-indefinites in the *than*-clause:

(23) John is taller than any girl is.

a. $\lambda P.[\boldsymbol{\Pi}(P)(\lambda d.\exists x.(G(x) \wedge T(x,d)))](\lambda d.\boldsymbol{\Pi}(\mathbf{er}(d))(\lambda d'.T(j,d')))$
b. $max(\lambda d'.T(j,d')) > max(\lambda d.\exists x.(G(x) \wedge T(x,d)))$

As desired, (23) is predicted to be true just in case John's height exceeds the highest degree to which at least one girl is tall. Finally, the Π theory is also able to derive the right truth-conditions for comparatives with *some* or *every* in the *than*-clause. However, this does require the additional assumption that these quantifiers are raised to take scope over the Π operator. Below we give the semantic derivation for a comparative with a *some*-indefinite in the *than*-clause. The assumed logical form is displayed in figure 2. The case of *every* and other quantifiers is analogous.

(24) John is taller than some girl is.

a. $\lambda P.[\lambda Q.[\exists x.G(x) \wedge Q(x)](\lambda x.\boldsymbol{\Pi}(P)(\lambda d.T(x,d)))](\lambda d.\boldsymbol{\Pi}(\mathbf{er}(d))(\lambda d'.T(j,d')))$
b. $\lambda Q.[\exists x.G(x) \wedge Q(x)](\lambda x.\boldsymbol{\Pi}(\lambda d.\mathbf{er}(d)(max(\lambda d'.T(j,d'))))(\lambda d.T(x,d)))$
c. $\lambda Q.[\exists x.G(x) \wedge Q(x)](\lambda x.\mathbf{er}(max(\lambda d.T(x,d)))(max(\lambda d'.T(j,d'))))$
d. $\lambda Q.[\exists x.G(x) \wedge Q(x)](\lambda x.max(\lambda d'.T(j,d')) > max(\lambda d.T(x,d)))$
e. $\exists x.G(x) \wedge max(\lambda d'.T(j,d')) > max(\lambda d.T(x,d))$

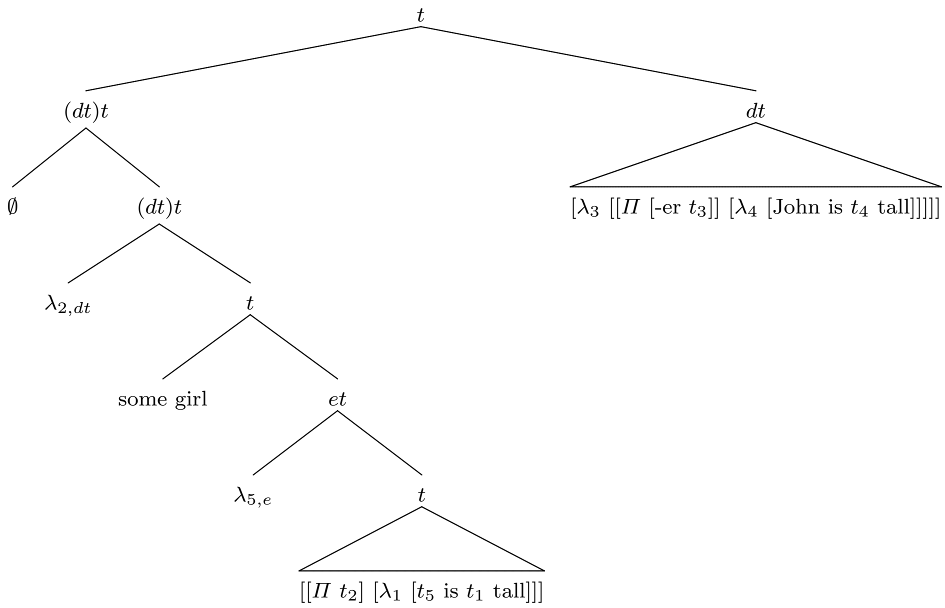


Fig. 2 The assumed logical form of (24) in the Π-theory.

Thus, both in the N-theory and in the Π-theory, universal meanings of indefinites are obtained by letting the indefinite scope under the relevant operator in the *than*-clause (negation or Π, respectively), and existential meanings are obtained by letting the indefinite scope over this operator. However, it is unclear why *any* should take narrow scope, while *some* and *every* should take wide scope. We could follow Heim (2006) and conjecture that scope is partly 'determined by the need for NPIs to be licensed' (Heim 2006, 21).[4] That is, we could assume that indefinites and quantifiers by default take scope over $\neg/\Pi$, but that NPIs violate this default rule in order to be licensed. As we know, *any* has negative polarity uses, so one could argue that this is why it must take scope under $\neg/\Pi$. However, this explanation would not extend to FC-*any* and other free choice items like Italian *qualunque*. As illustrated in the following examples, *qualunque* is a typical FCI (cf. example (2) from the introduction): it is felicitous in possibility statements (see (25)), but needs a post-nominal modifier to be licensed in episodic contexts (see (26)-(27)).

(25) Gianni può baciare qualunque ragazza.
John can kiss QUALUNQUE girl
'John can kiss any girl'

(26) #Gianni baciò qualunque ragazza.
John kissed QUALUNQUE girl
'John kissed any girl'

[4] Heim shows that Π, like negation, creates a DE environment, which presumably licenses NPIs.

(27) Gianni baciò qualunque ragazza con un cappello rosso.
John kissed QUALUNQUE girl with a hat red
'John kissed any girl with a red hat.'

Italian *qualunque* can further occur in comparatives, with universal meaning (see (28)), but is ungrammatical in negative contexts (see (29)), and therefore is arguably not an NPI.

(28) Gianni è più alto di qualunque altro ragazzo della sua classe.
John is more tall of QUALUNQUE other boy of his class
'John is taller than any other boy from his class'

(29) #Nessuno ha baciato qualunque ragazzo.
Nobody has kissed QUALUNQUE boy
'Nobody has kissed any boy'

To summarize, in the N- and Π-theories, universal meanings of indefinites are obtained by letting the indefinite scope under $\neg/\Pi$. However, this is unmotivated for genuine FCIs. The I-theory accounts for universal readings of indefinites in comparatives without stipulation. However, existential readings can only be obtained by letting existential quantifiers scope out of the *than*-clause, which is problematic since *than*-clauses otherwise behave like scope islands. Below we will re-implement these theories of comparatives in the framework of alternative semantics, and explore to what extent this resolves the encountered problems.

3 Indefinites in alternative semantics

Alternative semantics identifies the common meaning of various indefinite forms as their potential to introduce sets of propositional alternatives. Their difference in meaning and distribution derives from their necessary association with different matching operators. *Irgend*-indefinites have been assumed to associate with the existential propositional quantifier [∃] (Kratzer and Shimoyama 2002). We will make the same assumption for English *some*. In the illustrations below, we will assume that Sue and Mary are the only two girls in the relevant domain of quantification.

(30) a. John kissed some / irgendein girl.
b. [∃] (john kissed some/irgendein girl)
c. [∃] $\boxed{\text{John kissed Sue} \mid \text{John kissed Mary}}$
d. Predicted meaning: There is a girl that John kissed.

Free choice items like FC-*any* have been assumed to associate with a universal propositional quantifier [∀] and an exclusivity operator **excl** (Menéndez-Benito 2005; Menéndez-Benito 2010; Aloni 2007b). This licenses FC-*any* under $\Diamond$, and rules it out in episodic contexts. The exclusivity operator is defined as follows:[5]

(31) For any φ of type (st): $[\![\mathbf{excl}(\varphi)]\!] = \{\mathbf{excl}(\alpha, [\![\varphi]\!]) \mid \alpha \in [\![\varphi]\!]\}$
where: $\mathbf{excl}(\alpha, A) = \lambda w.\ w \in \alpha$ and for all $\beta \in A$ such that $\alpha \not\subset \beta$, $w \notin \beta$

[5] Independent motivation for this exclusivity operator is provided by recent analyses of disjunctive questions (Roelofsen and van Gool 2010; Pruitt and Roelofsen 2011, 2013).

To illustrate: if $[\![\varphi]\!] = \{$John kissed Sue, John kissed Mary$\}$ then $[\![\mathbf{excl}(\varphi)]\!] = \{$John kissed only Sue, John kissed only Mary$\}$. Crucially, **excl** delivers a set of mutually exclusive propositions. Thus, applying [∀] immediately after **excl**, as in (32), yields a contradiction. In (33) the modal operator 'intervenes,' which avoids the contradiction and delivers the desired universal free choice meaning.

(32) a. #John kissed any girl. <u>ruling out FC-*any* in episodic contexts</u>
b. [∀] **excl** (John kissed any girl)
c. [∀] $\boxed{\text{John kissed only Sue}}\boxed{\text{John kissed only Mary}}$ ⇒ contradiction

(33) a. John may have kissed any girl. <u>licensing FC-*any* under ◇</u>
b. [∀] ◇ **excl** (John kissed any girl)
c. [∀] $\boxed{\Diamond\ \text{John kissed only Sue}}\boxed{\Diamond\ \text{John kissed only Mary}}$
d. Predicted meaning: For every girl it is possible that J kissed only her.

4 Indefinites in comparatives

We will now implement the three theories of comparatives discussed above in alternative semantics. In this framework, all expressions denote sets, mostly singleton sets of traditional interpretations. We assume that semantic derivations make use of point-wise function application and alternative-friendly predicate abstraction as in Kratzer and Shimoyama (2002).[6] Here are some of the assumed denotations:

(34) a. $[\![\text{some girl}]\!] = \{m, s\}$
b. $[\![\text{tall}]\!] = \{\lambda d.\lambda x.\lambda w.T_w(x, d)\}$
c. $[\![\lambda_{i,d}\ \text{some girl is}\ t_{i,d}\ \text{tall}]\!] = \{\lambda d.\lambda w.T_w(m, d), \lambda d.\lambda w.T_w(s, d), \dots\}$

4.1 The I-theory

To implement the I-theory of comparatives in alternative semantics we assume that the comparative morpheme, *-er*, is an operator that takes two 'intensional' degree properties, of type $d(st)$, and delivers a proposition, of type (st).

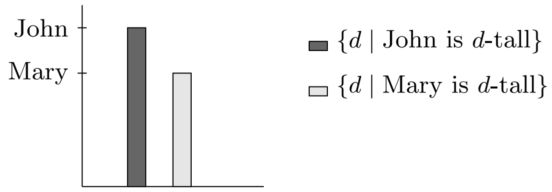
(35) $[\![\text{-er}]\!] = \{\lambda P_{d(st)}.\lambda Q_{d(st)}.\lambda w.[\lambda d.Q(d, w) \supset \lambda d.P(d, w)]\}$

A plain comparative is then treated as follows (semantically vacuous operators are omitted):

(36) a. John is taller than Mary is.
b. [-er [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. $\{\lambda w.[\lambda d.T_w(j, d) \supset \lambda d.T_w(m, d)]\}$

The sentence compares the set of degrees d such that John is d tall (the darkgray column) with the set of degrees d such that Mary is d tall (the lightgray column).

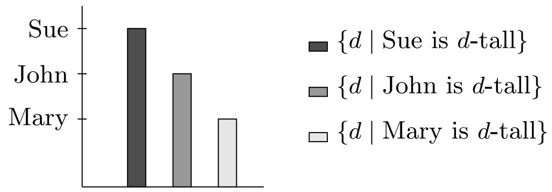
[6] As noticed by Kratzer and Shimoyama, the latter notion 'does not quite deliver the expected set of functions', but a larger set including many 'spurious' functions. See Shan (2004), Novel and Romero (2010), and Romero (2010) for discussion of this issue, and possible refinements. In the representations below we will disregard spurious functions; as far as we can see, they do not affect our predictions.



Next, consider a comparative with a *some*-indefinite in the *than*-clause.

(37) a. John is taller than some girl is.
b. [∃][-er [$\lambda_{1,d}$ some girl is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. The set of worlds w such that **at least one** of the following holds:
$\{d \mid \text{John is } d\text{-tall in } w\} \supset \{d \mid \textbf{Sue} \text{ is } d\text{-tall in } w\}$
$\{d \mid \text{John is } d\text{-tall in } w\} \supset \{d \mid \textbf{Mary} \text{ is } d\text{-tall in } w\}$
d. ⇒ for some girl y, John is taller than y

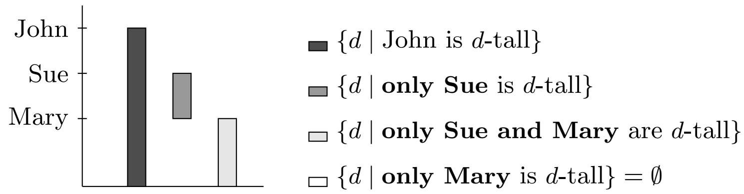
We saw that in the conventional I-theory, *some*-indefinites had to scope out of the *than*-clause in order to obtain an existential interpretation. In alternative semantics this is no longer necessary: we get a wide scope effect for the indefinite via the mechanism of propositional quantification, even though at the level of logical form the indefinite stays *in situ*. The sentence is true iff the set of degrees d such that John is d tall (the middle column in the diagram below) properly includes the set of degrees such that the shortest girl is d tall, in this case Mary (the rightmost column). Thus, an existential meaning is correctly predicted.



Finally, consider the case of *any*. We are assuming, following Menéndez-Benito (2005, 2010) and Aloni (2007b), that *any* associates with **excl** and [∀]. If moreover we assume that the set of alternatives introduced by *any girl* does not only include individual girls, like Sue and Mary, but also groups of girls, like Sue + Mary, then the right truth-conditions are derived.

(38) a. John is taller than any girl is.
b. [∀][-er [$\lambda_{1,d}$ **excl**[any girl is $t_{1,d}$ tall]]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. The set of worlds w such that **all** of the following hold:
$\{d \mid \text{John is } d\text{-tall in } w\} \supset \{d \mid \textbf{only Mary} \text{ is } d\text{-tall in } w\}$
$\{d \mid \text{John is } d\text{-tall in } w\} \supset \{d \mid \textbf{only Sue} \text{ is } d\text{-tall in } w\}$
$\{d \mid \text{John is } d\text{-tall in } w\} \supset \{d \mid \textbf{only Sue and Mary} \text{ are } d\text{-tall in } w\}$
d. ⇒ for every girl y, John is taller than y

The sentence is true iff the set of degrees to which John is tall (the leftmost, darkgray column in the diagram on the next page) properly contains the set of degrees to which only Sue is tall, the set of degrees to which only Mary is tall, and the set of degree to which only Sue and Mary are tall (the lighter gray columns). Thus, a universal meaning is correctly predicted.



This means that the current implementation of the I-theory in alternative semantics improves considerably on the conventional I-theory. In particular, the difference in quantificational force between (1a) and (1b) is predicted, and the Menèndez-Benito/Aloni account of FC-*any* under $\Diamond$ is extended to the case of comparatives: the comparative morpheme acts as a licensing 'intervener,' just like $\Diamond$.

4.2 The N-theory

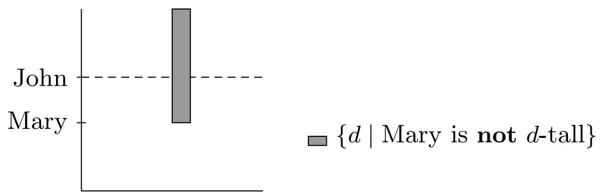
To implement the N-theory of comparatives in alternative semantics we again assume that the comparative morpheme is an operator that takes two intensional degree properties, of type $d(st)$, and delivers a proposition, of type (st).

(39) $[\![\text{-er}]\!] = \{\lambda P_{d(st)}.\lambda Q_{d(st)}.\lambda w.[max(\lambda d.Q(d,w)) \in \lambda d.P(d,w)]\}$

A plain comparative is analyzed as follows, with ¬ placed within the *than*-clause.

(40) a. John is taller than Mary is.
b. [-er [$\lambda_{1,d}$ ¬[Mary is $t_{1,d}$ tall]]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. $\{\lambda w.[max(\lambda d.T_w(j,d)) \in \lambda d.\neg T_w(m,d)]\}$

The sentence compares the maximal degree d such that John is d tall (the horizontal line) with the set of degrees d such that Mary is not d tall (the lightgray column).

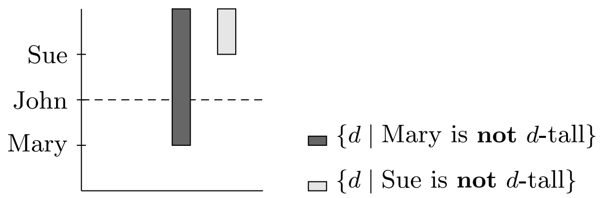


Next consider a comparative with a *some*-indefinite in the *than*-clause:

(41) a. John is taller than some girl is.
b. [∃][-er [$\lambda_{1,d}$ some girl[$\lambda_{3,e}$ ¬[$t_{3,e}$ is $t_{1,d}$ tall]]]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. The set of worlds w such that **at least one** of the following holds:
$max\{d$ | John is d-tall in $w\} \in \{d$ | **Mary** is **not** d-tall in $w\}$
$max\{d$ | John is d-tall in $w\} \in \{d$ | **Sue** is **not** d-tall in $w\}$

d. $\Rightarrow$ for some girl y, John is taller than y

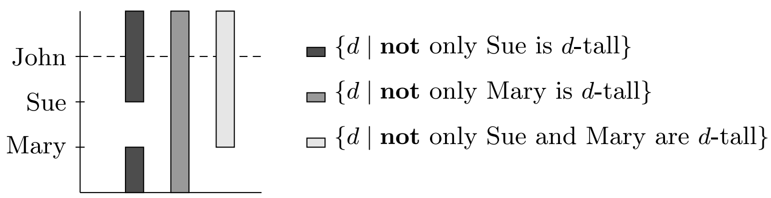
In this case, the maximal degree to which John is tall (the horizontal line) is compared with the set of degrees d such that Mary is not d tall, and the set of degrees d such that Sue is not d tall (the two columns). The sentence is true iff the line cuts through at least one of the columns. Thus, an existential reading is correctly derived.



We have assumed here that *some*, like ordinary quantifiers, scopes out of negation (this is especially clear in the representation in (41b)). However, it is important to note that this assumption is not really necessary. If we had left *some* in situ, in the scope of negation, we would have obtained exactly the same result.

We don't have this liberty in the case of *any*. Here we have to leave *any* in the scope of negation—otherwise wrong truth conditions obtain. Again, for this case we have to assume a plural domain of individuals.

(42) a. John is taller than any girl is.
b. $[\forall]$[-er $[\lambda_{1,d}\ \neg$[**excl**[any girl is $t_{1,d}$ tall]]]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. The set of worlds w such that **all** of the following hold:
$max\{d \mid$ John is d-tall in $w\} \in \{d \mid$ **not** only Sue is d-tall in $w\}$
$max\{d \mid$ John is d-tall in $w\} \in \{d \mid$ **not** only Mary is d-tall in $w\}$
$max\{d \mid$ John is d-tall in $w\} \in \{d \mid$ **not** only S and M are d-tall in $w\}$
d. $\Rightarrow$ for every girl y, John is taller than y



Thus, the N-theory can account for the licensing of *any* in comparatives, and for the difference in quantificational force between *some* and *any*, but we do need to stipulate that *any* takes scopes under negation.

4.3 The *Π*-theory

To implement the *Π*-theory in alternative semantics we assume that the comparative morpheme is an operator that takes two degree concepts, of type (sd), and delivers a proposition, of type (st).

(43) $[\![\text{-er}]\!] = \{\lambda a.\lambda a'.\lambda w.[a'(w) > a(w)]\}$

$\mathit{\Pi}$ now takes one argument of type $(sd)(st)$ and another argument of type $d(st)$, and delivers a proposition of type (st).

(44) $[\![\mathit{\Pi}]\!] = \{\lambda P_{(sd)(st)}.\lambda Q_{d(st)}.P(\lambda w.max(\lambda d.Q(d,w)))\}$

A plain comparative, then, is analyzed as follows (in all representations below, t_1 and t_4 are of type d; t_2 (and P) are of type $(sd)(st)$; and t_3 (and a) are of type (sd)).

(45) a. John is taller than Mary is.
b. $[\lambda_2[\mathit{\Pi}\ t_2[\lambda_1 \text{ M is } t_1 \text{ tall}]]][\lambda_3[\mathit{\Pi}[\text{-er } t_3][\lambda_4 \text{ J is } t_4 \text{ tall}]]]$
c. $\{\lambda P.[\boldsymbol{\Pi}(P)(\lambda d.\lambda w.T_w(m,d))](\lambda a.[\boldsymbol{\Pi}(\mathbf{er}(a))(\lambda d.\lambda w.T_w(j,d))])\} =$
$\{\lambda w.[max(\lambda d.T_w(j,d)) > max(\lambda d.T_w(m,d))]\}$

Comparatives with *some*-indefinites get existential meanings, as desired. In the representation below we take it that *some* scopes over $\mathit{\Pi}$, but the same result would obtain if we took *some* to scope under $\mathit{\Pi}$.

(46) a. John is taller than some girl is.
b. $[\exists][\lambda_2 \text{ some girl}[\lambda_5[\mathit{\Pi}\ t_2[\lambda_1\ t_5 \text{ is } t_1 \text{ tall}]]]][\lambda_3[\mathit{\Pi}[\text{-er } t_3][\lambda_4 \text{ J is } t_4 \text{ tall}]]]$
c. The set of worlds w such that **at least one** of the following holds:
$max\{d \mid \text{John is } d\text{-tall in } w\} > max\{d \mid \textbf{Mary} \text{ is } d\text{-tall in } w\}$
$max\{d \mid \text{John is } d\text{-tall in } w\} > max\{d \mid \textbf{Sue} \text{ is } d\text{-tall in } w\}$
d. $\Rightarrow$ for some girl y, John is taller than y

In the case of *any*, scope w.r.t. $\mathit{\Pi}$ does make a difference. Namely, if *any* takes scope under $\mathit{\Pi}$, as in (47), we obtain the desired universal meaning, with $\mathit{\Pi}$ intervening between $[\forall]$ and **excl**, just like $\Diamond$ in modal free choice constructions;[7] on the other hand, if *any* takes scope over $\mathit{\Pi}$, as in (48), we get a contradiction.

(47) a. John is taller than any girl is.
b. $[\forall][\lambda_2[\mathit{\Pi}\ t_2[\lambda_1\ \mathbf{excl}[\text{any girl is } t_1 \text{ tall}]]]][\lambda_3[\mathit{\Pi}[\text{-er } t_3][\lambda_4 \text{ J is } t_4 \text{ tall}]]]$
c. The set of worlds w such that **all** of the following hold:
$max\{d \mid \text{John is } d\text{-tall in } w\} > max\{d \mid \text{ only Sue is } d\text{-tall in } w\}$
$max\{d \mid \text{John is } d\text{-tall in } w\} > max\{d \mid \text{ only Mary is } d\text{-tall in } w\}$
$max\{d \mid \text{John is } d\text{-tall in } w\} > max\{d \mid \text{ only S and M are } d\text{-tall in } w\}$
d. $\Rightarrow$ for every girl y, John is taller than y

(48) a. John is taller than any girl is.
b. $[\forall][\lambda_2\mathbf{excl}[\text{any girl}[\lambda_5[\mathit{\Pi}\ t_2[\lambda_1\ t_5 \text{ is } t_1 \text{ tall}]]]]][\lambda_3[\mathit{\Pi}[\text{-er } t_3][\lambda_4 \text{ J is } t_4 \text{ tall}]]]$
c. $[\forall]\mathbf{excl}(\{\lambda x.\lambda w.[max(\lambda d.T_w(j,d)) > max(\lambda d.T_w(x,d))]\}([\![\text{any girl}]\!]))$
d. $\Rightarrow$ contradiction, no intervention between **excl** and $[\forall]$

The following table summarizes the merits of the three theories considered so far.

[7] Again, we have to assume a plural domain of individuals here. Moreover, the *max* function needs to be defined in such a way that $max(\emptyset) = 0$. We could say, for instance, that for every set of degrees D, $max(D)$ is the minimal degree that is greater than or equal to every degree in D (this is usually called the *supremum* of D). Then, indeed, $max(\emptyset) = 0$.

(49)

	some	*any*
I-theory	yes	yes
N-theory	yes	yes/no
Π-theory	yes	yes

All theories account for the contrast in quantificational force between (1a) and (1b), and for the licensing of FC-*any* in comparatives. The N-theory, however, overgenerates: without further stipulations, it predicts a reading for comparatives with *any* that is not attested. In order to avoid this reading, we are forced to assume that *any* has to take scope under negation. This assumption may be justified for NPI uses of *any*, but not for FC-*any* and other free choice items that exhibit the same behavior in comparatives. In the Π-theory we also have to assume that *any* takes scope under Π, but in this case we have a ready explanation: the alternative representation with *any* taking scope over Π yields a contradiction.

Thus, it seems fair to conclude at this point that the I-theory and the Π-theory are the most promising theories. We now turn to *irgend*-indefinites.

5 Irgend-indefinites: the crucial role of stress

Kratzer and Shimoyama (2002) assume that *irgend*-indefinites, like *some*, associate with [∃]. However, *irgend*-indefinites in comparatives can give rise to universal readings, as exemplified in (1c) in the beginning of the paper, here repeated as (50).

(50) Michael ist größer als IRGENDEIN Mitschüler in seiner Klasse.
Michael is taller than IRGENDEIN schoolmate in his class.
'Michael is taller than anyone in his class.'

How can such universal readings be derived? The crucial observation, we suggest, is that *irgend*-indefinites in comparatives must be stressed in order to yield a universal reading (Haspelmath 1997). The same is true for free choice uses of *irgend*-indefinites under modals, as was illustrated in example (4) in the introduction, repeated here as (51).

(51) Dieses Problem kann IRGEND JEMAND lösen.
this problem can IRGEND someone solve
'This problem can be solved by anyone'

Stressed *irgendein* is also felicitous in negative contexts, where it conveys a domain widening effect, but is not licensed in episodic sentences (unless stress is justified by independent contextual factors), as illustrated in (52) and (53) respectively:

(52) Niemand hat IRGENDEINE Frage beantwortet.
nobody has IRGENDEINE question answered
'Nobody answered ANY question'

(53) #IRGENDJEMAND hat angerufen.
IRGENDJEMAND has called
'Anyone called'

To explain these facts we will assume that stress signals focus, and that focus has the following three effects:

(i) it introduces a set of focus alternatives (Rooth 1985);
(ii) it *flattens* the ordinary alternative set;
(iii) it signals domain widening.

Effect (i) can be used to derive the free choice inferences of stressed *irgend*-indefinites under modals as anti-exhaustivity implicatures á la Kratzer and Shimoyama (2002) with the focus alternatives as the relevant set of alternatives.[8] On the other hand, we will see below that (ii) yields an account of the universal interpretation of stressed *irgend*-indefinites in comparatives. Under the additional (commonplace) assumption that domain widening is justified only if it does not yield a weaker statement (e.g., Kadmon and Landman 1993), we can further explain why stressed *irgendein* is out in episodic sentences, but licensed in negative contexts, and in constructions where it conveys a universal meaning: domain widening leads to a weaker statement in the former but not in the latter.

Before articulating our analysis of *irgend*-indefinites in comparatives in more detail, let us first briefly discuss some independent motivation for the assumption that focus flattens the ordinary alternative set. This motivation comes from the domain of disjunctive questions, as analyzed by Roelofsen and van Gool (2010).[9]

5.1 Focus in disjunctive questions

Consider the disjunctive question in (54):

(54) Did Ann or Bill play the piano?

This question can be interpreted in at least two ways. Namely, on the one hand, it can be interpreted as an ordinary *polar question*, which just happens to contain a disjunction. In this case, the responder is expected to confirm or deny that Ann or Bill played the piano (e.g, by answering *yes* or *no*). On the other hand, (54) may also be interpreted as an *alternative question.* In this case, the responder is expected to confirm that Ann played the piano, or to confirm that Bill played the piano (which cannot be done by answering *yes* or *no*).[10]

In English, disjunctive questions can be disambiguated by means of intonation. When intended as an alternative question, (54) is typically pronounced with stress on both disjuncts. When intended as a polar question, the sentence is typically pronounced without placing stress on both individual disjuncts. This observation has been made by many authors (see, e.g., the references in footnote 9), and the conclusion that is usually drawn from it is that the compositional semantics of disjunctive questions must operate in such a way that an alternative question interpretation is only derived if both individual disjuncts carry a focus feature.

[8] The same mechanism could be applied to derive free choice inferences of focused *any*-indefinites under modals, as in *John may kiss anybody$_F$*. The application of [∀] would be vacuous in this case (thanks to Luka Crnič for this observation).

[9] Several alternative analyses of the role of focus in disjunctive questions exist as well (e.g., von Stechow 1991; Aloni and van Rooij 2002; Han and Romero 2004; Beck and Kim 2006; Balogh 2009; Haida 2010; Pruitt and Roelofsen 2011; Biezma and Rawlins 2012). For a recent overview and comparison of these approaches see Pruitt and Roelofsen (2013).

[10] Roelofsen and van Gool (2010) distinguish a third interpretation as well, which they call an *open question* interpretation. However, the existence of this interpretation is not directly relevant for our purposes here and will therefore be left out of consideration.

Phonologically, these focus features are responsible for the fact that both individual disjuncts are stressed. Semantically, they are (at least partially) responsible for the way in which alternative question interpretations differ from polar question interpretations, in particular in terms of the responses that they elicit.

Note that there is another important intonational difference between alternative questions and polar disjunctive questions as well. Namely, the final pitch contour of alternative questions is always falling, while the final pitch contour of polar disjunctive questions, like that of polar questions in general, is typically rising. It has been shown experimentally that this intonational feature plays a crucial role in disambiguation, in fact more so than the stress pattern on the disjunctive phrase itself (Pruitt and Roelofsen 2013). Let us assume, then, streamlining the analysis of Roelofsen and van Gool (2010) somewhat, that an interrogative clause is headed by either one of two interrogative operators, Q$\downarrow$ or Q$\uparrow$. If it is headed by Q$\downarrow$, then it is pronounced with a final fall, and if it is headed by Q$\uparrow$, then it is pronounced with a final rise. Semantically, a final fall is taken to signal that the question presents a 'closed' list of alternatives, which are presupposed to be mutually exclusive and to jointly exhaust the space of available possibilities. On the other hand, a final rise signals that the question presents an 'open' list of alternatives, and elicits a response that locates the actual world either inside one of the given alternatives, or outside all of them, i.e., in the complement of their union.

Formally, Q$\downarrow$ takes a set of alternatives A, applies the exclusivity operator **excl** of Menéndez-Benito (2005) to it, and generates the presupposition that the actual world is located inside one the alternatives in $\mathbf{excl}(A)$. On the other hand, when Q$\uparrow$ applies to a set of alternatives A, it just adds the complement of $\bigcup A$ as an additional alternative.

Now consider the following three syntactic representations of the disjunctive question in (54):

(55)	a.	Q$\uparrow$ [Ann or Bill played the piano]$_{\mathrm{F}}$	$\Rightarrow$ polar question
	b.	Q$\uparrow$ [Ann or Bill]$_{\mathrm{F}}$ played the piano	$\Rightarrow$ polar question
	c.	Q$\downarrow$ [Ann]$_{\mathrm{F}}$ or [Bill]$_{\mathrm{F}}$ played the piano	$\Rightarrow$ alternative question

Note that (55a) is headed by Q$\uparrow$ and has broad focus; (55b) is also headed by Q$\uparrow$ but has narrow focus on the disjunctive phrase; finally, (55c) is headed by Q$\downarrow$ and has even narrower focus on each individual disjunct.

What we want to derive is that (55a) and (55b) yield a polar question interpretation, while (55c) yields an alternative question interpretation. Roelofsen and van Gool (2010) obtain this result by assuming that the semantic contribution of focus (besides generating focus alternatives) is to *flatten* the ordinary alternative set.

Let us make this somewhat more precise, first for the case where focus applies to a constituent φ of type (st). In this case, every element of $[\![\varphi]\!]$ is a set of possible worlds, and focus collapses all these sets into one big set. That is, $[\![\varphi_{\mathrm{F}}]\!]$ is a singleton set, consisting of the *union* of all the elements of $[\![\varphi]\!]$:[11]

[11] This operation is called *non-inquisitive closure* in inquisitive semantics (see, e.g., Groenendijk and Roelofsen 2009; Ciardelli 2009), and *existential closure* in alternative semantics (see, e.g., Kratzer and Shimoyama 2002).

(56) If φ is of type (st), then:

$$[\![\varphi_{\mathrm{F}}]\!] := \{\bigcup[\![\varphi]\!]\}$$

With this definition in hand, we can compute the semantic value of (55a), where focus applies to a constituent of type (st).

(57) a. $[\![\text{Ann or Bill}]\!] = \{\mathsf{Ann}, \mathsf{Bill}\}$

b. $[\![\text{Ann or Bill played}]\!] = \left\{ \begin{array}{c} \lambda w.\mathsf{played}(\mathsf{Ann})(w), \\ \lambda w.\mathsf{played}(\mathsf{Bill})(w) \end{array} \right\}$

c. $[\![[\text{Ann or Bill played}]_{\mathrm{F}}]\!] = \{\lambda w.\mathsf{played}(\mathsf{Ann})(w) \vee \mathsf{played}(\mathsf{Bill})(w)\}$

d. $[\![\mathrm{Q}\!\uparrow [\text{Ann or Bill played}]_{\mathrm{F}}]\!] = \left\{ \begin{array}{c} \lambda w.\mathsf{played}(\mathsf{Ann})(w) \vee \mathsf{played}(\mathsf{Bill})(w), \\ \lambda w.\neg(\mathsf{played}(\mathsf{Ann})(w) \vee \mathsf{played}(\mathsf{Bill})(w)) \end{array} \right\}$

As desired, we get a set of two alternatives: one is the set of all worlds where either Ann or Bill played the piano, while the other is the set of worlds where neither of them played.

In order to compute the semantic value of (55b) and (55c), we have to specify what the semantic contribution of focus is when the constituent φ that it applies to is of some type σ that is different from (st). In this case the elements of $[\![\varphi]\!]$ are not sets of possible worlds, so it is not guaranteed that we can simply take their union. However, following e.g. Partee and Rooth (1983), we can always take their 'generalized union':

(58) If φ is of some type σ, different from (st), then:

$[\![\varphi_{\mathrm{F}}]\!] := \{\lambda z. \bigcup_{\alpha \in [\![\varphi]\!]} z(\alpha)\}$ where z is a variable of type $(\sigma(st))$

For our examples, the relevant case is the one where φ is of type e. In this particular case, we have:

(59) $[\![\varphi_{\mathrm{F}}]\!] := \{\lambda P. \bigcup_{\alpha \in [\![\varphi]\!]} P(\alpha)\}$ where P is a variable of type $(e(st))$

We are now ready to compute the semantic value of (55b) and (55c), which is done in (60) and (61), respectively.

(60) a. $[\![\ [\text{Ann or Bill}]_{\mathrm{F}} \text{ played }]\!] = \{\lambda w.\mathsf{played}(\mathsf{Ann})(w) \vee \mathsf{played}(\mathsf{Bill})(w)\}$

b. $[\![\ \mathrm{Q}\!\uparrow [\text{Ann or Bill}]_{\mathrm{F}} \text{ played }]\!] = \left\{ \begin{array}{c} \lambda w.\mathsf{played}(\mathsf{Ann})(w) \vee \mathsf{played}(\mathsf{Bill})(w), \\ \lambda w.\neg(\mathsf{played}(\mathsf{Ann})(w) \vee \mathsf{played}(\mathsf{Bill})(w)) \end{array} \right\}$

(61) a. $[\![\ [\text{Ann}]_{\mathrm{F}} \text{ or } [\text{Bill}]_{\mathrm{F}} \text{ played }]\!] = \left\{ \begin{array}{c} \lambda w.\mathsf{played}(\mathsf{Ann})(w), \\ \lambda w.\mathsf{played}(\mathsf{Bill})(w) \end{array} \right\}$

b. $[\![\ \mathrm{Q}\!\downarrow [[\text{Ann}]_{\mathrm{F}} \text{ or } [\text{Bill}]_{\mathrm{F}} \text{ played}]\ ]\!] = \left\{ \begin{array}{c} \lambda w.\mathsf{played}(\mathsf{Ann})(w) \wedge \neg\mathsf{played}(\mathsf{Bill})(w), \\ \lambda w.\mathsf{played}(\mathsf{Bill})(w) \wedge \neg\mathsf{played}(\mathsf{Ann})(w)) \end{array} \right\}$

In the case of (55b) we obtain the same two alternatives as in (55a). However, in the case of (55c), we obtain two different alternatives: one is the set of worlds where Ann played the piano and Bill didn't, and the other alternative is the set of worlds where Bill played the piano and Ann didn't. Moreover, we also derive a presupposition in this case, due to Q↓, to the effect that these two alternatives exhaust the space of available possibilities, i.e., to the effect that exactly one of Ann and Bill played the piano.

Notice that the interaction between disjunction and focus is crucial here. Intuitively, in (55a) and (55b) the alternatives generated by disjunction are subsequently collapsed into one big alternative by focus, while in (55c), focus applies *before* disjunction, which means that its semantic effect is vacuous and that the alternatives generated by disjunction are no longer collapsed.

Inevitably, we have glossed over several aspects of the analysis of disjunctive questions of Roelofsen and van Gool (2010). However, we hope to have illustrated the analysis in enough detail to furnish some independent motivation for the assumption that focus, besides generating focus alternatives, also flattens the ordinary semantic value of the constituent that it applies to. With this independent motivation in hand, we now turn to our main concern in this section: the analysis of *irgend*-indefinites in comparatives.

5.2 Focus on *irgend*-indefinites in comparatives

To see how the proposed analysis of focus applies to sentences involving *irgend*-indefinites, first consider the following two simple examples, both involving an *irgend*-indefinite, one without focus, the other with.

(62) Irgendjemand called.
 a. Alternative set: {Mary called, Sue called, ...}
 b. Focus value: $\emptyset$

(63) Irgendjemand$_{\mathrm{F}}$ called.
 a. Alternative set: {somebody called} [result of 'flattening']
 b. Focus value: {Mary called, Sue called, ...}

Here is the full derivation for the alternative set in (63a) (where P is of type $e(st)$ and our domain consists only of people):

(64) $[\![\text{irgendjemand}_{\mathrm{F}}]\!]([\![\text{called}]\!])$
 $= \{\lambda P. \bigcup_{y \in [\![\text{irgendjemand}]\!]} P(y)\}(\{\lambda x.\lambda w.\mathsf{called}(x)(w)\})$ [pointwise FA]
 $= \{\bigcup_{y \in [\![\text{irgendjemand}]\!]} \lambda w.\mathsf{called}(y)(w)\}$
 $= \{\lambda w.\exists y.\mathsf{called}(y)(w)\}$

If we assume that focus induces flattening of the alternative set we obtain an account for the universal meaning of stressed *irgend*-indefinites in comparatives. For the I-theory, the result is straightforward, for the N-theory and Π-theory we need the extra assumption that *irgend*-indefinites always scope under the covert negation / Π operator. Stressed *irgend*-indefinites are arguably NPIs (felicitous in DE contexts, but out in episodic sentences), so this scopal behavior would follow from Heim's conjecture. However, as noted in Footnote 2, *irgend*-indefinites are ungrammatical under clausal negation, whether stressed or not. This could be considered an additional argument favoring the Π-theory over the N-theory.[12]

[12] We provide a full derivation for example (65), the other two cases are derived in a similar way. Step (d) is the crucial step:

 a. $[\![\text{tall}]\!] = \{\lambda d.\lambda y.\lambda w.T_w(y, d)\}$

(65) **I-theory**

a. John is taller than IRGENDJEMAND$_F$ is.
b. [∃][-er [$\lambda_{1,d}$ irgendjemand$_F$ is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. $\lambda w.[\lambda d.T_w(j,d) \supset \lambda d.\exists x.T_w(x,d)]$
d. $\Rightarrow$ for every person x, John is taller than x

(66) **N-theory**

a. John is taller than IRGENDJEMAND$_F$ is.
b. [∃][-er [$\lambda_{1,d}\neg$[irgendjemand$_F$ is $t_{1,d}$ tall]]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. $\lambda w.[max(\lambda d.T_w(j,d)) \in \lambda d.\neg\exists x.T_w(x,d)]$
d. $\Rightarrow$ for every person x, John is taller than x

(67) ***Π*-theory**

a. John is taller than IRGENDJEMAND$_F$ is.
b. [∃][λ_2[Π t_2[λ_1[irgendjemand$_F$ is t_1 tall]]]][λ_3[Π[-er t_3][λ_4 J is t_4 tall]]]
c. $\lambda w.[max(\lambda d.T_w(j,d)) > max(\lambda d.\exists x.T_w(x,d))]$
d. $\Rightarrow$ for every person x, John is taller than x

The question that arises next is what happens if we stress *someone* in a *than*-clause? Even if stressed, *some*-indefinites never yield a universal interpretation.

(68) a. John is taller than IRGENDJEMAND$_F$ is. [universal meaning]
b. John is taller than SOMEONE$_F$ is. [existential meaning]

The I-theory cannot distinguish between these two cases, and makes the wrong predictions for (68b). The N-theory and the *Π*-theory do make the right predictions, under the assumption that *someone* scopes over the covert negation / *Π* operator.

(69) **I-theory**

a. John is taller than SOMEONE$_F$ is.
b. [∃][-er [$\lambda_{1,d}$ someone$_F$ is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]
c. $\bigcup\{\lambda w.[\lambda d.T_w(j,d) \supset \lambda d.\exists x.T_w(x,d)]\}$
d. $\Rightarrow$ for every person x, John is taller than x [**wrong**]

---

b. $[\![t_{1,d}$ tall$]\!] = \{\lambda y.\lambda w.T_w(y,d_1)\}$
c. $[\![$irgendjemand$]\!] = \{m, s\}$ [assuming a domain consisting of just m and s]
d. $[\![$irgendjemand$_F$ is $t_{1,d}$ tall$]\!]$
$= \{\lambda P.\bigcup_{x\in[\![\text{irgendjemand}]\!]} P(x)\}(\{\lambda y.\lambda w.T_w(y,d_1)\})$ [pointwise FA]
$= \{\bigcup_{x\in[\![\text{irgendjemand}]\!]} \lambda w.T_w(x,d_1)\}$
$= \{\lambda w.\exists x.T_w(x,d_1)\}$
e. $[\![\lambda_{1,d}$ irgendjemand$_F$ is $t_{1,d}$ tall$]\!] = \{\lambda d.\lambda w.\exists x.T_w(x,d)\}$
f. $[\![\lambda_{2,d}$ John is $t_{2,d}$ tall$]\!] = \{\lambda d.\lambda w.T_w(j,d)\}$
g. $[\![$-er$]\!] = \{\lambda P_{d(st)}.\lambda Q_{d(st)}.\lambda w.[\lambda d.Q(d,w) \supset \lambda d.P(d,w)]\}$
h. $[\![$[-er [$\lambda_{1,d}$ irgendjemand$_F$ is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]$]\!]$
$=\{\lambda P_{d(st)}.\lambda Q_{d(st)}.\lambda w.[\lambda d.Q(d,w) \supset \lambda d.P(d,w)]\}$ $(\{\lambda d.\lambda w.\exists x.T_w(x,d)\})$
$(\{\lambda d.\lambda w.T_w(j,d)\})$ [pointwise FA]
$= \{\lambda w.[\lambda d.T_w(j,d) \supset \lambda d.\exists x.T_w(x,d)]\}$
i. $[\![$[∃][-er [$\lambda_{1,d}$ irgendjemand$_F$ is $t_{1,d}$ tall]][$\lambda_{2,d}$ John is $t_{2,d}$ tall]$]\!]$
$= \lambda w.[\lambda d.T_w(j,d) \supset \lambda d.\exists x.T_w(x,d)]$

(70) **N-theory**

a. John is taller than $\text{SOMEONE}_{\text{F}}$ is.
b. $[\exists][\text{-er } [\lambda_{1,d} \text{ someone}_{\text{F}}[\lambda_{3,e}\neg[t_{3,e} \text{ is } t_{1,d} \text{ tall}]]]][\lambda_{2,d} \text{ John is } t_{2,d} \text{ tall}]$
c. $\bigcup\{\lambda w.[max(\lambda d.T_w(j,d)) \in (\lambda d.\exists x.\neg T_w(x,d))]\}$
d. $\Rightarrow$ for at least one person x, John is taller than x **[ok]**

(71) ***Π*-theory**

a. John is taller than $\text{SOMEONE}_{\text{F}}$ is.
b. $[\exists][\lambda_2 \text{ someone}_{\text{F}}[\lambda_5[\Pi\ t_2[\lambda_1\ t_5 \text{ is } t_1 \text{ tall}]]]][\lambda_3[\Pi[\text{-er } t_3][\lambda_4 \text{ J is } t_4 \text{ tall}]]]$
c. $\bigcup\{\lambda w.\exists x.[max(\lambda d.T_w(j,d)) > max(\lambda d.T_w(x,d))]\}$
d. $\Rightarrow$ for at least one person x, John is taller than x **[ok]**

Thus, the predictions of the three theories are summarized in the following table:

(72)

	some	*any*	IRGEND	SOME
I-theory	yes	yes	yes	no
N-theory	yes	yes/no	yes/no	yes
***Π*-theory**	yes	yes	yes	yes

The I-theory wrongly predicts universal meaning for stressed *some* in comparatives. The predictions of the N-theory are correct but rely on the assumption that while *some* has to take scope over the covert negation operator, FC *any* and *irgend*-indefinites must take scope under it. This assumption is unjustified: it is unclear why FCIs should scope under negation in general, and it is particularly unnatural to assume that *irgend*-indefinites scope under the covert negation operator, since they are ungrammatical under overt clausal negation.

The Π theory is most satisfactory: *some* (like ordinary quantifiers) must take scope over Π, while stressed *irgend*-indefinites must take scope under Π because they are NPIs and, as shown by Heim (2006), Π creates a downward entailing environment. Finally, FC-*any* and other genuine free choice items must scope under Π, because they would otherwise yield a contradiction.[13]

We would like to conclude this section by briefly mentioning another possible way of implementing Heim's theory in an alternative semantics. This implementation employs Aloni's (2007b) notion of exhaustification, **exh**, which generalizes Menéndez-Benito's **excl** operator in order to account for subtrigging cases (see example (2c)). In the Π-theory formulated above, the **excl** operator triggered by FC-*any* occurs in the scope of the operator *max*, which is introduced as part of the meaning of Π (see example (47)). The central idea behind the alternative implementation would be to employ the operator **exh**, which can not only be seen as a generalization of **excl** but also of *max*. We would assume, then, that: (i) comparatives employ **exh** in their logical form (cf. Jacobson 1995; Beck 2010) rather than *max* in their semantics (Π is now of type $((sd)(st))((sd)(st))$, and again semantically vacuous operators are omitted):

(73) a. John is taller than Mary is.
b. $[\lambda_2[\Pi\ t_2[\mathbf{exh}[\lambda_1 \text{ M is } t_1 \text{ tall}]]]][\lambda_3[\Pi\ [\text{-er } t_3]\ [\mathbf{exh}[\lambda_4 \text{ J is } t_4 \text{ tall}]]]]$

and (ii) *any* requires the application of **exh**, rather than **excl**, as in Aloni (2007b):

[13] It should be noted that the Π-theory does encounter problems with negative indefinites and DE items. We refer to Gajewski (2008) for discussion.

(74) $[\forall] \ldots \mathbf{exh} \ldots$ *any* ...

FCIs are then licensed in comparatives precisely because comparatives employ the operator that FCIs are dependent on. Furthermore we have a straightforward explanation of why FCIs must take narrow scope in comparative clauses, otherwise they would fall out of the scope of their licensing operator **exh**.

(75) John is taller than any girl is.

a. $[\lambda_2[\Pi\ t_2[\mathbf{exh}[\lambda_1$ any girl is t_1 tall$]]]][\lambda_3[\Pi$[-er $t_3]$ $[\mathbf{exh}[\lambda_4$ J is t_4 tall$]]]]$

b. # $[\lambda_2[$ any girl $[\lambda_5[\Pi\ t_2[\mathbf{exh}[\lambda_1\ t_5$ is t_1 tall$]]]]]][\lambda_3[\Pi$[-er $t_3]$ $[\mathbf{exh}[\lambda_4$ J is t_4 tall$]]]]$

This alternative implementation of Heim's theory seems to give us essentially the same overall predictions as the Π-theory presented above. A proper comparison between the two analyses must be left for another occasion.

6 Conclusion

We have explored the meaning and distribution of indefinites in comparatives, focusing on English *some* and *any*, and German *irgend*-indefinites. We considered three theories of comparatives, and showed that all these theories encounter certain problems if indefinites are simply treated as existential quantifiers. We re-implemented the three theories in the framework of alternative semantics (Kratzer and Shimoyama 2002), where indefinites are treated as introducing propositional alternatives. This allowed us to extend the Menèndez-Benito/Aloni account of free choice indefinites under modals to the case of comparatives.

The move to alternative semantics also allowed us to formulate a new account of the semantic contribution of stress/focus. Following Roelofsen and van Gool (2010), we assumed that focus *flattens* the alternative set (besides introducing focus alternatives). This effect plays a crucial role in the interpretation of stressed *irgend*-indefinites in comparatives.

Finally, we found that Heim's (2006) theory of comparatives, re-implemented in alternative semantics and extended with our theory of focus, suitably accounts for the observed variability in quantificational force. Other theories do not seem to be able to account for the full range of observations without further stipulations.

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