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Indefinites in Comparatives*

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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 combine three competing theories of comparatives 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. John is taller than (almost) anyone else in his class. ∀
b. John is taller than someone else in his class. ∃
c. Hans ist größer als IRGENDEIN Mitschüler in seiner Klasse. ∀

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: p.245). If *irgendein* is not stressed in (1-c), the sentence seems to receive a 'specific unknown' interpretation: John is taller than someone else from his class, the speaker doesn't know who.

The second puzzle concerns the licensing of *any* in (1-a). Since *any* can be modified by *almost* here, it is arguably a free choice item rather than an NPI (Heim 2006: p.20). FC-items have a restricted distribution. They are felicitous in possibility statements, but need a post-nominal modifier to be felicitous in episodic sentences

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(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 & Tovena 2005; Menéndez-Benito 2005; Aloni 2007). However, it is not known why FC-items 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 free distribution, and in positive contexts they convey speaker ignorance.

(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 under negation, 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 & 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 (1-a) and (1-b) 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 & Shimoyama 2002;

Menéndez-Benito 2005), and in section 4 we integrate this treatment 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.

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, plain comparatives are analyzed as follows:

(6) a. John is taller than Mary is.
b. 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 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 prediction is correct for *any*, but not for *some*.

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

(8) 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.

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

To solve this problem the I-theory must assume that quantifiers (and *some*-indefinites) scope out of *than*-clauses. This, however, is unexpected since *than*-clauses otherwise behave like scope islands. The theories discussed below avoid this problem.

N-theory. The second theory we will consider is intended to capture the insights and predictions of the account proposed by Schwarzschild (2008).[1] One prominent

1 What we call the N-theory here corresponds to what Gajewski (2008) calls the *Maximality* theory.

feature of this theory is that it assumes a negation operator within the *than*-clause. We therefore refer to this theory as the *Negation Theory*, or *N-theory* for short. Plain comparatives are analyzed as follows:

(10) a. John is taller than Mary is.
b. $max(\lambda d.$ 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.[2]

(11) 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**]

(12) 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:

(13) 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

Π-theory. The third theory we will consider is that of Heim (2006). 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 (14-a) has (14-b) as its basic syntactic representation.

(14) a. John is taller than Mary is.
b. [John is [Π [-er than Mary is [Π ∅] tall]] tall]

She further assumes that:

- *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):
  $[\![than]\!] = \lambda p.\ p$
- ∅ is a semantically vacuous operator of type $((dt)t)((dt)t)$:

2 Problems do arise with downward entailing quantifiers, see Gajewski (2008) for discussion.

$[\![\emptyset]\!] = \lambda Q_{(dt)t}.\ Q$

- Π is a relation between degree properties, of type $(dt)((dt)t)$:
  $[\![\Pi]\!] = \lambda P_{dt}.\lambda Q_{dt}.\ P(max(Q))$

The assumed Π operator distinguishes Heim's theory most prominently from others. We will therefore refer to this theory as the Π-theory. Heim assumes that the Π operator "is generated in the degree-argument position of an adjective, where it combines with whatever is traditionally generated in that slot" (Heim 2006: p.14).

Given these assumptions, the basic syntactic representation of (14-a) in (14-b) is uninterpretable, due to several type-mismatches. Heim assumes that this triggers a sequence of movement operations. The complete derivation is given in (15)–(19). 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.

(15) [John is [Π [-er Mary is <u>[Π $\emptyset$]</u> tall]] tall]

(16) [John is [Π [-er <u>[Π $\emptyset$]</u> [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]]] tall]

(17) [John is [Π [-er <u>[$\emptyset$ [$\lambda_{2,dt}$ [[Π $t_{2,dt}$] [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]]]]</u>]] tall]

(18) [$\emptyset$ [$\lambda_{2,dt}$ [[Π $t_{2,dt}$] [$\lambda_{1,d}$ Mary is $t_{1,d}$ tall]]]] [$\lambda_{3,d}$ [John is <u>[Π [-er $t_{3,d}$]]</u> tall]]

(19) [$\emptyset$ [$\lambda_{2,dt}$ [[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 $\mathbf{\Pi}$ and **er** as an abbreviation of the meanings of Π and *-er*):

(20) John is taller than Mary is.

a. $\lambda P.[\mathbf{\Pi}(P)(\lambda d.T(m,d))](\lambda d.\mathbf{\Pi}(\mathbf{er}(d))(\lambda d'.T(j,d')))$
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, (14-a) 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:

(21) John is taller than any girl is.

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

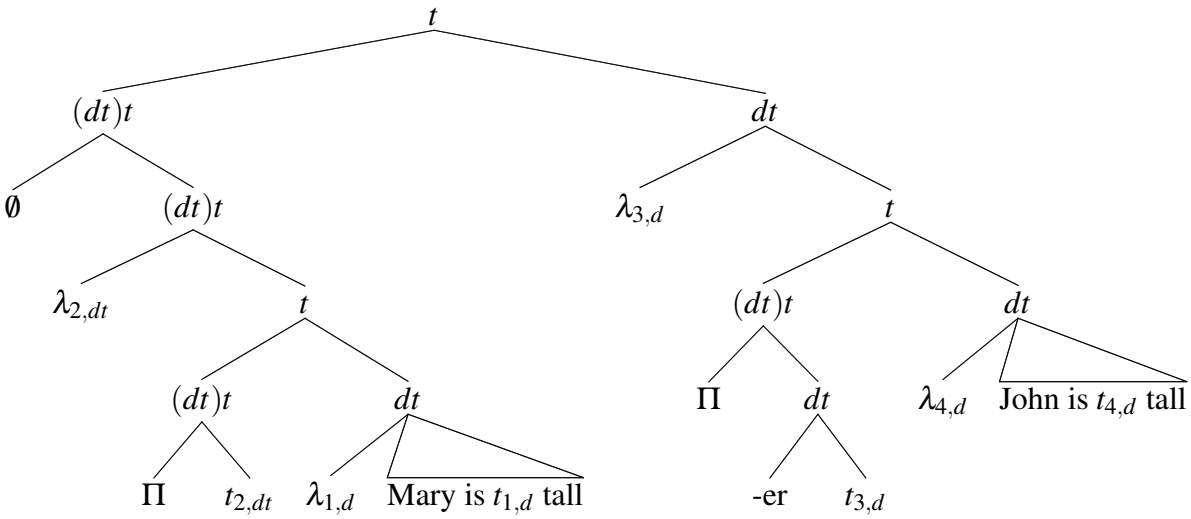


Figure 1 The assumed logical form of (14-a) in the Π-theory.

b. $max(\lambda d'.T(j,d')) > max(\lambda d.\exists x.(G(x) \wedge T(x,d)))$

As desired, (21) 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.

(22) John is taller than some girl is.

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

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

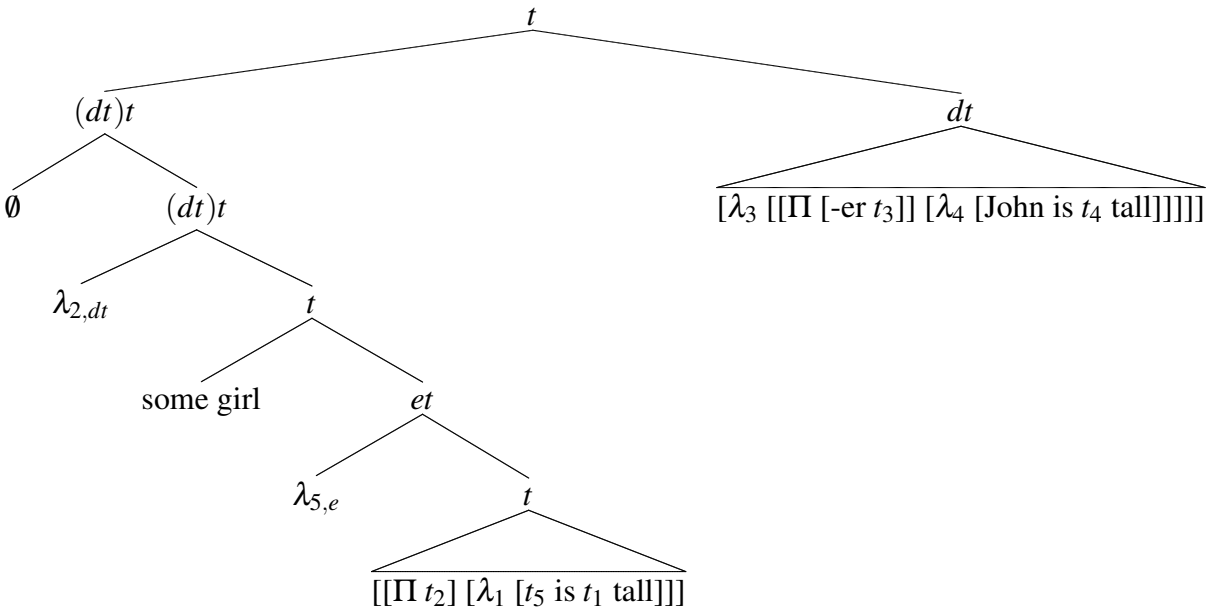


Figure 2 The assumed logical form of (22) in the Π-theory.

to be licensed' (Heim 2006: p.21).[3] That is, we could assume that indefinites and quantifiers by default take scope over ¬/Π, 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 ¬/Π. However, this explanation would not extend to FC-*any* and other free choice items like Italian *qualunque* or Spanish *cualquiera*. These items occur in comparatives, with universal meaning (see (23)), but are ungrammatical in negative contexts (see (24)), and therefore are not NPIs.

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

(24) #Nessuno ha baciato qualunque ragazzo.
'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 ¬/Π. However, this is unmotivated for genuine FCIs. The I-theory accounts for universal readings of indefinites in comparatives without stipulation. However, existential readings are not accounted for at all by the I-theory. Below we will re-implement these theories of comparatives in the framework of alternative semantics, and explore to what extent this resolves

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

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 $[\exists]$ (Kratzer & 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.

(25) a. Some / irgendein girl fell.
b. $[\exists]$ (some/irgendein girl fell)
c. $[\exists]$ | Sue fell | Mary fell |
d. Predicted meaning: some girl fell.

FC items like FC-*any* have been assumed to associate with a universal propositional quantifier $[\forall]$ and an exclusivity operator **excl** (Menéndez-Benito 2005; Menéndez-Benito 2010; Aloni 2007). This licenses FC-*any* under $\Diamond$, and rules it out in episodic contexts. The exclusivity operator is defined as follows:[4]

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

To illustrate: if $[\![\phi]\!]$ = {Sue fell, Mary fell} then $[\![\mathbf{excl}(\phi)]\!]$ = {only Sue fell, only Mary fell}. Crucially, **excl** delivers a set of mutually exclusive propositions. Thus, applying $[\forall]$ immediately after **excl**, as in (27), yields a contradiction. In (28) the modal operator 'intervenes,' which avoids the contradiction and delivers the desired universal free choice meaning.

(27) a. #Any girl fell. ruling out FC-*any* in episodic contexts
b. $[\forall]$ **excl** (any girl fell)
c. $[\forall]$ | only Sue fell | only Mary fell | $\Rightarrow$ contradiction

(28) a. Any girl may fall. licensing FC-*any* under $\Diamond$
b. $[\forall]$ $\Diamond$ **excl** (any girl fall)
c. $[\forall]$ | $\Diamond$ only Sue falls | $\Diamond$ only Mary falls |
d. Predicted meaning: for each girl it is possible that only she falls.

4 Roelofsen and van Gool's (2010) analysis of alternative questions provides independent motivation for this exclusiveness operator.

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 & Shimoyama (2002).[5] Here are some of the assumed denotations:

(29) 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

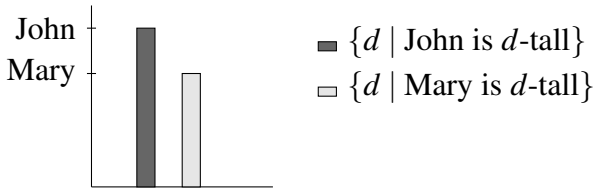
To implement the I-theory of comparatives in alternative semantics we assume that the comparative morpheme, *-er*, is an operator that takes two 'intensional' degree properties, of type $d(st)$, and delivers a proposition, of type (st).

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

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

(31) 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).



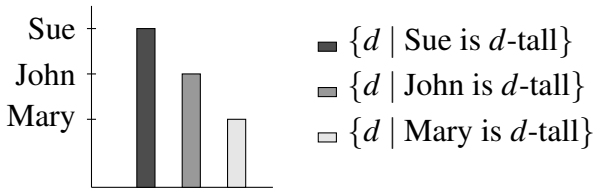
Next, consider a comparative with a *some*-indefinite in the *than*-clause.

(32) a. John is taller than some girl is.

5 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) 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 have impact on our predictions.

b. $[\exists][\text{-er } [\lambda_{1,d} \text{ some girl is } t_{1,d} \text{ tall}]][\lambda_{2,d} \text{ John is } t_{2,d} \text{ tall}]$
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. $\Rightarrow$ for some girl y, John is taller than y

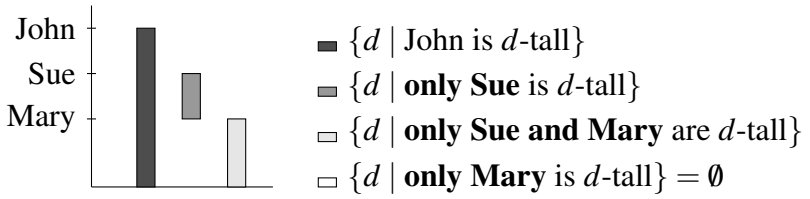
We saw that in the conventional I-theory, *some*-indefinites had to scope out of the *than*-clause in order to obtain an existential interpretation. In alternative semantics this is no longer necessary: we get a wide scope effect for the indefinite via the mechanism of propositional quantification, even 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); Menéndez-Benito (2010) and Aloni (2007), that *any* associates with **excl** and $[\forall]$. 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.

(33) a. John is taller than any girl is.
b. $[\forall][\text{-er } [\lambda_{1,d} \textbf{excl}[\text{any girl is } t_{1,d} \text{ tall}]]][\lambda_{2,d} \text{ John is } t_{2,d} \text{ tall}]$
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. $\Rightarrow$ 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) 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 (1-a) and (1-b) 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

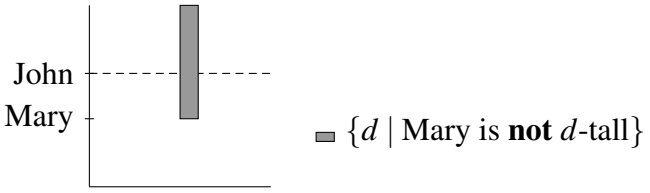
To implement the N-theory of comparatives in alternative semantics we again assume that the comparative morpheme is an operator that takes two intensional degree properties, of type $d(st)$, and delivers a proposition, of type (st).

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

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

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

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).



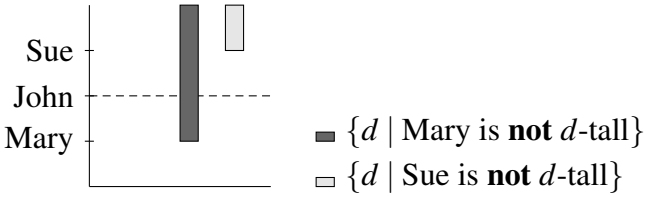
Next consider a comparative with a *some*-indefinite in the *than*-clause:

(36) a. John is taller than some girl is.
b. [$\exists$][-er [$\lambda_{1,d}$ some girl[$\lambda_{3,e}$ $\neg$[$t_{3,e}$ 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:

$max\{d \mid$ John is d-tall in $w\} \in \{d \mid$ **Mary** is **not** d-tall in $w\}$
$max\{d \mid$ John is d-tall in $w\} \in \{d \mid$ **Sue** is **not** d-tall in $w\}$

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

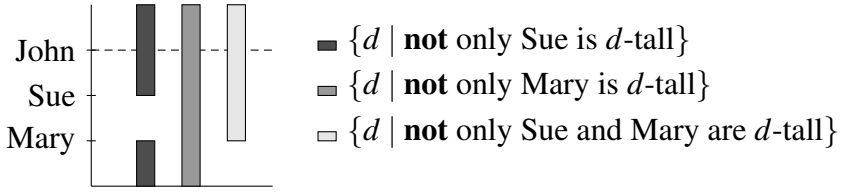
In this case, the maximal degree to which John is tall (the horizontal line) is compared with the set of degrees d such that Mary is not d tall, and the set of degrees d such that Sue is not d tall (the two columns). The sentence is true iff the line cuts through at least one of the columns. Thus, an 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 (36-b)). 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.

(37) 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).

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

Π now takes one argument of type $(sd)(st)$ and another argument of type $d(st)$, and delivers a proposition of type (st).

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

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)).

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

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

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

In the case of *any*, scope w.r.t. Π does make a difference. Namely, if *any* takes scope under Π, as in (42), we obtain the desired universal meaning, with Π intervening between $[\forall]$ and **excl**, just like $\Diamond$ in modal free choice constructions;[6] on the other hand, if *any* takes scope over Π, as in (43), we get a contradiction.

(42) a. John is taller than any girl is.
b. $[\forall][\lambda_2[\Pi\ t_2[\lambda_1$ **excl**[any girl is t_1 tall$]]]][\lambda_3[\Pi$[-er $t_3][\lambda_4$ J is t_4 tall$]]]$

6 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, $max(\emptyset) = 0$.

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

(43) a. John is taller than any girl is.
b. $[\forall][\lambda_2$**excl**$[$any girl$[\lambda_5[\Pi\, t_2[\lambda_1\, t_5$ is t_1 tall$]]]]][\lambda_3[\Pi[$-er $t_3][\lambda_4$ J is t_4 tall$]]]$
c. $[\forall]$**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.

(44)

	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 (1-a) and (1-b), 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 accent

Kratzer & Shimoyama (2002) assume that *irgend*-indefinites, like *some*, associate with $[\exists]$. However, *irgend*-indefinites in comparatives can give rise to universal readings, as exemplified in (1-c) in the beginning of the paper. 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). Incidentally, the same is true for free choice uses of *irgend*-indefinites under modals, as was illustrated in example (4) in the introduction.

We will assume that stress signals focus, and that focus has two semantic effects: (i) it introduces a set of focus alternatives (Rooth 1985), and (ii) it flattens the

ordinary alternative set (Roelofsen & van Gool 2010). Effect (i) allows us to derive the free choice inferences of stressed *irgend*-indefinites under modals as obligatory implicatures à la Chierchia (2010), and (ii) yields an account of stressed *irgend* in comparatives. Let us have a closer look at the latter.

The flattening effect of focus is defined as follows (Roelofsen & van Gool 2010):

(45) a. If α is of type (st), then $[\![\alpha]\!]$ is a set of propositions, and:
$[\![\alpha_F]\!] = \{\bigcup [\![\alpha]\!]\}$

b. If α is of type $\sigma \neq (st)$, then:
$[\![\alpha_F]\!] = \{\lambda z.\bigcup_{y \in [\![\alpha]\!]} z(y)\}$, where z is of type $\sigma(st)$

The first part of the definition, (45-a), specifies the effect of focus at the clausal level: the alternative set for a focused clausal constituent α_F consists of a single alternative, which is the union of all the alternatives for α itself. In this sense, focus *flattens* the alternative set. The second part of the definition extends this idea to sub-clausal focused constituents. For illustration, consider the following two examples, both involving an *irgend*-indefinite, one without focus, the other with.[7]

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

(47) Irgendjemand$_F$ 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 (47-a) (where P is of type $e(st)$ and our domain consists only of people):

(48) $[\![\text{irgendjemand}_F]\!]([\![\text{called}]\!]) = \{\lambda P.\bigcup_{y \in [\![\text{irgendjemand}]\!]} P(y)\}(\{\lambda x.\lambda w.C_w(x)\})$
$= \{\bigcup_{y \in [\![\text{irgendjemand}]\!]} \lambda w.C_w(y)\} = \{\lambda w.\exists y.C_w(y)\}$

If we assume that focus induces flattening of the alternative set we have a ready 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 negation or

7 Under these assumptions, focus also has a flattening effect on *wh*-pronouns and FCIs. In order to derive the meaning of questions like *Who$_F$ called?* we can assume, following Beck (2006), that $[\![Q(A)]\!] =$ focus-value(A), rather than $[\![Q(A)]\!] = [\![A]\!]$. As for stressed FCIs, we would have to rely on (obligatory) implicatures to derive the correct interpretation of sentences like *John may kiss anybody$_F$*. The application of $[\forall]$ would be vacuous in this case (thanks to Luka Crnič for this observation).

the Π operator. Stressed *irgend*-indefinites are arguably NPIs (felicitous in DE contexts, but out in episodic sentences), so this scopal behavior follows from Heim's conjecture. Note however that (stressed) *irgend*-indefinites are ungrammatical under sentential negation (Angelika Kratzer, p.c.). This could be considered an additional argument favoring the Π-theory over the N-theory.

(49) **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. $\bigcup\{\lambda w.[\lambda d.T_w(j,d) \supset \lambda d.\exists x.T_w(x,d)]\}$
d. ⇒ for every person x, John is taller than x

(50) **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. $\bigcup\{\lambda w.[max(\lambda d.T_w(j,d)) \in \lambda d.\neg\exists x.T_w(x,d)]\}$
d. ⇒ for every person x, John is taller than x

(51) **Π-theory**

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

(52) 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 (52-b). The N-theory and the Π-theory do make the right predictions, under the assumption that *someone* scopes over negation and Π respectively.

(53) **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. ⇒ for every person x, John is taller than x **[wrong]**

(54) **N-theory**

a. John is taller than SOMEONE$_F$ is.
b. [∃][-er [$\lambda_{1,d}$ someone$_F$ [$\lambda_{3,e}\neg$[$t_{3,e}$ is $t_{1,d}$ tall]]]][$\lambda_{2,d}$ John is $t_{2,d}$ 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]**

(55) **Π-theory**

a. John is taller than SOMEONE$_F$ is.
b. $[\exists][\lambda_2$ someone$_F[\lambda_5[\Pi\ t_2[\lambda_1\ t_5$ is t_1 tall]]]][$\lambda_3[\Pi$[-er t_3][λ_4 J is t_4 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:

(56)

	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 scope out of negation, FC *any* and *irgend*-indefinites must scope under negation. This assumption is unjustified: it is unclear why FCIs should scope under negation, and it is unnatural to assume that *irgend*-indefinites scope under negation since they are ungrammatical under sentential 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.

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 (2007) notion of exhaustification, **exh**, which generalizes Menéndez-Benito's **excl** operator in order to account for subtrigging cases (see example (2-c)). 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 (42)). 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):

(57) a. John is taller than Mary is.

b. $[\lambda_2[\Pi\, t_2[\textbf{exh}[\lambda_1$ M is t_1 tall]]]][$\lambda_3[\Pi$ [-er t_3] [**exh**[λ_4 J is t_4 tall]]]]

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

(58) $[\forall] \ldots$ **exh** $\ldots$ *any* $\ldots$

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**.

(59) John is taller than any girl is.

a. $[\lambda_2[\Pi\, t_2[\textbf{exh}[\lambda_1$ any girl is t_1 tall]]]][$\lambda_3[\Pi$[-er t_3] [**exh**[λ_4 J is t_4 tall]]]]

b. # $[\lambda_2[$ any girl $[\lambda_5[\Pi\, t_2[\textbf{exh}[\lambda_1\, t_5$ is t_1 tall]]]]]][$\lambda_3[\Pi$[-er t_3] [**exh**[λ_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 & 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 & 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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