

IV. Existential? Universal? i-Readings

Connectives and quantificational determiners whose forms suggest that they are disjunctions and respectively existential quantifiers sometimes exhibit surprisingly stronger interpretations.

Are disjunctions inclusive or exclusive?

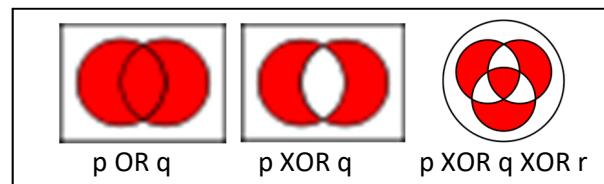
Are indefinites sometimes existentials and sometimes universal?

Do disjunctions sometimes work as conjunctions?

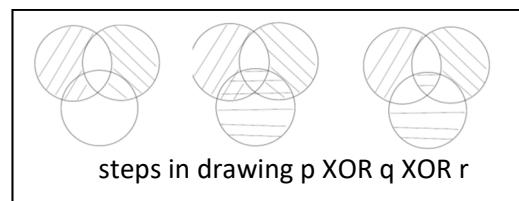
Do we have lexical ambiguities or a productive mechanism? If there is a mechanism, is it semantic or pragmatic?

If cross-linguistic differences exist, what may explain them?

IV/a. A paradigmatic puzzle: Is *or* Boolean OR or XOR or something else?



- (1) She bought an apple or a pear.
- (2) If she bought an apple or a pear,
I'll buy grapes.
She didn't buy an apple or a pear.
- (3) She bought an apple or a pear or a lemon.



Conclusion: What we perceive as “exclusive *or*” is not Boolean XOR.

What is it, then? And is the word *or* ambiguous -- inclusive and exclusive meanings?

Scalar implicatures (SI), informally: Grice (1975) + Horn (1989, 2004)

Assume that the speaker is making the strongest claim that they can take responsibility for, if that is relevant.

When expression E is a member of a set of linguistically defined alternatives (scale), and it is not the strongest alternative, use of E implicates that the stronger (or, non-weaker) alternatives are false, according to the speaker. We'll make use of scalar implicatures (SI) on Friday too!

The soup is warm	=SI=>	not hot
It is raining or it is snowing	=SI=>	not both
Some people applauded	=SI=>	not all
I have three cats	=SI=>	not more than three
If you work, you'll be paid	=SI=>	if you don't, you won't be
You may sit down	=SI=>	you don't have to
You may swim or dance	=SI=>	you may swim and you may dance, but not both

IV/b. Informal analysis of the semantic version of implicatures

Grammaticized scalar implicatures (Chierchia, Fox & Spector 2012 and many more)

$$\begin{array}{ccc}
 & p \vee q & \\
 p & & q \\
 & p \wedge q & \\
 \end{array}
 \quad \begin{array}{c}
 \text{subdomain alternatives of } p \vee q \\
 \text{scalar alternative of } p \vee q
 \end{array}$$

Exhaustification: innocently negating the scalar alternative(s).

Innocent Exclusion: negating alternatives without contradicting the assertion.

Assert $p \vee q$.

Implicate innocent negation of stronger alternative(s), if there are any: $\neg(p \wedge q)$.

In positive contexts, the scalar alternative $p \wedge q$ is stronger than $p \vee q$.

In negative contexts, $p \wedge q$ is weaker; it doesn't get negated. (Exception: focus negation.)

(Rain and Snow)	entails, i.e. is stronger than	(Rain or Snow)
Not (Rain and Snow)	doesn't entail, i.e. is weaker than	Not (Rain or Snow)

So, a suggestive **diagnostic** of an interpretation being the result of a scalar implicature is that it obtains **in positive but not in negative** (downward entailing) environments.

She bought an apple or a pear. -- If she bought an apple or a pear, I'll buy grapes.
She didn't buy an apple or a pear.

Sometimes exhaustification is applied more than once (i.e., recursively), if the first step is not satisfactory in some communicative sense, e.g. it only conveys ignorance.

The first step is, however, not vacuous, because it affects the set of alternatives that will be negated in the second step.

Sometimes meanings are strengthened via exhaustification without negating a scalar alternative. This is what we are concerned with today.

Examples (some formal mechanism comes after looking at the data):

OR str.to	AND	Warlpiri <i>manu</i> ; Child English <i>or</i> ; E. <i>for example A or B</i> ; Hun. <i>többek között A vagy B</i> ;
\exists str.to	\forall	Hebrew <i>kol</i>
OR str.to	unconditional	<i>Whether you like it or not, we'll go.</i>
\exists str.to	universal free choice	<i>Anyone can come in.</i>
conditional that restricts dets		<i>Everyone will succeed if he works hard but no one will succeed if he goofs off.</i>

IV/c. Cross-linguistic examples

Walpiri *manu* (Bowler, 2014)

When not within the scope of another operator, *manu* is unambiguously 'and'.

(4) Cecilia **manu** Gloria=pala yanu tawunu-kurra.
 Cecilia manu Gloria=3DU.SUBJ go.PAST town-ALLAT
 'Cecilia and (/*or) Gloria went to town'

Under negation, *manu* is unambiguously interpreted as 'or'.

(5) a. Cecilia **manu** Gloria **kula**=pala yanu tawunu-kurra.
 Cecilia manu Gloria NEG=3DU.SUBJ go.PAST town-ALLAT
 'Neither Cecilia nor Gloria went to town'
 * 'Cecilia and Gloria didn't both go to town'

b. Kula-rna yunparnu **manu** wurntijajalangu. Lawa.
 NEG=1SG.SUBJ sing.PAST manu dance.PAST today nothing
 'I didn't sign or dance today. I did nothing'

Bowler reports that speakers are uncomfortable using *P manu Q* under negation in contexts in which they consider it possible that only one of *P* and *Q* is false, suggesting that *P manu Q* is unambiguously disjunctive under negation.

Interestingly, Warlpiri does not have a connective that invariably means 'and.'

Child English *or* is often interpreted as 'and' (Singh et al. 2016).

Aside: In antecedents of conditionals and wh-questions, the interpretation of *manu* is ambiguous between a disjunction and a conjunction, see below. The reason is that neither reading entails the other, and so, exhaustification is optional. (We won't go into this.)

(10) a. Kaji=npa kuyu **manu** mangarri ngarni ngula kapu=npa
 IRR=2SG.SUBJ meat manu food eat.NPST that AUX.FUT=2SG.SUBJ
 pirrjirdi-jarrimi.
 strong-become.NPST
 'If you eat meat and vegetables, you will become strong.' [Bowler (2014)]

b. Kaji=npa jarntu pakarni **manu** window luwarni, ngula=ju
 IRR=2SG.SUBJ dog hit.NPST manu window shoot.NPST that-TOP
 Nungarrayi-rli kapi=ngki jirna-wangu-mani.
 Nungarrayi-ERG AUX.FUT=2SG.NSUBJ scold.NPST
 'If you hit the dog or break the window, then Nungarrayi will scold you.'

(11) a. Ngana-ngku ka mardarni ngaya **manu** jarntu?
 who-ERG AUX have.NPST cat manu dog
 'Who has a cat and a dog?' [Bowler (2014)]

b. Ngana yanu Juka Juka-kurra **manu** Wakulpa-kurra?
 who yanu Juka Juka-ALL manu Wakulpa-ALL
 'Who has been to Juka Juka or Wakulpa?' [Bowler (2014)]

“Exemplification” with Hungarian *vagy* and English *or* (Szabolcsi 2020)

(6) A Kiss Imre által vezetett Tatabányában pályára lépett többek között Szabó György, **vagy** Csapó Károly, akik még ma is jó játékerőt képviselnek. Az Esztergomi Öregfiúkban olyan legendák játszottak, mint Markó Béla, Varga Tibor **vagy** Ormándi Imre, hogy csak néhányukat említsünk.

<https://tinyurl.com/skoch6b>

‘Playing in [the soccer team] Tatabánya, led by Imre Kiss were, among others, György Szabó **or** Károly Csapó, who continue to be strong players even today. Esztergom Old Boys was represented by legends like Béla Markó, Tibor Varga **or** Imre Ormándi, to mention just a few of them.’

(7) A szerződésbe rögzíteni kell többek között, hogy mekkora a bérletidíj összege, **vagy** mikor fizetendő a bérletidíj.

<https://tinyurl.com/sesoghn>

‘The contract must specify, among other things, what the amount of the rent is, **or** when the rent is due.’

The most conspicuous feature that the above examples share is that the authors probably intended the lists to be **conjunctive** (and they are true as such). The first example leaves no doubt that both Szabó and Csapó played in Tatabánya. The second does not say that either the amount or the due date of the rent can be omitted from the contract, and so on.

Another shared feature is that the lists are expressly **non-exhaustive**, as indicated by the expression *többek között* ‘among others.’ (The internet searches always contained this expression, to ensure that they picked up relevant examples. Using ‘for example’ would give similar results.) This is why I dub this use of *vagy* **disjunction of exemplification**.

Disjunction of exemplification also exists in English, although to my knowledge it has not been discovered. In distinction to Hungarian, it mainly occurs in scientific or legal texts.

(8) That speakers of Latvian, German, **or** Spanish, for example, perceive the pronouns and determiners of the *kaut-*, *irgendein* **or** *algún* series as existentials would now no longer mean that those expressions are themselves existentials.

https://scholarworks.umass.edu/linguist_faculty_pubs/182/

(9) Some examples include a person's age **or** whether a person smokes.

<http://www.cdc.gov/socialdeterminants/Definitions.html>

Such cells are, for example, cells like mucosal cells **or** intestinal cells.

<https://patents.google.com/patent/US9243293>

The label must state, for example, the nature of a nutritional **or** compositional change, **or** the presence of an allergen.

<https://tinyurl.com/agmuvka>

Hebrew *kol* (Bar-Lev and Margulis, 2014, Jeretič 2021)

Unambiguous readings of *kol*, where it is only interpreted as universal.

(10) **Kol** yeled higi'a.
 KOL boy arrived
 'Every boy arrived'

When negated, *kol* is interpreted as ambiguous between existential and universal, at least for some speakers (Bar-Lev and Margulis (2014) only report the existential reading, since it was the reading of interest for their purposes).

(11) Ha-mu'amad **lo** kibel **kol** tSuva.
 the-candidate NEG received KOL response
 'The candidate didn't receive any response'

Aside: The following data comes from informal data collection by Jeretič (from Moshe Bar-Lev and Itamar Kastner p.c.) In other non-upward-entailing contexts, such as questions, conditional antecedents, and negated *think*, both existential and universal readings are available.

See two contexts, one that would elicit the existential reading, the other the universal reading. For one of the speakers, the sentences were good in both contexts, i.e. both existential and universal readings were available, as reflected in the translations below.

(12) Context 1: we can move on if 3 out of 3 responses were received.
 Context 2: we can move on if at least 1 out of 3 responses was received.

(15) Haim hitkabla **kol** tSuva? efSar lehamSix?
 Q was.received KOL answer possible to.continue
 'Has any/every response been received? Can we proceed?'

(16) {Im hitkabla **kol** tSuva / im **kol** tSuva hitkabla} efSar lehamSix.
 if was.received KOL answer / if KOL answer was.received possible to.continue
 'If any/every response has been received, we can move on.'

(17) Ani lo xoSev Se-hitkabla **kol** tSuva, az i efSar lehamSix.
 I NEG think that-was.received KOL answer so not possible to.continue
 'I don't think that any/every response has been received, so we can't move on.'

The other speaker only accepted existential readings in these contexts (and under negation). This starkly contrasted with the first, who reported that existential *kol* is in fact associated with formal register.

**Universal free choice in English (*anyone*) and Hungarian (*akárki*),
Dayal 2013, Szabolcsi 2019, Fălăuș & Nicolae 2022**

English *any* and Hungarian *akár* do not occur in plain positive, non-modal contexts.

(16) * Anyone is calling.
 * Akárki telefonál.

Any / *akár* serve as negative polarity items, so it is likely they are existentials.

(17) She didn't call anyone. / I don't think that she called anyone.
 Nem hiszem, hogy akárkit (is) felhívott.

Any / *akár* also serve as free choice items in the presence of a possibility modal.

(18) Anyone may call / You may call anyone.
 Akárki telefonálhat / Akárkit felhívhatsz.

But not with a necessity modal:

(19) * Anyone must call / * You must call anyone.
 * Akárkinek telefonálnia kell / * Fel kell hívnod akárkit.

If we look at a single world where “anyone may call” is true, it is okay if everyone calls -- *any* / *akár* are **universal** free choice items.

But, we must be able to consider multiple worlds, and those who are calling have to vary somewhat across worlds -- *any* / *akár* require **fluctuation**. This is why plain one-world examples like (16) and necessity modal examples like (19) are unacceptable.

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Note the contrast with German *irgendein*, which forms an **existential** free choice item, enabled by both **necessity** and **possibility** modals (Kratzer & Shimoyama 2005).

Ignorance/indifference

(20) Hans: Jemand hat angerufen. 'Somebody has called.' (can be specific "some")
 Maria: Wer war es? 'Who was it?'

(21) Hans: **Irgendjemand** hat angerufen. 'Irgend-one has called' (can't be specific)
 Maria: # Wer war es? 'Who was it?'

Necessity or possibility modals

(22) Mary musste **irgendeinen** Mann heiraten.
 Mary had-to irgend-one man marry.
 (a) 'There was some man Mary had to marry, the speaker doesn't know or care who it was'
 (b) 'Mary had to marry a man, any man was a permitted option for her.'

(23) Du kannst dir **irgendeins** von diesen beiden Büchern leihen.
 you can you(dat.) irgend-one of those two books borrow.
 'You can borrow one of those two books, it doesn't matter which.'

Unconditionals: semantic relatives of free choice

Hungarian (Szabolcsi 2019), Romanian (Fălăuș & Nicolae 2022)

In English, unconditionals (24)-(25) are formed with *wh-ever*, not with *any*:

(24) Whoever is bringing the wine, it'll be good.
 (25) Whether Eva or Maria is bringing the wine, it'll be good.

But in Hungarian, *akár* forms all of negative polarity items, free choice items and unconditionals (26):

(26) Akárki telefonált, elbeszélgettünk. (same *akárki* as above)
 'Whoever called, we chatted'
 Akár Éva, akár Mari hozza a bort, jó lesz.
 'Whether E or M is bringing the wine, it'll be good'

Unconditionals are so called because they express orthogonality (Rawlins 2013): the identity of the caller is orthogonal to the issue of whether we chat.

Recall that above we said that *akárki* is an existential.

Similarly to universal free choice, unconditionals have a universal flavor for the call-chat correspondence and require fluctuation among the callers. So *akár* also presents an existential/universal puzzle.

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Romanian *oricine* also works in both free choice and in unconditionals. It is not a negative polarity item, but *ori* is disjunction ('or'):

(27) a. Oricine poate veni la petrecere.
 oricine can.3SG come to party
 'Anyone can come to the party.'

b. Oricine va suna azi, sunt ocupată.
 oricine FUT.3SG call today am busy
 'Whoever is going to call today, I'm busy'

c. Ana a mâncat (ori) salată ori supă.
 Ana has eaten DISJ salad DISJ soup
 'Ana has eaten (either) salad or soup'

Conditionals (Higginbotham 1986, Bassi & Bar-Lev 2016)

The standard semantic analysis of “If S_1 then S_2” is, “In all cases where S_1 holds, S_2 holds”. This works well for (28), (29), (31) – but not for (30) and (32)!

(28) You will succeed if you work hard. STANDARD ANALYSIS OF “IF...THEN”:
 \approx **In all cases** where you work hard, you succeed.

(29) Everyone will succeed if he works hard.
 \approx $\forall x$. **in all cases** where x works hard, x succeeds.

(30) No one will succeed if he goofs off.
 \approx $\neg \exists x$. **there is a case** where x goofs off and succeeds.
 (doesn't mean, 'For no one does goofing off guarantee success'!)

(31) I believe that A will come if B comes \approx I believe that **in all cases**, if B... then A ...

(32) I doubt that A will come if B comes \approx I doubt that **there's a case** where B ... and A ...

Why is “if... then” interpreted as “in all cases...” in positive (UE) contexts and as “there is a case...” is negative (DE) ones? Are conditionals ambiguous?

The same VP including a conditional can take on both an “all” and a “there is” reading in **VP-ellipsis**.

(33) Every boy calls his mother if he gets an A,
 and no girl does [call her mother if she gets an A] \approx
 UE calls **in all cases** when he gets an A
 DE calls **in any case** when she gets an A

These facts **argue against an ambiguity analysis**.

Analogy with Free Choice, which already has an analysis in Fox 2007.

(34)a. John can eat ice-cream or cake. $\text{CAN } (A \vee B)$
 \approx J can eat ice-cream **and** can eat cake $\text{CAN } A \wedge \text{CAN } B$

b. Everyone can eat ice-cream or cake. $\forall x [\text{CAN } (A(x) \vee B(x))]$
 \approx Everyone can eat ice-cream **and** can eat cake. $\forall x [\text{CAN } A(x) \wedge \text{CAN } B(x)]$

c. No one can eat ice-cream or cake. $\neg \exists x [\text{CAN } (A(x) \vee B(x))]$
 $\approx \neg \exists x [\text{CAN } A(x) \wedge \text{CAN } B(x)]$

Bassi & Bar-Lev's proposal in a nutshell:

(35) **Bare conditionals are underlyingly existential across the board.**
 In **positive** contexts they undergo grammatical **strengthening** and become **universal**.
 In **negative** contexts their **basic existential meaning is preserved**.

IV/c. Basic formal account of strengthening (Fox 2007, Bar-Lev & Margulis 2013)
The literature uses disjunctions also to represent existential quantifiers
(Someone walks = He walks or she walks = $a \vee b$)

Exhaustification, EXH of p with respect to a set of alternatives of p , $\text{Alt}(p)$:

(a) $\text{EXH}(\text{Alt}(p)) (p) (w) \Leftrightarrow$ p is true in w,
and every excludable alternative of p is false in w.

(b) $\text{Excludable}(p, \text{Alt}(p)) = \cap \{ \text{Alt}(p)' \subseteq \text{Alt}(p) : \text{Alt}(p)' \text{ is a maximal set in } \text{Alt}(p)$
such that
 $\{p\} \cup \{\neg q : q \in \text{Alt}(p)'\}$ is consistent }

Results differ depending on whether there is a stronger (scalar) alternative in the set. If yes, it is negated, and we get 'not both' type readings.

If the language does not have a lexicalized scalar alternative of the relevant sort, there is no scalar alternative in the set. Obviously, it is then not negated. We get 'both' ('all') type readings. Effectively, we are strengthening disjunction to conjunction.

Below we demonstrate the latter type:
recursive strengthening in the absence of a scalar alternative.

- Recursively strengthened existential is a universal: **EXH EXH (avb) = a \wedge b.**

EXH EXH **kol** boy arrived
 avb
 Alt(avb) = {avb, a, b} Note: a \wedge b is not an alternative.

EXH Alt(avb) [avb] = avb	B/c neither a, nor b is excludable. Why? {avb, $\neg a$ } and {avb, $\neg b$ } are both consistent sets and maximal as such. But $a, b \notin \{avb, a\} \cap \{avb, b\}$. If $a \wedge b$ were in Alt(avb), it would be excludable; EXH(avb) would be $(avb \wedge \neg(a \wedge b))$.
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$$\text{Alt EXH Alt(avb)} [avb] = \{ \text{EXH Alt(avb)} [avb], \text{EXH Alt(avb)} [a], \text{EXH Alt(avb)} [b] \} = \{ avb, a \wedge \neg b, b \wedge \neg a \}$$

$$\begin{aligned}
 \text{avb} \wedge \neg(a \wedge \neg b) \wedge \neg(b \wedge \neg a) &= \\
 \text{avb} \wedge (a \rightarrow b) \wedge (b \rightarrow a) &= \\
 \text{avb} \wedge (a \leftrightarrow b) &= \\
 a \wedge b
 \end{aligned}$$

- Recursively strengthened modal existential is free choice

$$\mathbf{EXH\ EXH\ \Diamond(avb) = \Diamond a \wedge \Diamond b}$$

$$\text{Cf. } \Diamond(avb) \wedge (\Diamond a \leftrightarrow \Diamond b) = \Diamond a \wedge \Diamond b$$

If $\Diamond(a \wedge b)$ had been in $\text{Alt}(\Diamond(avb))$, it would have been excludable and negated.

If FCI-KOL has an additional $\Diamond(a \wedge b)$ reading, that is pragmatic,

or comes from $\Diamond\ \mathbf{EXH\ EXH\ (avb)}$.

- Recursive strengthening doesn't affect \exists in a DE environment:

$$\mathbf{EXH\ EXH\ \neg(avb) = \neg(avb)}$$

$$\neg(avb)$$

$$\text{Alt}(\neg(avb)) = \{\neg(avb), \neg a, \neg b\}$$

$$\mathbf{EXH\ Alt}(\neg(avb)) = \neg(avb) \quad \neg(avb) \text{ entails } \neg a \text{ and } \neg b, \text{ they aren't negatable}$$

The same if EXH is re-applied to this.

Appendix: Chierchia 2013 on negative polarity and universal free choice (from Szabolcsi 2019)

Our goal is to unify Hungarian unconditionals, universal free choice and negative polarity, as demanded by the identity of AKÁR expressions in these roles. Unconditionals and free choice could be unified in various attractive ways, but not all of them offer a natural connection to polarity. English *any* and Hungarian *akár* are rather common in serving both in free choice and in (some subset of) polarity items. Chierchia 2013 is a theory that brings them together. Presupposing familiarity with it, this section merely recaps some of the assumptions without arguing for them.

Chierchia 2013 proposes that negative polarity items and free choice items are existentials/disjunctions with grammaticalized, active alternatives that must be exhaustified. The alternatives may be sub-domain or scalar alternatives. The exhaustifier relevant to us is the silent operator **O**[nly], which negates alternatives not entailed by the literal assertion.

Let a proposition with an NPI schematically assert $p \vee q$; its sub-domain alternatives are p and q . Exhaustification yields a contradiction: $O(p \vee q) = p \vee q \wedge \neg p \wedge \neg q$. Contradiction is averted if $p \vee q$ is originally within the immediate scope a decreasing operator \downarrow . In that case $\downarrow(p \vee q)$ entails the sub-domain alternatives $\downarrow p$ and $\downarrow q$, and so **O** does not get to negate them: $O\downarrow(p \vee q) = \downarrow(p \vee q)$. See Chierchia 2013: Ch 1 for details.

Existential and universal FCIs both come with pre-exhaustified sub-domain alternatives, so an application of **O** to the whole proposition will amount to recursive exhaustification in the sense of Fox 2007.

\exists -FCIs (irgendein NP and un NP qualsiasi) occur within the scope of a modal: $\Diamond > \exists$, so the assertion is $\Diamond(p \vee q)$. Now $O\Diamond(p \vee q)$ negates both the pre-exhaustified subdomain alternatives and the scalar alternative, and yields $\Diamond p \wedge \Diamond q \wedge \neg\Diamond(p \wedge q)$. Chierchia 2013: Ch 5.

\forall -FCIs (any NP and qualsiasi NP) scope immediately above a possibility modal: $\exists > \Diamond$, so the assertion is $\Diamond p \vee \Diamond q$. First consider just exhaustification with respect to the pre-exhaustified sub-domain alternatives $O\Diamond p$ and $O\Diamond q$. The conjunction of $\Diamond p \vee \Diamond q$ with $\neg O\Diamond p = \neg(\Diamond p \wedge \neg\Diamond q)$ and $\neg O\Diamond q = \neg(\Diamond q \wedge \neg\Diamond p)$ yields $\Diamond p \wedge \Diamond q$. See Chierchia 2013: Ch 6.

We just strengthened disjunction to conjunction (an existential to a universal). The result is the Universal Free Choice implicature. It will be referred to as Universal Force below, so as to remain agnostic regarding implicatures.

\forall -FCIs however are not universals, although they have Universal Force. They have another crucial property that Dayal 2009 called Fluctuation: the realized options cannot be kept constant across worlds. Chierchia recasts Fluctuation by utilizing the stronger, scalar alternative, here $\Diamond p \wedge \Diamond q$. The negation of the scalar alternative is conjoined with the result of exhaustifying the domain alternatives (as is done in the case of \exists -FC). But now the resulting $\Diamond p \wedge \Diamond q \wedge \neg(\Diamond p \wedge \Diamond q)$ is a contradiction – unless, Chierchia points out, the modal bases used in the two computations are different. If modal base $SC \subset$ modal base FC , there need not be a contradiction. He refers to that subset relation as Modal Containment, MC. See Chierchia 2013: 316-317 for discussion of the two modal bases SC and FC .

Hungarian AKÁR expressions are NPIs and \forall -FCIs, so Chierchia's treatment of English *any NP* can be adopted for them. We add, as a reminder, that while English *either_or* is not a dedicated NPI or FCI, Hungarian reiterated *akár_akár* has the same behavior as the combination of *akár* with an indeterminate pronoun. Those reiterations are also subsumed.

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