Conjunction Meets Negation:
A Study in Cross-linguistic Variation

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Abstract. This inquiry is prompted by the observation of a sharp cross-linguistic contrast in the interaction of conjunction and negation. It turns out that conjunctions in Hungarian (Russian, Italian, Japanese) behave in the expected way, because they replicate the behavior of plurals, their natural semantic relatives. The puzzle is why English (German) presents a different range of interpretations. By teasing out finer distinctions in intonation and context the paper tracks down missing readings in both language types and takes several steps towards concluding that it is eventually not necessary to postulate a radical cross-linguistic semantic difference.

1 INTRODUCTION[*]

Although conjunction, disjunction, and negation are the simplest logical operators, their interaction exhibits surprising cross-linguistic differences. Compare the English and the Hungarian examples below – taking them, for starters, to be isolated written sentences, i.e. deprived of intonation and context. The primary readings are as follows:

(1)   Mary hasn't taken hockey or algebra.
        `Mary hasn't taken hockey and hasn't taken algebra'

(2)   Mari nem járt   hokira   vagy algebrára.
        Mari not   went hockey-to or   algebra-to
        `Mary hasn't taken hockey or hasn't taken algebra'

(3)   Mary hasn't taken hockey and algebra.
        `Mary hasn't taken hockey or hasn't taken algebra'

(4)   Mari nem járt   hokira   és   algebrára.
        Mari not   went hockey-to and algebra-to
        `Mary hasn't taken hockey and hasn't taken algebra'

At first blush, one might describe the contrasts as follows. English disjunction and

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conjunction scope below the c-commanding negation and dutifully obey the de Morgan laws, whereas the Hungarian counterparts either scope above the c-commanding negation or fail to obey the de Morgan laws. Similar to English is German; similar to Hungarian are Russian, Serbian, Italian, and Japanese, among other languages.[1] -- Would this description be correct?

2 POSITIVE POLARITY

Szabolcsi (2002a,b) argued that the counterparts of *or* in Hungarian-type languages are positive polarity items (PPIs). Thus the contrast between (1) and (2) does not challenge the Boolean character of Hungarian *vagy* (Russian and Serbian *ili,* Italian *o*); it may be looked upon as a matter of scope. However, PPIs of the relevant type are not simply prohibited from scoping below clause-mate negation, as traditional wisdom would have it: the illegitimate `not>PPI' reading can be rescued by placing into a NPI-licensing context:

(5)   a.   He didn't see someone.   clause-mate negation
           * `not > some'
           √ `some > not'
      b.   I don't think that he saw someone.   extra-clausal negation
           √ `not > some'
      c.   If you don't see someone, you are doomed.   cf. *If anyone ...*
           √ `not > some'
      d.   I regret that he didn't see someone.   cf. *I regret that anyone...*
           √ `not > some'

(6)   a.   Nem látta Katit vagy Marit.
           Lit. `He didn't see K or M'[2]
           * `not > or'
           √`or > not'
      b.   Nem hiszem, hogy látta volna Katit vagy Marit.
           `I don't think that he saw K or M'
           √ `not > or'
      c.   Ha nem látod Katit vagy Marit, véged.
           `I you don't see K or M, you are doomed'
           √ `not > or'
      d.   Sajnálom, hogy nem láttad Katit vagy Marit.
           `I regret that you didn't see K or M'
           √ `not > or'

Szabolcsi characterizes rescuable PPIs as double NPIs, meaning that they simultaneously

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[1] We thank Thomas Leu, Martin Hackl, Artur Stepanov, Vita Markman, Zeljko Boskovic, Franca Ferrari, and Andrea Gualmini for German, Russian, Serbian, and Italian judgments. Muromatsu (2002) and Goro (2003) report similar facts for Japanese, with some intriguing observations regarding locality conditions. The English judgments reported in this paper are understood to be American English.

[2] *Lit.* indicates a literal translation when the English and the Hungarian interpretations diverge or possibly diverge. We often omit glosses because morphological details are typically irrelevant in this paper.

exhibit the licensing needs of *yet*-type and *ever*-type NPIs; see the detailed analysis in the papers cited above.

The present paper is concerned with the contrast between (3) and (4). The foregoing raises the possibility that Hungarian conjunctions are also PPIs. But they do not exhibit the requisite diagnostics. The `neither' interpretation does not give way to `not both' if negation is extra-clausal or if an NPI-licensor is added: [3]

(7) a. Nem látta Katit és Marit.
         Lit. `He didn't see K and M'
         * `not both'
         √ `neither'
     b. Nem hiszem, hogy látta volna Katit és Marit.
         Lit. `I don't think that he saw K and M'
         * `not both'
         √ `neither'
     c. Ha nem látod Katit és Marit, véged.
         Lit. `If you don't see K and M, you are doomed'
         * `not both'
         √ `neither'
     d. Sajnálom, hogy nem láttad Katit és Marit.
         Lit. `I regret that you didn't see K and M'
         * `not both'
         √ `neither'

3 HOMOGENEITY

More promising is to notice that definite plurals in both English and Hungarian interact with negation in the same way that Hungarian definite conjunctions do:[4]

(8) He didn't see the girls.
     * `not all the girls'
     √ `none of the girls'

(9) Nem látta a lányokat.
     `He didn't see the girls'
     * `not all the girls'
     √ `none of the girls'

This is in fact not surprising. The plurals literature works on the assumption that

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[3] To make the jargon transparent, we are going to use the `not both' and `neither' labels to distinguish two readings. The latter label really stands for just `not X and not Y' and is not intended to carry the specific shades of meaning of the *neither...nor* construction. Section 7 discusses some of the relevant empirical differences.

[4] Definite plurals are known to tolerate exceptions. This phenomenon is orthogonal to the issue at hand and will be ignored in what follows.

definite plurals and definite conjunctions share the same semantics: both support collective and cumulative readings in addition to run-of-the-mill distributive ones; both take extra-wide existential scope but do not readily take even clause-internal distributive inverse scope, etc. To save space, these properties are illustrated using only English:

(10)   The girls/Kate and Mary lifted up the table together.
        `collective'

(11)   The girls/Kate and Mary were born in London and Boston.
        `cumulative'

(12)   Everyone heard the rumor that you had spotted the girls/Kate and Mary. They are wanted for bank robbery.

(13)   Six students took these two subjects/hockey and algebra. ?* The twelve students graduate in May.

Definite plurals are generally interpreted as denoting pluralities: sets or individual sums. However, their peculiar interaction with negation does not follow from the basic semantics. Those few studies of plurality that discuss this issue at all invoke a homogeneity presupposition accompanying distributive predication.[5] Drawing from Löbner and Schwarzschild, Beck (2001) formulates Homogeneity as in (14). *A* denotes a plurality and **P* a pluralized, i.e. distributive one-place predicate; Beck also extends the definition to pluralized, i.e. cumulative two-place relations ***P*.

(14)   Homogeneity
        $*P(A) = 1$ iff $\forall x[x \varepsilon A \rightarrow P(x)]$
                      0 iff $\forall x[x \varepsilon A \rightarrow \neg P(x)]$
                      undefined otherwise

If the general behavior of definite plurals and definite conjunctions are the same, we expect the latter to share Homogeneity.[6] Hungarian-type languages bear out this expectation quite

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[5] For example, Link, Schein, Landman, and Winter do not discuss interaction with negation.

[6] If Homogeneity is intimately linked to denoting pluralities (as in (14)) then it is potentially vulnerable to Schein's (1998) objections to such an analysis. Schein refers to Collins' (1988) observation that the members of English conjunctions can be modified by a modal – sentential – adverb even on the collective reading (a single unbroken chain):

(i) The Columbia students and possibly the Harvard students formed the unbroken chain around the Pentagon.

Collins proposed the following interpretation for the conjunction (in Schein's wording; we have not seen Collins' ms.):

(ii) (All) the persons(X) such that the Columbia students are among them(X) and possibly the Harvard students are among them(X) (and no one else)...

straightforwardly. Thus we conclude that conjunctions as in (4) do not scope above the c-commanding negation. But Hungarian definite conjunctions indeed do not obey the de Morgan laws, because their connective is not Boolean.

This analysis has the welcome consequence that the `neither' reading of (7b) does not require the conjunction to take extra-clausal distributive scope; it is due to presupposition projection (Roger Schwarzschild, p.c.). Also, it correctly predicts that when the connective is plausibly Boolean, e.g., in the conjunction of quantifiers, the `not both' reading is available.

(15)   Mari nem olvasott el minden verset és minden regényt / háromnál több regényt.
        Mari not read every poem-acc and every novel-acc / three-than more novel-acc
        √ ` Mary didn't read every poem or didn't read every novel / more than three novels'

Viewed from this perspective, it is English-type languages that call for an explanation. In what follows we examine the English data, carefully adding considerations pertaining to intonation and context, and argue that English and Hungarian are more similar than they initially seem to be. The main claims are as follows. (i) Both languages have a standard Boolean connective that gives rise to `not both' readings with quantifiers, predicates, etc. Its availability for definite arguments seems to correlate with whether connectives in the given language may bear non-corrective stress. (ii) The homogeneous plurality interpretation that is so prominent in Hungarian definite conjunctions is also available in English, although it is contextually more restricted.

4 STRESSED *AND*, A BOOLEAN CONNECTIVE

The fact that the most prominent reading of negated definite conjunctions in English is `not both' might suggest that *and* is thoroughly Boolean: unlike its Hungarian counterpart, *hockey and algebra* would not refer to a plurality but to a set of properties shared by the denotations of the individual conjuncts, $\lambda P[P(hockey') \& P(algebra')]$. Whether such an approach is viable in part depends on what general theory of plurals it is embedded in and is in part an empirical matter. Let us for the moment put aside theories according to which either there is no reference to pluralities (Schein) or it is a derived reference, so to speak (Winter). These theories account for the whole spectrum of plurality behavior in a different way. The crucial

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Schein notes, however, that this interpretation is incorrect. Since every actual Harvard student is possibly a Harvard student, (ii) makes the Harvard students inescapably part of the chain. The crucial ingredient of Schein's own solution is to derive conjunctions from a sentential source, i.e. conjunction reduction, which is essentially equivalent to the plain Boolean interpretation. But it seems to us that there is a way to interpret (i) without falling into the trap that Schein points out:

(iii) A plurality X such that the Columbia students are in X and possibly the Harvard students are in X and nothing that is not Columbia st's. or Harvard st's. is in X...

As Z. Szabó (p.c.) notes, this interpretation is in turn vulnerable to Kripke's objections and might force conjunctions to be interpreted as groups in the intensionalized sense of Landman (1989). Nevertheless, this is so only if *possibly* is interpreted non-epistemically. If it is epistemic, then no problem arises. The conjecture that the modals in conjunctions are epistemic ones is supported by the fact that *necessarily*, for instance, does not occur here. Thus, data such as (i) do not make the plurality analysis untenable. We add that it is not obvious how Schein's own theory would replicate the predictions Homogeneity makes, without forcing unusual scopings and without predicting that conjunctions of quantifiers and conjunctions of definites behave alike.

point is that, aside from interaction with negation, the behavior of English definite conjunctions is too similar to that of definite plurals to recommend a thoroughly Boolean treatment if definite plurals are not accorded a purely quantificational one. One might weaken this position and propose that *and* forms pluralities but distributive predication is not associated with Homogeneity. But it is difficult to see how this would be compatible with a formulation of Homogeneity as in (14). (14) makes reference to pluralities and is insensitive to whether a plural or conjunction denotes that plurality. In sum, it is unlikely that the prominent `not both' reading is to be accounted for by assuming that English definite conjunctions never denote homogeneous pluralities.

Attention to intonational details supports the conclusion that `not both' cannot be treated as **the** interpretation of negated definite conjunctions. Consider (3), repeated below with three distinct intonation patterns. In (16), the connective is contrastively focused. In (17), the conjunction as a whole is contrastively focused. The former means `not both', the latter means `neither'. (18) has no contrastive focus (say, it is an answer to the question *What's going on?*) and as it stands it is fairly marginal.

(16)   Mary hasn't taken hockey AND algebra.
        `not both'

(17)   (Of the classes on the list), Mary hasn't taken HOckey and ALgebra.
        `neither'

(18)   ?? Mary hasn't taken hockey and algebra.

These data suggest that the typical reaction to an isolated written sentence like (3) is a result of complex cooperative behavior. Native speakers cannot help endowing the string with an intonation contour that makes it acceptable and, because no context is supplied, they probably come up with one that does not require complex background assumptions. This leads to a `not both' interpretation, but the fact remains that `not both' is strictly associated with stressed *AND*. [7]

Let us first address *AND* to get it out of the way. Where does it come from? One possibility is that definite conjunctions initially refer to homogeneous pluralities but stress on the connective removes the homogeneity presupposition. (See Schwarzschild 1993:224 for a similar suggestion.) This is reasonable, but it is not obvious how it would account for the fact that conjunctions with stressed *AND* do not support collective readings.

(19)   a. *Mary AND Susan solved the problem together, so they should share the prize.
        b. *Mary, Joan, AND Susan solved the problem together, so...

Another possibility, which accounts for (19), is that stressed *AND* is a separate Boolean connective: *Mary AND Susan* denotes a generalized quantifier somewhat like *both Mary and Susan*. On this view *AND* resembles *both* and *every* in that in VP-internal position it does not

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[7] Additionally, the `not both' reading is possible in sentences like *MARY didn't take hockey and algebra*, understood as a retort to *Susan didn't take hockey AND algebra*. We assume that the absence of high stress on *AND* here is a phonological.

scope over negation:

(20)   a. Mary hasn't taken every course.
          * `every>not'
        b. Mary hasn't taken both courses.
          * `both>not'
        c. Mary hasn't taken both hockey and algebra.
          * `both>not'
        d. Mary hasn't taken hockey AND algebra'
          * `AND>not'

Stressed *AND* is however not identical to *both...and*, since the latter more readily takes inverse distributive scope:

(21)   a. At least ten students are taking every course.   √ `every > at least ten'
        b. At least ten students are taking both hockey and algebra. √ `both > at least ten'
        c. At least ten student are taking hockey AND algebra.   ? `AND > at least ten'

M. Hackl (p.c.) points out that the assumption that *AND* is a Boolean connective is supported by the fact that it exhibits scalar implicatures that are expected only if it has *or* as its scalar alternative: [8]

(22)   Mary hasn't taken hockey AND algebra. ⇒ Mary has taken hockey or algebra.

The implicature arises because the sentence asserts that Mary has not taken both hockey and algebra and, by the Maxim of Quantity, implicates that the stronger alternative i.e. that Mary has not taken either hockey or algebra, is false.

The observation that a separate Boolean connective with stress is responsible for the `not both' reading of English definite conjunctions will help explain why the Hungarian counterparts lack such a reading. (4), repeated as (23), is unambiguous:

(23)   Mari nem járt hokira és algebrára.
        Mary not went hockey-to and algebra-to
        √ `neither'
        * `not both'

Hungarian generally does not allow non-corrective stress on connectives. To our knowledge the same holds for Russian, Serbian, and Italian.

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[8] More precisely, *Mary hasn't taken hockey AND algebra* implicates that Mary has taken hockey but not algebra. This is probably due the fact that stressed *AND* has an asymmetrical scalar implicature:

(i)   a. The Hungarian translation of Homer preserves the content AND the meter.
           `the content and even the meter'
        b. # The Hungarian translation of Homer preserves the meter AND the content.
           `the meter and even the content'

(24)   a. * Mari nem járt hokira ÉS algebrára.
         Mary not went hockey-to and algebra-to
       b. * Mari nem hokira ÉS algebrára járt.

(25)   c. * Mari nem járt hokira VAGY algebrára.
         Mary not went hockey-to or algebra-to
       d. * Mari nem hokira VAGY algebrára járt.

(26)   Mari nem hokira VAGY algebrára, hanem hokira ÉS algebrára jár.
       Mari not hockey-to or algebra-to but hockey-to and algebra-to goes
       `Mary isn't taking hockey OR algebra, she is taking hockey AND algebra'

       In sum, all languages have a Boolean `and' that operates on quantifiers, predicates, sentences, etc. and may in principle scope above or below negation. However, it appears that only under stress does it operate on names and definites. Languages that do not allow non-corrective stress on connectives therefore lack a `not both' reading in definite conjunctions. Expression of this reading requires an overtly quantificational connective, in Hungarian *X is, Y is* `X also, Y also = both X and Y.'

5 *AND* SCOPING ABOVE NEGATON

Because definite conjunctions denote pluralities, the literature seems to assume that they fall within the scope of negation irrespective of their syntactic position (e.g. Schwarzschild 1993/94). The following sharp contrast argues against this assumption. *Hockey and algebra* (with no particular stress) as the subject of a negative sentence is entirely natural and supports the `neither' interpretation; in object position *or* is highly preferred on the same reading:

(27)   Hockey and algebra are not offered this year.
       `hockey is not offered and algebra is not offered'

(28)   a. We do not offer hockey or algebra this year.
         `we do not offer hockey and do not offer algebra'
       b. ?? We do not offer hockey and algebra this year.

A comparable asymmetry is observable in the behavior of stressed *AND*, which lacks the `not both' reading in subjects:

(29)   Hockey AND algebra are not offered this year.
       * `not both'

(30)   We do not offer hockey AND algebra this year.
       `not both'

Similarly, T. Leu (p.c.) points out that while *X und Y* does not express `neither' when in the scope of negation in Swiss German, the same reading is perfect if *X und Y* is topicalized:

(31)   a. Käi Lehrer biätet das Jahr Tschutä und Singä a.
        no teacher offers this year soccer and singing PRT
        `not both'
        * `neither'

      b Käi Lehrer biätet das Jahr Tschutä odr Singä a.
        no teacher offers this year soccer or singing PRT
        `neither'

(32)   Tschutä und Singä biätet das Jahr käi Lehrer a.
       soccer and singing offers this year no teacher PRT
       `neither'

We take these data to indicate that definite conjunctions in subject and topic position scope above negation (as do other subjects and topics). This is in no way incompatible with the claim that they denote pluralities, which are potentially scopeless. On Landman's (2000) theory a plural may enter the sentence either directly or via scopal quantifying in (SQI). Landman uses this duality to distinguish cumulative readings (where both arguments of the relation are interpreted distributively but scopelessly) and asymmetrical distributive readings (which involve SQI).

Let us now return to (17), repeated as (33), where both context and intonation indicate that the whole conjunction is contrastively focused. We thank D. Beaver (p.c.) for pointing out that in this case the natural reading is `neither':

(33)   (Of the classes on the list), Mary hasn't taken HOckey and ALgebra.
       `neither'

In view of the above, we propose that contrastively focused *HOckey and ALgebra*, although it is a direct object, scopes above negation. This is plausible since such sentences answer implicit or explicit negative questions:

(34)   Which of the classes hasn't Mary taken?

In sum, although the examples in this section receive a `neither' interpretation, we assume that these conjunctions do not fall within the scope of negation and, therefore, do not fall within the scope of our inquiry.

6 HOMOGENEITY IN ENGLISH: PACKAGES AND NON-PACKAGES

We have found that of the three intonational variants of *Mary hasn't taken hockey and algebra*, one contains a Boolean connective and one has the conjunction scoping over the negation. If anything, the third pattern, which has no contrastive stress, has a chance to replicate the Hungarian-type `neither' reading but, instead, it is rather marginal out of the blue.

(35)   ?? Mary hasn't taken hockey and algebra.   no contrastive stresses

The task now is to find out why.

We observe that the nature of the conjuncts matters. Consider math and physics, which form a stereotypical package. They are often linked together in college programs, they are thought to require similar skills, etc. (36)-(37) show that when the conjuncts form a package, both the stressed and the unstressed versions are acceptable and unambiguous:

(36)   Mary hasn't taken math AND physics.
        `not both'

(37)   Mary hasn't taken math and physics.
        `neither'

The stressed *AND* fact is the same as above, so from now on we focus on the contrast between (35) and (37). (37) replicates the behavior of Hungarian conjunctions – but in Hungarian, packaging was not necessary to secure this behavior.

The important conclusion that (37) leads to is that, contrary to initial impressions, the homogeneous plurality interpretation of conjunctions is not absent from English. But while in Hungarian all conjunctions are open to this interpretation, perhaps in English only packaged conjunctions are. This restriction would not only be curious, but also incorrect. First, notice that unstressed non-packaged conjunctions are perfectly acceptable in non-negated contexts:

(38)   Mary has taken hockey and algebra.

Second, it turns out that packaging is not a necessary condition even in negative contexts. So far we have only considered decontextualized examples. It is relatively easy to make unstressed non-packaged conjunctions acceptable on the `neither' reading if an appropriate context is provided. Consider the following:

(39)   Context: Professor is advising a student who has five more required courses to take. All are offered in the given semester, but the student cannot fit all into her schedule at the same time. The five courses are unrelated to each other. Professor says,

        You haven't taken hockey and algebra. Why don't you sign up for them now?

Hockey and algebra are not a stereotypical package, nor are the only courses the student still has to take, nor does the context link them together to the exclusion of other required courses. Nevertheless, the `neither' reading is perfectly acceptable. Not any old context will do, though:

(40)   Context: Student asks Professor to recommend courses from the catalog that will contribute to a nice balanced curriculum. Professor says,

        a. # You haven't taken hockey and algebra. Why don't you take them?
        b.   You haven't taken hockey or algebra. Why don't you take them?

(39) shows that English does not draw a sharp line between packages and non-packages. Both can be interpreted as `neither'. Therefore the homogeneous plurality interpretation of distributive predication must in principle be generally available.

7 THE "NORMALLY / EXPECTED BOTH" IMPLICATURE

We are still left with the task of explaining why packaged conjunctions so easily carry the `neither' reading while non-packaged ones require special contexts in English. Corpus data may be used to corroborate the impressions gleaned from the examples in section 6. The following data are among those turned up by a Google search for *"don t * * * and"*, etc. on one day in May 2003; they most plausibly carry the `neither' reading: [9]

(41)   a. Don't blame consulting firms and I-banks
         b. Don't call area 809 and other Caribbean codes
         c. Winter's coming – but don't abandon the yard and garden
         d. Don't Let Sports Sprains and Strains Sideline You
         e. Why don't Bonnie B. Barr and Michael B. Leyden answer their mail ...
         f. We don't have dancing girls and corporate boxes, but this is the oldest rugby league
                 club in Australia
         g. Don't Let the Feminists and Cloners Lead Your Members Astray
         h. Don't help the spammers and hackers!
         i. Don't forget seat belts and depend on air bags, ...
         j. Don't Cut Tributaries, Streams, and Wetlands Out of the Clean Water Act
         k. Don't get plastic tarps and duct tape just yet ...
         l. Don't waste your energy and intellect on ignorance
         m. I Don't See My Templates and Custom Lists. What Happened?
         n. Why doesn't God prevent evil and suffering?
         o. Teen Doesn't Care about Schoolwork and Hygiene
         p. Border doesn't block dirty air and water
         q. Golf doesn't have training camp and overpriced exhibition games.
         r. ASW's online store doesn't work with Opera and iCab.
         s. Features, Ease of Use, Stability, Speed, "doesn't work on Mac and Linux".
         t. Mike doesn't work with Messenger and Paltalk
         u. Mailing List ls doesn't show directories and links in WU-FTPD 2.6.
         v. restore icon doesn't work in Word and Pwrpoint
         w. She likes animals, nature, and me. She doesn't like violence, poaching, and meat.
         x. Okay, so maybe heart disease doesn't show itself for years, but that doesn't mean it
                 doesn't exist in kids and teens
         y. EU won't divulge passengers' race and religion
         z. Why didn't "everything" include "mew" and "im"?

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[9] As the reader may easily confirm, each such search will find over a million tokens of a negated auxiliary separated from *and* by three arbitrary words. Most of the examples have to be discarded because *and* is not within the scope of the negation (*Don't miss it! Bonnie and Clyde...*). Many of the relevant ones, especially those involving conjoined VPs, will obviously carry the `not both' interpretation; we do not discuss them here.

Some of these examples clearly involve what may be called packages (*sprains and strains, the feminists and cloners*, *evil and suffering,* etc.) but many others do not. For example, Mac and Linux are far from being a stereotypical pair. What makes the use of *and* natural in (41s) is that the customer expects a product to work on both Mac and Linux (among other systems, presumably). In general, strikingly many of the relevant examples express complaints, i.e. failed expectations, of some sort.

This squares well with the contrast between (39) and (40). In the context of (39), *You haven't taken hockey and algebra* is natural, because although unrelated, both courses are required, while in the context of (40), the same sentence is not natural, because the two courses are not required. In other words, in (39) it is normal or expected for the student both to take hockey and to take algebra, while in (40) it is not.

Similar insights are obtained if the same sentence is contrasted with some alternatives. They are alternatives in the sense that all three sentences require that you have not taken hockey and you have not taken algebra. (42a) with *not...and* suggests that it is normal or expected to take both hockey and algebra, though not necessarily simultaneously. (41b) with *not...or* makes no such suggestion; it sounds like mentioning two examples of courses the advisee has not taken. Finally, (42c) with *neither...nor* resembles (42b) in that it does not suggest that normally both courses are taken; it suggests, however, that these two courses are under discussion and checks them off one by one.

(42)		normal or expected to take both	hockey and algebra discourse salient
a.	You haven't taken hockey and algebra.	yes	no
b.	You haven't taken hockey or algebra.	no	no
c.	You have taken neither hockey nor algebra.	no	yes

Let us describe the extra shade of meaning that *not...and*-sentences carry as follows:

(43) The "Normally Both" Implicature:
Not *P X and Y implicates that it is normal or expected for the predicate to hold of both X and Y.

This observation explains the data as follows. If X and Y form a stereotypical package in some pragmatic dimension and the predicate is one that pertains to the same dimension, the "normally both" implicature is satisfied by default. For example, if math and physics are courses that programs often group together, and we are talking about taking courses, it is straightforward that it is normal to take both math and physics, not just one of them. When however the two conjuncts are lumped together in an ad hoc fashion, the context must provide a clue that the predicate normally holds of both. This explains the fact that non-package examples are either judged unacceptable out of the blue, or the hearer will note the effort needed to think up a context to rationalize the use of *and*.

In other words, on this view packages do not enjoy a distinguished status. Instead, packaging ensures, by default reasoning, that the "normally both" implicature is satisfied.

The "normally both" implicature is not specific for English; it is more difficult but

possible to detect it in Hungarian. It is more difficult, because packaging certainly does not make a difference, and *Még nem jártál hokira és algebrára* `You haven't taken hockey and algebra yet' is entirely felicitous in both the (39) and the (40) contexts, i.e. whether or not hockey and algebra are required. Consider however (44):

(44)   Context: The visa application form of a particular country lists the questions in
        Spanish and English. We see a man staring at the blank form in front of him and say,

        a. #Ez a fickó nem tud angolul és spanyolul; nem tudja kitölteni a kérdôívet.
           this guy not knows English and Spanish; not can out.fill-inf the form-acc
           Lit. `This guy doesn't know English and Spanish; he cannot fill out the form'

        b. Ez a fickó nem tud se angolul, se spanyolul; nem tudja kitölteni a kérdôívet.
            this guy not knows nor English nor Spanish; not can out.fill-inf the form-acc
            `This guy knows neither English nor Spanish; he cannot fill out the form'

We know that although the application form offers two languages, the applicant is supposed to use only one of them. (44a) with *és* `and' is infelicitous because it suggests that it would be useful, perhaps even expected, for the applicant to know both. (44b) with *se X, se Y* `nor X, nor Y' (the negative concord version of *X is, Y is* `both X and Y') is felicitous, because it carries no such suggestion, and X and Y are the salient options in the discourse situation.
        Comparison of (45) and (46) highlights the same distinction:

(45)   Sajnálom, hogy nem jártam hokira és algebrára.
        Lit. `I regret that I didn't take hockey and algebra' = I didn't take either, and it would
        have been good if I had taken both

(46)   Sajnálom, hogy nem jártam hokira vagy algebrára.
        Lit. `I regret that I didn't take hockey or algebra' = I didn't take either, and it would
        have been good if I had taken at least one of them

8 SUMMARY

Our inquiry started with the observation that English and Hungarian negated conjunctions favor different interpretations; we asked if this indicates radical differences in the lexical semantics of the connectives or, perhaps, in their scopal abilities. By relating conjunctions to plurals and teasing out intonational and contextual distinctions we have reached the pleasant conclusion that it is not necessary to postulate radical cross-linguistic differences. English *and* and Hungarian *és* both have a Boolean version and a non-Boolean version. In the domain of definites, the former is stressed and the latter is unstressed. Under negation the stressed, Boolean connective is responsible for `not both' readings and the unstressed, non-Boolean one for `neither' readings, through the agency of Homogeneity. The absence of `not both' readings from Hungarian is due to the fact that the connective cannot bear non-corrective stress. The fact that `neither' readings in English need heavy contextual support unless the conjuncts form a package is due to the fact that negated conjunctions carry what we called the "normally both" implicature. The same implicature is detectable but weaker in Hungarian.

We have two important questions left. One is the compositionality question: How does the "normally both" implicature arise? The other is the cross-linguistic question: Why does the "normally both" implicature constrain the use of negated conjunction so much more in English than in Hungarian?

At present we do not have satisfactory answers to these questions. In what follows we outline why they are puzzling and some of the considerations that may bear on them.

9 COMPETITION

One might want to write "normally both" into the lexical semantics of *and*, but it is unclear how it could be done. For example, (47) would fail miserably:

(47)   [[*hockey and algebra*]]^c denotes the set of those properties P for which P({h, a}) is defined and true if in the context c it is normal or expected for both P(h) and P(a) to be true; it is undefined otherwise.

If P happened to be the property denoted by *Mary has taken*, (47) would say that *Mary has taken hockey and algebra* is undefined unless Mary is expected to take both hockey and algebra. And if P happened to be the property denoted by *Mary hasn't taken*, then (47) would say that *Mary hasn't taken hockey and algebra* is undefined unless Mary is expected to have taken neither. Both predictions are incorrect: the positive sentence does not appear to carry much of a "normally both" implicature, and the negative sentence carries a positive, not a negative expectation.

M. Hackl (p.c.) has proposed an elegant alternative to derive "normally both" from a general felicity condition on negation, as in (48):

(48)   Felicity Condition on *not p*: *not p* presupposes/implicates that p is normal or was expected.

As a motivation for (48), Hackl observes that (under normal circumstances) *John was yelling* and John *wasn't breathing* are felicitous, but *John wasn't yelling* and *John was breathing* are not. It seems to us that (48) is too strong. *Naturally, not p* and *As was expected, not p* are fully felicitous sentences types. Additionally, Hackl's observation that (under normal circumstances) *John was breathing*, similarly to *John wasn't yelling,* is infelicitous entails that a comparable condition should be imposed on plain non-negated *p* as well; this is now called into question by the felicity of the type *Naturally, p* and *As was expected, p*.

More specifically, it is difficult to see how a felicity condition pertaining solely to negation would account for the differential acceptability of definite plurals and definite conjunctions within its scope. (49) is perfect and (50) nevertheless marginal when *the rooms at the back* and *the bedroom and the study* refer to the same plurality. In this simple context it is very unlikely that expectations as to what I should have seen diverge as a function of the two descriptions.

(49)   The living room is tidy, but of course I haven't seen the rooms at the back.
(50)   ?? The living room is tidy, but of course I haven't seen the bedroom and the study.

Another fact about (48), as Hackl himself points out, is that it cannot be subject to cross-linguistic variation; therefore it will not shed light on the cross-linguistic issue.

Both the compositionality and the cross-linguistic problems might seem solvable by assuming that "normally both" arises as a function of the competition with other ways of expressing a similar meaning. The idea has two basic ingredients. First, while it seems difficult to tie "normally both" to *and*, it seems entirely safe to attribute a complementary property to *or* and *neither…nor*:

(51)   Independence
       $[[X\ or\ Y]]([[P]])^c$ and $[[neither\ X\ nor\ Y]]([[P]])^c$ are defined if P(X) and P(Y) are independent possibilities in *c*.

Second, while it seems difficult to derive "normally both" solely from the pragmatics of negation, it can be made contingent on the presence of negation by observing that precisely in the context of negation do *and*, *or*, and *neither…nor* come out as near equivalents:

(52)   a. *not-P(X and Y)* is true   iff   ¬P(X) and ¬P(Y)   [in view of Homogeneity]
       b. *not-P(X or Y)* is true   iff   ¬P(X) and ¬P(Y), and
                                             P(X) and P(Y) are independent
       c. *P(neither X nor Y)* is true iff   ¬P(X) and ¬P(Y), and
                                             P(X) and P(Y) are independent, and
                                             X and Y are discourse salient

A speaker who wishes to convey ¬P(X) and ¬P(Y) can choose from (at least) three distinct options. She is supposed to choose the one that fits best with the context; thus, if P(X) and P(Y) are independent, she is supposed to choose *not...or* or *neither...nor*. Thus, use of *not...and* will convey non-independence without it being part of the lexical semantics of *and*.

This reasoning also has a chance to illuminate the difference between Hungarian (Russian, Serbian, Italian, Japanese) and English (German), because we have seen that disjunctions are positive polarity items in the former languages. Recall from section 2 that this means that disjunction cannot scope under clausemate negation, unless the whole construction is further embedded in an NPI-licensing context. Therefore, in the most typical negative environment disjunction does not compete with conjunction for the expression of ¬P(X) and ¬P(Y). Negated conjunctions compete only with counterparts of *neither...nor*, which are presumably weaker competitors, in view of the fact that they require discourse salience and they are syntactically dissimilar. This may explain the unmarked character of negated conjunctions in Hungarian-type languages and the fact that the "normally both" implicature becomes discernible either in contexts exhibiting extreme independence, as in (44), or in those special cases where disjunction is indeed possible, as in (45)-(46).

The formulation of competition raises various technical questions. Can it be formulated as a Gricean implicature (quantity or relevance) that easily combines with compositional semantics? Or does it necessitate an Optimality Theoretic formulation that allows violations of faithfulness to lexical meanings and is therefore not strictly compositional? More important than the technical questions is exactly what definition of independence (in disjunctions) derives the "normally both" implicature for conjunctions. Requiring $\Diamond(P(X) \neq P(Y))$, i.e. that it be possible for one disjunct to be true without the other

being true is safe, but it does not suffice to derive "normally both". On the other hand, defining independence as the converse of "normally both", i.e. that it is not expected that P(X) and P(Y), is too strong. Even if wide scope disjunctions are put aside as epistemic modals (cf. Zimmermann 2001), it would predict, incorrectly, that *Every student has taken hockey or algebra* is infelicitous if both courses are required.

The cross-linguistic dimension also faces a problem. The competition account would work best if all languages fell either into the English type or the Hungarian type:

(53)   English, German:
        disjunction not a PPI -- negated conjunctions difficult on the `neither' reading

(54)   Hungarian, Russian, Serbian, Italian, Japanese:
        disjunction a PPI -- negated conjunctions natural on the `neither' reading

In fact, we are aware of a third type, which resembles English in one crucial respect but Hungarian in another:[10]

(55)   Modern Hebrew, Bulgarian, Romanian:[11]
        disjunction not a PPI -- negated conjunctions natural on the `neither' reading

The good news is that the division of labor between conjunctions and disjunctions in these latter languages conforms to our generalizations (see some data in section 10). The bad news is that this third type reveals a gap in the explanation. The existence of the "normally both" implicature explains, English internally, why the homogeneous plurality interpretation is not available to non-packaged conjunctions out of the blue. But we have another striking fact, namely, that speakers of English and German overwhelmingly disprefer the use of negated conjunctions to express `neither'. This dispreference is one of the major factors behind the dramatic contrast that we started out with in (3) and (4). On our account, the explanation of any difference in the use of negated conjunctions to express `neither' relies on competition from disjunction. The discovery of languages of the third type reveals, however, that competition from disjunction does not necessarily have the requisite effect: the two expressions may peacefully coexist. In fact, there seems to exist an (at least) three-point scale. According to our informants,[12]

(56)   Where negated conjunctions and negated disjunctions compete for the expression of
        `neither', and the pragmatic context is rather neutral,

        English, German: disjunction highly preferred to conjunction
        Bulgarian: disjunction somewhat preferred to conjunction
        Hebrew, Romanian: conjunction somewhat preferred to disjunction

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[10] According to at least one speaker, Finnish may represent the logically possible fourth type, with *tai* `or' a PPI but *ja* `and' behaving similarly to English *and*. We thank Arto Anttila and Liina Pylkkänen for discussion.

[11] We thank Ioana Chitoran and Oana Ciucivara for discussion on Romanian.

[12] These are impressionistic judgments by native speakers, which we have not attempted to verify in statistically reliable ways.

Hungarian probably sides with Hebrew and Romanian in those syntactic contexts that make competition possible (extraclausal negation or embedding under an NPI-licenser, (6b,c,d) versus (7b,c,d)).

These observations raise very interesting questions. Is it possible to account for these cross-linguistic differences solely within a compositional semantics coupled with Gricean principles? Is it necessary to invoke an Optimality Theoretic notion of competition, allowing violations of faithfulness to meaning and/or preferential rankings of alternatives – two devices that go beyond, or even against, compositionality? [13] If yes, what broader conclusions are to be drawn about the status of compositionality? Answering these questions, however, is beyond the scope of this paper.

10 PEACEFUL COEXISTENCE

We conclude by illustrating the situation in Modern Hebrew and Bulgarian.

Modern Hebrew exhibits the full array of possibilities discussed in connection with English and Hungarian:[14]

(57)   lo macati ba'al o me'ahev
        not I-found husband or lover
        Lit. `I didn't find a husband or a lover' = looked for either and found neither

(58)   lo macati ba'al ve me'ahev
        not I-found husband and lover
        Lit. `I didn't find a husband and a lover' = looked for both and found neither

(59)   lo macati lo ba'al ve lo me'ahev
        not I-found not husband and not lover
        Lit. `I found neither a husband nor a lover' = two separate searches, both failed

(60)   lo macati ba'al VE me'ahev
        not I-found husband AND lover
        Lit. `I didn't find both a husband and a lover' implies that a husband was found

(61)   lo macati gam ba'al ve gam me'ahev
        not I-found also husband and also lover
        Lit. `I didn't find both a husband and a lover'

The Bulgarian data come from a chatroom corpus of 64 tokens, collected and translated for this project by Boyana Stamenova. The fact that Bulgarian may use *i* `and' and *ili* `or' interchangeably is nicely illustrated by the following example, where the same person

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[13] See Anttila and Fong (2002) as a possible model for an Optimality Theoretic account based on intra-linguistic variation in semantics.

[14] We thank Edit Doron for the data; also Julia Horvath, Erez Levon, Eytan Zweig, and Yoad Winter for discussion.

uses both connectives in the same sense in the same sentence:

(62) Само един въпрос Пуфи – защо смяташ, че предвижданията **НЕ** СЕ
ОПРЕДЕЛЯТ от харесването **и** нехаресването, одобрението **или** неодобрението.
Only one question Puffy – why do you think that the predictions are not based on the
like and dislike, the approval or disapproval.

The data below support the conclusion that Bulgarian uses *i* more liberally than English does
and. However, *ili* `or' is the connective of choice in many cases even though *i* would also be
acceptable.[15]

(63) Examples of *i* `and' in the scope of negation where the English speaker author of the
present paper judges that *and* would be appropriate in English, also:

a. За твое успокоение моята професия **няма нищо** общо с литературата **и**
поезията.
For your consolation, my profession doesn't have anything to do with fiction and
poetry.

b. Убеден съм, че атентатите нямат нищо общо с отчаяните "малки", които биха
използвали атентата да привлекат вниманието към съдбата си, да разтърсят
чувствата на тези, които **не** забелязват борбата **и** нещастието им.
I am convinced that the attacks have nothing to do with the desperate
"insignificant"(people), who would use the attack to draw the attention to their
destiny, to shake the feelings of those who do not notice their struggle and
unhappiness.

c. Така че тезата ми остава – тези юзери, които са дали такива "предвиждания"
не им достига обективност **и** реализъм...
So my argument remains – those users who have made such "predictions" do not have
suffiecient objectivity and realism…

d. Всеки капитал, за да **не** бъде разпилян по мерцедеси **и** секретарки, има своя
логика - нормалния инвестиционен процес, предлагането на нещо, което …
Every capital, so that it's not wasted on mercedeses and secretaries, has its own logic –
the normal investment process, the offering of something that…

(64) Examples of *i* `and' in the scope of negation where the English speaker author of the
present paper judges that *and* would **not** be appropriate in English.

a. Сблъсъкът, който предстои обаче не е типична война и **не** може да се спечели
с класическите методи на наказателна окупация **и** разрушение.

The forthcoming conflict, however, is not a typical war and cannot be won with the classical methods of punishing occupation and destruction [agreement shows that the bracketing is *(punishing occupation) and (destruction)*].

b. И запомнете, че **никакви** японски, палестински и други жертви **няма** да направят тероризма оправдан, приемлив **и** симпатичен за нормалните хора.
And remember that no Japanese, Palestine and other victims will (not) make terrorism justified, acceptable and appealing to normal people.

c. Досега нищо **не** е потвърдено **и** доказано още.
Up to now nothing has(n't) been confirmed and proven yet.

d. Досега **нямах** навика да чета **и** да участвам в тази дискусия.
Up to now I didn't have the habit of reading and participating in this discussion.

e. И че философията на Нане и на Изродите - на "тях да им е зле" **не** е направила **никого** по-щастлив **и** по-богат.
And that Nane's philosophy of "other people should feel bad" has (not) made noone happier and richer.

(65)   Examples of *ili* `or' in the scope of negation where Stamenova judges that *i* `and' could also have been used in the `neither' sense.

a. Или простичко казано - може да си отличник в западна банка, но да **не** можеш да вдигнеш ни за година ни за две нивото на ДСК , БББ **или** Първа до тяхното.
Or, simply said, it is possible that you're excellent at a Western bank but (that) you cannot improve not for a year, not for two, the level of DSK, BBB or First to theirs.

b. Не става дума за частни уроци а за превръщането на детето в човек. **Никой не** дава частни уроци по патриотизъм **или** благонравие.
No one is giving lessons on patriotism or kind-heartedness.

c. България може да стане демократична държава само ако **никой** от тези 1 милион комунисти **или** техните роднини **не** са във властта.
Bulgaria can become a democratic country only if none of these 1 million communists or their relatives are not in the government.

d. Но той **не** е дошъл да им открадне натрупаните пари, **или** технологии.
But he hasn't come to steal their accumulated money or technologies.

e. **Не** осъждам Борис I **или** Ст. Стамболов - те са приложили единственото средство за решаване на техните задачи.
I don't judge Boris I or Stambolov – they applied the only means for fulfilling their tasks.

f. Декларирам за яснота: **не** *съм привърженик на НДСВ* **или** *партньорите му*. Това означава, че имам своите опасения за бъдещето.
I declare for clarity: *I am not affiliated to NDSV or its partners*. This means that I have my fears for the future.

(66)   Examples of *ili* `or' in the scope of negation where Stamenova judges that *i* `and' would be unacceptable or would mean `not both':

a. И никакъв Костов, Симеон **или** който ще **не** може да го направи вместо тебе!
And no Kostov, Simeon or whoever, cannot do this for you!

b. Зам.-министърът обаче **не** допусна и мисълта за незаконна сеч **или** някакви злоупотреби, а поясни, че ползвателят имал мебелна фирма, много се нуждаел от дървесина и разчитал на печалба от преработката.
The deputy minister, however, did not even accept the thought of illegal cutting or any abuses, but clarified that …

c. Ето мнението на човек, който **не** бих нарекъл глупав, крадец **или** мошеник
Here is the opinion of someone I wouldn't call stupid, a thief or a swindler.

d. Аз, както и хората, които съм командвал, не сме причинили на нито един гражданин нищо лошо, **никого не** сме обидили **или** БИЛИ,нито сме предизвикали ексцесия, каза Борисов.
I, just as the people under my command, have not done to not one citizen nothing wrong, nobody (we) not have insulted or beaten up, nor have (we) caused excession, said Borisov.

e. Председател на управителен съвет, на съвет на директорите, изпълнителен директор, прокурист и актюер може да бъде лице, което: т.9. (нова,ДВ,бр.58 от 1997 г.; изм.,бр.88 от 1999 г.) **не** извършва охранителна **или** сходна с нея дейност, **не** е съдружник **или** акционер, както и член на ръководен или контролен орган на дружество, което извършва охранителна дейност.
The chair of the Board of Directors can be a person who does not do security or similar to it activity, is not a partner or share-holder, as well as a member of ….

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