Direct vs. indirect disjunction of *wh*-complements, as diagnosed by subordinating complementizers [1]

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Szabolcsi (1997) introduced the observation that the presence of a subordinating complementizer in each coordinated clause correlates with indirect (VP-level) coordination, i.e. with the conjunction/disjunction of lifted complements. This paper revisits the observation using English, Hungarian, and Korean data. Hungarian and Korean have subordinators in both declarative and *wh*-complements, and so they allow one to study the distribution of direct vs. indirect disjunctions of *wh*-complements in a way that English does not. The present paper focuses on the following issues: (i) How and why does the presence of a complementizer in each clause correlate with lifting and thus indirect coordination? (ii) What is the distribution of direct vs. indirect disjunctions of *wh*-complements? Is there a difference between veridical vs. non-veridical matrix contexts? (iii) Are there remaining cases of direct disjunction of *wh*-complements after all? If yes, can they perhaps be explained away as conjunctions (to be dubbed *exemplifications*)?

1. Introduction

Since the early 1980s, there has been a debate in the semantics literature pertaining to whether *wh*-interrogatives can be *directly disjoined*, as main clauses and as complements. Those who held that the direct disjunction of *wh*-interrogatives was in conflict with certain theoretical considerations proposed that they could be disjoined indirectly. *Indirect disjunction* proceeds by first lifting both *wh*-interrogatives and then disjoining them; it assigns matrix-level scope to *or*. To illustrate with a skeletal example,

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(1)   a. Sue knows where you live or who you married.
        b. Lift(where_you_live) = λP[P(where_you_live)]
            Lift(who_you_married) = λP[P(who_you_married)]
        c. λP[P(where_you_live) $\lor$ P(who_you_married)]
        d. λq[Sue_knows(q)]
        e. λP[P(where ...) $\lor$ P(who ..)](λq[Sue_knows(q)]) =
           = Sue_knows(where ...) $\lor$ Sue_knows(who ...)

The next section summarizes the theoretical details of the debate, based on Groenendijk and Stokhof (1984), Szabolcsi (1997, 2015), Krifka (2001), Haida and Repp (2013), and Ciardelli, Groenendijk and Roelofsen (2015), among others. As we will see, the notorious theoretical need for indirect disjunction has disappeared by today. But the factual question remains. Are *wh*-complements disjoined directly or indirectly? What is the fact of the matter?

    Szabolcsi (1997: 324-327) made the following observation about the co-ordination of complement clauses in general:

(2)   The presence of a subordinating complementizer in each coordinated clause correlates with the coordination of lifted complements; in other words, with *indirect* coordination.

Languages that have overt subordinators in *wh*-complements as well allow one to study the distribution of direct vs. indirect disjunctions in a way that English does not. Among others, Hungarian and Korean are such languages. Szabolcsi found the following in Hungarian, and likewise in Korean.

(3)   Complementizer *hogy* is required in each disjunct:
        János megtudta, hogy   kit   vettél   feleségül
        John found.out   SUB   whom took.2sg as.wife
        vagy   <u>(hogy)</u>   hol   laksz.*
        or   SUB   where live.2SG
        `John found out who you married or where you live'

(4)   Complementizer *hogy* is optional in the second conjunct:
        János megtudta, hogy   kit   vettél   feleségül
        John found.out   SUB   whom took.2sg as.wife
        és   <u>(hogy)</u>   hol   laksz.
        and   SUB   where live.2SG
        `John found out who you married and where you live'

Szabolcsi interpreted these findings as support for the claim that *wh*-complements cannot be directly disjoined, although they can be directly conjoined.

    (2)-(3)-(4) serve as a point of departure for the present paper. I take a

new look at the pertinent data, primarily in English and Hungarian, in light of recent literature and my own new research. I will refer to the presence of a subordinator in each coordinated *wh*-complement clause as the "double-*hogy*" pattern (although a three-way coordination will be a triple-*hogy* one, etc.), and to the presence of only one, initial subordinator as the "single-*hogy*" pattern. I will argue for the following main claims.

(5)   The double-*hogy* pattern is indeed strongly correlated with indirect coordination. However, it is less obligatory than was claimed in (3). The single-*hogy* pattern is observed, for example, in cases that can be analyzed as *intermediate-scope* indirect disjunction. These are VP-level disjunctions within the scope of a higher operator. I propose that, among others, the non-veridical matrix contexts discovered by Haida and Repp (2013) fall into this category.

(6)   The single-*hogy* pattern also occurs, less robustly, in veridical contexts. Some of these cases yield the same interpretation as double-*hogy*, i.e. they instantiate lifting without an overt syntactic correlate. But other cases, discovered by Ciardelli et al. (2015) do not seem to involve indirect disjunction. I tentatively propose that they involve what I will call *exemplifications*.

In sum, I argue that the case against the direct disjunction of *wh*-complements remains reasonably strong, based on Hungarian. Korean possibly provides even stronger evidence, because it has less tolerance for lifting without a syntactic marker, according to judgments provided by WooJin Chung.

If this is correct, then we must conclude with resurrecting the old question: What theory of interrogatives predicts the need for indirect disjunctions?

2. Direct vs. indirect disjunctions: theoretical underpinnings

Universal quantification is a generalization of a conjunction of propositions, and existential quantification, of a disjunction of propositions. It is no wonder that many linguistic phenomena group together universals and conjunctions on the one hand, and existentials and disjunctions on the other. Starting at least with Groenendijk and Stokhof (1982, 1984), it has been noted that pair-list readings of *wh*-questions are more natural with universals than

with indefinites:

> (7) What is every girl doing?
> Alla is laughing, and Bella is sleeping, and Celia is snacking.
> (8) What are two girls doing?
> ?? Bella is sleeping and Celia is snacking.

Szabolcsi (1997) and Krifka (2001) argued that a parallel contrast can be observed between plain conjunctions and disjunctions of *wh*-questions. Restricting attention to main clauses for the moment, the connective *and* is equally good in inter-sentential (9a) and intra-sentential (9b) positions. But the connective *or* is much better in the inter-sentential version, and indeed (10a) may be seen as replacing the first question with the second. (10b) is less natural.

> (9) a. Where do you live? And, who did you marry?
> b. Where do you live and who did you marry?
> (10) a. Where do you live? Or (rather), who did you marry?
> b.?? Where do you live or who did you marry?

Different explanations have been proposed for why such contrasts exist. At the heart of the explanation that Groenendijk and Stokhof offered is the claim that the semantic duty of a question is to partition the set of possible worlds: to carve it into mutually exclusive and jointly exhaustive subsets. This requires questions to have unique true and complete answers: each cell of the partition contains those worlds in which one such answer holds. Giving a particular answer locates the actual world in a particular cell. An atomic question (*What is Alla doing?*, *Where do you live?*) has a unique true and complete answer, and the conjunction of questions does too. But the disjunction of questions offers a choice. In (8), the addressee may choose to answer about Bella and Celia (as illustrated), or about Alla and Bella, or about Alla and Celia. Likewise, the intended interpretation of (10b) is that the addressee may choose to answer either the *where*-question or the *who*-question.

Taking (8) and (10) at face value, the partition theory does not qualify them as semantic questions. Whether we are happy with this result depends on how we evaluate the ?? tags in (8) and (10).

Jumping ahead in time, Krifka (2001) argued that speech acts in general, question acts among them, cannot be disjoined.

> We conclude that, while coordination [i.e. conjunction, AS] is a well-defined operation for speech acts, disjunction is not. Syntactic forms that look like disjunction of two speech acts typically are interpreted in special ways, for example, by lowering the disjunction to the propositional level or by interpreting it as a replacement of the first speech act.

Why are there no natural cases of speech act disjunctions? If we see speech acts as operations that, when applied to a commitment state, deliver the commitments that characterize the resulting state, then we can give the following answer: speech act disjunction would lead to disjunctive sets of commitments, which are difficult to keep track of. Take commands as an example. Uttering a conjoined command [A & A'](s) leads, in general, to the union of the commitments that A(s) and A'(s) would have led to: A(s) $\cup$ A(s'). But a disjunction of A and A' at the state s could only be captured by a set of commitment states which we would have to under stand disjunctively, {A(s), A(s')}. This is of a higher type than a simple commitment state, and further disjunctive speech acts would lead to still higher types. Hence, we cannot have speech act disjunction and a uniform type of commitment states, namely sets of commitments, at the same time. (Krifka 2001:16)

Because Krifka is concerned with speech acts in semantic, not in pragmatic, terms, his response is fully relevant to us. However, its scope is limited to main clauses and, perhaps, certain special complements. (11) and (12) contain *wh*-complements but no speech acts (no question acts):

(11) a. Sue knows what every girl is doing.
b. Sue knows what two girls are doing.
(12) a. Sue knows where you live and who you married.
b. Sue knows where you live or who you married.

The contrasts noted in main clauses disappear in *know*-complements. (11) and (12) are important, because the literature in general was concerned with both main-clausal and complement uses of *wh*-interrogatives.

Groenendijk and Stokhof (1984) (henceforth G&S) proposed that (8) and (10) need not be taken at face value. Quantification and coordination can operate on interrogatives that are each first lifted to generalized quantifiers.

(13) *Lifting* of interrogative Q: $\lambda P[P(Q)]$
where P is a property like *is known by Sue*, *is a secret*, etc.
(14) *Indirect* conjunction/disjunction:
$\lambda P[P(Q_1)] \cap/\cup \lambda P[P(Q_2)] = \lambda P[P(Q_1) \cap/\cup P(Q_2)]$
(15) *Direct* conjunction/disjunction:
$Q_1 \cap/\cup Q_2$

When the participating interrogatives are first lifted, their coordination is *indirect*: it pertains to sentences or verb phrases that contain interrogatives, but not to interrogatives themselves. We illustrate this with (1), repeated:

(16) a. Sue knows where you live or who you married.
 b. Lift(where_you_live) = λP[P(where_you_live)]
  Lift(who_you_married) = λP[P(who_you_married)]
 c. λP[P(where_you_live) ∨ P(who_you_married)]
 d. λq[Sue_knows(q)]
 e. λP[P(where ...) ∨ P(who ..)](λq[Sue_knows(q)]) =
  = Sue_knows(where ...) ∨ Sue_knows(who ...)

By invoking indirect disjunction, G&S have their cake and eat it too. *Wh*-interrogatives joined with *or* do not need to run counter to the partition theory of the semantics of questions. G&S maintain that both main-clause questions and *wh*-complements can be lifted. According to them, the ??-marked examples (8) and (10) may be more labored than (7) and (9), but they are essentially acceptable.

Szabolcsi (1997) adopted the partition theory, but disagreed with G&S as to where lifting is appropriate. She argued that, unless we literally adopt Ross's performative hypothesis, according to which all main clauses are embedded under a silent performative verb, it is unnatural to interpret main clauses as generalized quantifiers in the manner of (16): main clauses will never combine with the expressions *P* that generalized quantifiers are functions of. The natural habitat of lifted questions is the complement position. So, if the ??-marked main-clausal (8) and (10) are acceptable at all, they must have other interpretations. (8) admits a "mention-some" question analysis with a narrow-scoping indefinite (Szabolcsi 1997: 323) and (10), a "question replacement" analysis (Szabolcsi 1997: 325). This is the same conclusion that Krifka subsequently reached with reference to speech acts. On the other hand, Szabolcsi subscribed to the use of lifting in the treatment of *wh*-complements. [2]

The present paper will not study main-clause questions further; our focus is on *wh*-complements. What is the state of the art in that domain?

A major development has been the discovery that although some *wh*-complements have strongly exhaustive readings (ones that correspond to unique true and complete answers for main-clausal questions), not all of them do. Moreover, the weaker readings cannot be obtained from the strongly exhaustive ones, but one can proceed the other way around. See Heim (1994), Beck and Rullmann (1999), Klinedinst and Rothschild (2011), Spector and Egré (2015), Theiler (2014), and Cremers and Chemla (2016), among others.

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[2] Szabolcsi's proposal for quantificational (11)-(12) differed from G&S's in other respects, motivated by the fact that in *wh*-complements, not only upward monotone quantifiers support pair-list readings. This issue was central to Szabolcsi (1997), but it does not concern us here.

For example, Cremers and Chemla elicited judgments for (17) in a situation in which out of four squares, two blue and two red, John correctly remembered the two blue ones as blue, but thought that one of the red squares was green and had no recollection of the color of the other red square.

    (17)   John knew which squares were blue.

A significant number of speakers judged (17) to be false, apparently assigning it a strongly exhaustive reading (John did not know about each of the squares whether it was blue or not). But a significant number of other speakers accepted (17) as true, which indicates that weaker readings are also available. The non-negotiable requirement is for John to have no false beliefs regarding the facts that the question is explicitly concerned with.

Consequently, the partition theory, which does not recognize weaker readings, has been abandoned. Among others, Inquisitive Semantics has developed a non-partitional theory for questions, for reasons going beyond those discussed above. As a by-product, the disjunction of questions is predicted to be unproblematic, as far as the basic semantics goes. See Mascarenhas (2009) and Ciardelli, Groenendijk and Roelofsen (2015).

3. A single complementizer vs. one in each conjunct/disjunct

3.1 *The subordinating complementizer as a type-lifter*

To set the stage, let us start with some English examples. Consider the following pairs. There is a subtle but systematic contrast between single-*that* and double-*that* examples:

    (18)   *Sue was surprised <u>that</u> John was drunk and Mary was driving.*
             can mean: `surprised by the combination'
    (19)   *Sue was surprised <u>that</u> John was drunk and <u>that</u> Mary was driving.*
             preferred: `surprised by this and surprised by that'
    (20)   *Sue was surprised <u>that</u> John drinks or Mary gambles.*
             can mean: `surprised by the disjunction'
    (21)   *Sue was surprised <u>that</u> John drinks or <u>that</u> Mary gambles.*
             preferred: `surprised by this or surprised by that, I am not sure which'

In first-personal attitude reports, double-*that* results in infelicity, because it forces a reading where the speaker is not sure what he/she knows (believes, regrets, etc.):

(22)   *I know that John drinks or Mary gambles.*
         felicitous: `I know the disjunction'
(23)   *I know that John drinks or that Mary gambles.*
         less felicitous: `I know this or I know that, I am not sure
         which I know'

What explains the contrasts? Szabolcsi (2015b) proposed the simple idea that the subordinator is a type-lifter: it signals that its clause is slated to be the argument of an embedding verb. I.e. *that John drank* is a function from embedding verbs to VPs. Now, if the subordinator is present in both clauses, they are first lifted individually and then get conjoined/disjoined. The interpretation is (a), which guarantees that the embedding verb distributes into both conjuncts/disjuncts, as in (b):

(24)   a. *that A and/or that B* = $\lambda P[P(A)] \cap/\cup \lambda P[P(B)]$ =
             = $\lambda P[P(A) \cap/\cup P(B)]$
         b. $\lambda P[P(A) \cap/\cup P(B)](verb)$ = $verb(A) \cap/\cup verb(B)$

If only one subordinator is present, then it is at least possible for *A* and *B* to be directly conjoined/disjoined and, therefore, for the verb not to be distributed into the individual conjuncts/disjuncts:

(25)   a. *that A and/or B* = $\lambda P[P(A \cap/\cup B)]$
         b. $\lambda P[P(A \cap/\cup B)](verb)$ = $verb(A \cap/\cup B)$

Why is it only possible, not necessary? Even if the subordinator is a lifter, lifting might also apply freely (as it is customarily assumed). If so, then the single-*that* examples are predicted to be ambiguous. It is plausible that there is an additional economy constraint that prefers as little lifting as is compatible with the overt material. (But see also *3.4*.)

(26)   Free lifting (possible but dispreferred in view of the
         overtly marked double-*that* option in (24)):
         that A and/or B = $\lambda P[P(A)] \cap/\cup \lambda P[P(B)]$ =
         = $\lambda P[P(A) \cap/\cup P(B)]$

This seems like a correct first approximation of the judgments. It is definitely a correct approximation of the Hungarian data.

3.2 *Coordination of interrogative and declarative complements*

Starting with Mascarenhas (2009), one argument in favor of the Inquisitive Semantic notion of meaning has been that it provides a common denominator for declaratives and interrogatives, and thus enables us to conjoin them. Roelofsen (2014) provides the following example:

(27)   Bill knows which girl Fred likes and that he asked her out
        on a date.

Note, however, that this sentence becomes ungrammatical on the intended reading if *that* is omitted, and thus the suspicion arises that (27) involves VP-conjunction, facilitated by lifting:

(28)   Bill knows which girl Fred likes and he asked her out
        on a date.
        cannot mean `Bill knows (this and that)'
        only means `Bill knows this and Bill asked her out'

Thus the contrast between (27) and (28) supports the lifting-inducing role of the subordinator (irrespective of what it entails for Inquisitive semantics).

3.3 *The complementizer as a "bridge"*

What if *that* is, in fact, not a type-lifter, i.e. if *that John was drunk* cannot be regarded as a function that takes a propositional attitude verb as an argument? Moulton (2015), following Kratzer (2006), argues that the attitude verb does not select for a proposition. Instead, it selects for an abstract individual (notated as x_c) whose content is given by the complement clause, in the manner of Predicate Modification:

(29)   a. $CONT(x_c)(w) = \{w' : w'$ is compatible with the
            intentional content determined by x_c in w$\}$
        b. $[[C]] = \lambda p\, \lambda x_c\, \lambda w\, [CONT(x_c)(w) = p]$
        c. $[[$ that Fred left $]] = \lambda x_c\, \lambda w\, [CONT(x_c)(w) =$
            $= \lambda w'[$Fred left in w'$]]$
(30) $\lambda x_c\, \lambda w\, [$John explained$(x_c)(e)(w)]\ \cap$
        $\lambda x_c\, \lambda w\, [CONT(x_c)(w) =$ that Fred left$]$
        $= \lambda x_c\, \lambda w\, [$John explained$(x_c)(e)(w) \wedge CONT(x_c)(w) =$
        that Fred left$]$
(31) $\exists$-closure and event-abstraction:
        $\lambda e\, \lambda w\, \exists x_c\, [$John explained$(x_c)(e)(w) \wedge CONT(x_c)(w) =$
        that Fred left$]$

Over and above general considerations, such an analysis would make sense for Hungarian. Recall that all complement clauses are introduced by *hogy*. The *hogy*-clause combines with the verb directly, or it first attaches to the distal demonstrative "head" *az*. (All the clause types to be introduced in the next section work identically.) For consistency, I continue to gloss *hogy* as SUB.

(32) a. *(az,)*   *hogy*   *Kati*   *otthon*   *van*
   DEM   SUB   Kate   home   is
   `that Kate is at home'

   b. *(az)*   *a*   *tény,*   *hogy*   *Kati*   *otthon*   *van*
   DEM   the fact   SUB   Kate   home   is
   `the fact that Kate is at home'

Let us assume that the *hogy*-clause always attaches to DEM, but DEM may be phonetically null. (See de Cuba and Ürögdi (2009) for details.) It is plausible that *(az,) hogy Kati otthon van* is a generalized quantifier over content individuals x_c, and *hogy* is a "bridge", as per Moulton, between such an individual and the complement content.

(33) $\lambda P \lambda e \exists x_c [P(x_c)(e)(w) \wedge \text{CONT}(x_c)(w) =$
   that Kate is at home]

The same *hogy*-construction in Hungarian specifies quotational content, something that English expresses with apposition:

(34) a. *az*   *(a*   *szó,)*   *hogy*   *"nem"*
   DEM   the   word   SUB   *nem*
   `the word *nem'* [expresses negation]

   b. *az*   *(a*   *mondat,)*   *hogy*   *"Nem megyek haza"*
   DEM   the   sentence   SUB   *Nem megyek haza*
   `the sentence *Nem megyek haza'* [occurred twice]

Note that none of these constructions involves a relative clause. Relative clauses also have demonstrative "heads", but they are introduced by relative pronouns (e.g. *amelyik* `which') and not by *hogy*. Those are not interchangeable; the strings below are word salads.

(35) a. *   *az (a tény), amelyik Kati otthon van*
   *`the fact which Kate is at home'

   b. *   *az (a kérdés), amelyik Kati hol van*
   *`the question which where Kate is'

   c. *   *az (a szó,) amelyik "nem"*
   *`the word which *nem'*

How does such a rethinking of the role of *hogy* affect the coordination situation? The content of one x_c cannot be identical to two distinct propositions. If we have two propositions, one possibility is to conjoin/disjoin them before the result specifies the content of x_c with the help of one *hogy*:

(36) $\lambda P \lambda e \exists x_c [P(x_c)(e)(w) \wedge \text{CONT}(x_c)(w) =$ that Kate is at home and/or Mary is at home]

Alternatively, two distinct quantifiers can be formed with the two proposi-
tions and they are subsequently conjoined/disjoined. Once (37) combines
with the matrix verb, the result is no different from (24).

(37) $\lambda P\lambda e\exists x_c$ [$P(x_c)(e)(w) \wedge CONT(x_c)(w)$ = that K ...] $\cap/\cup$
$\lambda P\lambda e'\exists y_c$ [$P(y_c)(e')(w) \wedge CONT(y_c)(w)$ = that M ...] =
$\lambda P[\lambda e\exists x_c$ [$P(x_c)(e)(w) \wedge CONT(x_c)(w)$ = that K ...] $\cap/\cup$
$\lambda e'\exists y_c$ [$P(y_c)(e')(w) \wedge CONT(y_c)(w)$ = that M ...]]

($P(y_c)(e)(w)$ should really be $<e,t>$; we intend to lift over the matrix verb.)
   If this is correct, the results of the lifting account of the single-*hogy* vs.
double-*hogy* contrast can be replicated.

3.4 *A caveat re:* az*, the demonstrative "head"*

Further work will be needed to fully figure in the contribution of *az*.
Whether *az* can be present at all is contingent on the embedding verb and on
topic-focus relations. In principle there are five possibilities, of which the
work I am reporting in this paper has scrutinized the contrast between (d)
and (e).

(38) a. <u>az</u>,   hogy S_1 és/vagy   <u>az</u>,   hogy S_2
          DEM SUB S_1 and/or   DEM SUB S_2
       b. <u>az</u>, hogy S_1 és/vagy hogy S_2
       c. <u>az</u>, hogy S_1 és/vagy S_2
       d. hogy S_1 és/vagy hogy S_2
       e. hogy S_1 és/vagy S_2

Scrutinizing the contrast especially between (a) and (b) might help fine-tune
the analyses. Recall from *3.1* that English single-*that* sentences were tenta-
tively claimed to be ambiguous between a direct and an indirect coordina-
tion reading. The more careful survey of Hungarian data has yielded the
same result for single-*hogy* wh-complements. At the end of *3.1*, I proposed
that this ambiguity is due to the fact that lifting can freely apply to the sec-
ond member of the coordination. Whether lifting is indeed a free operation
(as generally assumed in the semantic literature) or such sentences can con-
tain phonetically null elements (*that*$_\varnothing$, *hogy*$_\varnothing$, *az*$_\varnothing$, perhaps even *it*$_\varnothing$) that
correspond to the operations that result in indirect coordination is an inter-
esting question. However, I have not done either the descriptive or the theo-
retical work needed to address it. It is entirely left to future research.

3.5 *Interim summary*

This section addressed how and why the presence of iterated complementizers correlates with indirect coordination involving lifting. It was proposed that the subordinating complementizer can be interpreted either as a type-lifter or as a "bridge" in the spirit of Moulton (2015). In either case, two complementizers will correspond to two generalized quantifiers, and the embedding verb will be distributed over the members of the coordination. Thus, *Sue was surprised <u>that</u> John was drunk and <u>that</u> Mary was driving* will be interpreted as Sue experiencing two surprises. Examples with a single complementizer will be able to carry the direct coordination (single surprise) reading. If such examples are in fact ambiguous, the type-lifter analysis easily allows for separate liftings to occur even in the absence of a second overt complementizer, subject to some economy condition.

For simplicity, the rest of the paper will talk about indirect coordination in terms of lifting, but the availability of the alternative analysis in terms of Moulton (2015) will always be assumed.

4. Subordinators in wh-complements

Hungarian has an invariant subordinating complementizer (*hogy* /hod'/) in all complement-clause types. It will be glossed as SUB.

(39) *Tudom,*   *hogy Kati otthon*   *van.*
know.1SG   SUB Kate home   is
`I know that Kate is at home'

(40) *Tudom,*   *hogy Kati otthon*   *van-e.*
know.1SG   SUB Kate home   is-INTERROG
`I know whether Kate is at home'

(41) *Tudom,*   *hogy Kati hol*   *van.*
know.1SG   SUB Kate where   is
`I know where Kate is'

(42) *Követelem,*   *hogy Kati otthon*   *legyen.*
demand.1SG SUB Kate home   be.SUBJ.3SG
`I demand that Kate be at home'

Invariant *hogy* makes it easy to examine the same coordination patterns across all clause types.

Other languages also have separate subordinators in *wh*-complements, even though they may not be identical to the subordinators in declarative complements. Korean *ci* in (43) perhaps plays a role similar to *hogy* in (41), although it is not an all-purpose subordinator (S. Nam, W. Chung, p.c.):

(43)　　*John-un　sonnim-i　eti-eyse　o-ass-nun-ci*
　　　　　John-TOP　guest-NOM　where-DAT　come-PRES-SUB
　　　　　alanay-ss-ta.
　　　　　figure.out-PAST-DECL
　　　　　`John figured out where the guest comes from'

5. Veridical vs. non-veridical contexts: Haida and Repp 2013

As was mentioned in the introduction, Szabolcsi (1997) made the following claim based on Hungarian examples like (3)-(4) and their Korean counterparts, and concluded that the obligatoriness of the double-*hogy* (double-*ci*) pattern supported the need for indirect *wh*-complement disjunction.

(44)　　Complementizer *hogy* is required in each *wh*-complement disjunct, but optional in the second *wh*-complement conjunct.

The matrix verb Szabolcsi used was `find out', because such factives played a central role in G&S's theory of questions.

　　Haida and Repp (2013) argue that the disjunction of *wh*-complements is unacceptable in a veridical environment, but acceptable in a decreasing or non-veridical one. The first part of their claim is in agreement with Szabolcsi's, but the second part is not: it clearly indicates that we must go beyond considering veridical matrix clauses.

　　I acknowledge that Haida and Repp's (H&R) discovery has a counterpart in Hungarian. When *megtud* `find out' is replaced by *nem tud* `not know', or a monotone decreasing subject or adverb is added to the matrix clause, the single-*hogy* pattern becomes natural. (The improvement under negation is more marginal in Korean; W. Chung, p.c.) I will argue, however, that H&R's discovery is by and large compatible with the "indirect *wh*-disjunctions only" view. It will be critical to note, in line with (26), that lifting may be available in the presence of a single (overt) subordinator.

　　On H&R's view, *wh*-question disjunctions denote proper semantic questions, but are pragmatically deviant outside specific contexts. These specific contexts are contexts that license polarity-sensitive items (PSIs): decreasing or non-veridical ones. In PSI-licensing contexts, the pragmatic inadequacy disappears due to a pragmatically induced recalibration of the implicature triggered by *or* (cf. Chierchia 2004). H&R write,

[29]　　The police did [not [find out [$_{orP}$ [$_{Q1}$ how Paul got home that night] [$_{or'}$ or [$_{Q2}$ when Paul got home that night]]]]]

The unenriched meaning of [29] that occurs in a non-veridical context

is given in [30].

[30]   ¬find_out (the_police, ans({p1 ∨ p2 | p1 ∈ [[Q1]]^g ∧
        p2 ∈ [[Q2]]^g }))

[31]   ans(Q) = λw.∀p(p ∈ Q → p(w))

If we assume, as before, that Paul in fact got home only by bus and only at 3 a.m., [30] is the semantic object in [32], where ANS is the proposition in [33].

[32]   ¬find_out(the_police, ANS)

[33]   ANS = λw(Paul got home by bus in w ∨ Paul got home at 3 a.m. in w)

In contrast, a locally enriched meaning that occurs in a veridical context:

[14] *   The police found out how or when Paul got home that night.

[45]   find_out(the_police, O$_{ALT}$ (ans({p1 ∨ p2 | p1 ∈ [[Q1]]^g ∧
        p2 ∈ [[Q2]]^g })))

p$_{bus}$ and p$_{3am}$ are true in the actual world: they are elements of [[Q1]]^g and [[Q2]]^g, respectively, which are sets of true answers. This means that the enriched embedded proposition, i.e. (p$_{bus}$ ∨ p$_{3am}$) ∧ ¬(p$_{bus}$ ∧ p$_{3am}$), is false in the actual world. This produces a presupposition failure under the factive verb *find out*, and more generally, a failure of the existence presupposition of the embedded wh-question. That is we assume that a wh-question Q presupposes that there is a true answer, which is not satisfied by the pragmatically enriched answer to Q. This also explains why wh-disjunctions neither can be embedded under non-factive verbs like *tell* (not illustrated). (Haida and Repp 2013: 266)

I do not find the argument that these examples represent direct disjunctions compelling. Within the immediate scope of decreasing operators (DE) it is impossible to distinguish the following two constellations:

(45)   a. DE > verb(Q$_1$ or Q$_2$)
       b. DE > verb(Q$_1$) or verb(Q$_2$)

Compare:

(46)   a. The police <u>didn't</u> <u>find out</u> (how he got home or
           when he got home).
       b. The police <u>didn't</u> (<u>find out</u> how he got home or
           <u>find out</u> when he got home).

Szabolcsi's (1997) claim was that what look like disjunctions of *wh*-complements are in fact results of lifting, so that they are disjunctions of VPs. Contexts in which the truth conditions of the two structures are indistinguishable are not suitable for arguing against that position.

Indeed, I believe that the DE environments discovered by H&R work so well because of the above equivalence. That is, I believe that they are in fact cases of lifting *within* the scope of the DE operator.

In some non-decreasing, non-veridical cases, too (not from H&R) the "lift within the scope of an operator" account seems very satisfactory. It involves some lexical decomposition:

> (47)   Mary is <u>investigating</u> where John lives or what he does
>   for a living.
>   `Mary is <u>trying</u> (<u>to find out</u> where John lives or
>   <u>to find out</u> what he does for a living)'

In other words, the lifting analysis doesn't make it necessary to interpret this sentence as "Mary is investigating this or investigating that". In fact, as J. Groenendijk (p.c.) points out, that interpretation would not arise in the original 1984 framework either. In G&S's terms, *investigate*, like *wonder*, is an intensional question-embedding verb. Therefore the basic (non-extensionalized) interpretation is as below, which does not entail that Mary investigates this question or Mary investigates that question:

> (48) a. Mary is <u>investigating</u> (where John lives or what he does
>   for a living).
>   b. investigate$'$ (λi[λj[λx[John lives at x in i] = λx[John lives
>   at x in j] $\cup$ λj[λx[John does x in i] = λx[John does x in
>   j]]])

G&S would not need to decompose *investigate* into *try to find out*. I point out the possibility of decomposition, because this assimilates the case at hand to the others under consideration.

H&R's non-veridical example [37] would also be amenable to the "lift within the scope of another operator" analysis that I am advocating, if speakers indeed judge that the investigator should get the money:

> [37] *Suspicious wife to private investigator:* Find out how or when
>   my husband returned to his hotel last night! I'll give you
> $1000 if you succeed.
>
>   A week after, the private investigator tells the wife that her husband
>   returned to his hotel by bus or at 3 a.m. Should he get the money?
>   (Haida and Repp 2013: 267)

The reason is that the imperative undoubtedly involves an operator above the verb:

> (49) Find out (how my husband returned or when my husband returned).
> `bring-it-about that you (find out how my husband returned or find out when my husband returned)'

What do the Hungarian data contribute to this debate? It appears that both single-*hogy* and double-*hogy* support indirect disjunctions. However, double-*hogy* is strongly correlated with maximal-scoping disjunction, whereas single-*hogy* in this domain of data favors intermediate-scoping disjunction. See section *8* for a survey.

In sum, it seems the non-veridical examples can be generally accounted for on the lifting proposal. If so, then we are back to the veridical case for a potential source of evidence for direct disjunction.

6. A new veridical test case in Ciardelli et al. (2015)

Ciardelli et al. (2015: 80-84) offer a new data point in favor of the Inquisitive Semantics claim that *wh*-questions and *wh*-complements can be directly disjoined without a problem. They observe that (50) is felicitous as a single question.

> (50) Where can we rent a car, or who might have one that we could borrow?

They add that the Hungarian *wh*-complement version of (50) also works with a single *hogy* (data and judgments credited to D. Farkas, A. Lipták and A. Szabolcsi). The judgments are the same with *azt vizsgálja* `is investigating' in the place of *megtudta* `found out'.

> (51) *Péter megtudta, hogy hol tudunk autót bérelni,*
> Peter found.out   SUB   where can.2PL car.acc   rent
> *vagy (hogy) kinek van egy, amit   kölcsönvehetnénk.*
> or   SUB   who   has   one   which.acc   could.borrow.1PL
> `Peter found out where we can rent a car or who has one that we could borrow'

They propose that the reason why direct disjunctions of main-clause questions and *wh*-complements often sound unacceptable or incoherent is pragmatic. They comment:

> The disjunction of two questions expresses an issue that may be resolved equally well by providing information resolving the first disjunct, or by providing information resolving the second disjunct. It is difficult to see what kind of motivation (or what kind of decision problem, to follow van Rooij (2003)) a speaker could have that would lead her to raise or even consider the issue expressed by [*Where do you live or who did you marry?*]. This is very different in the case of [*Where can we rent a car, or who might have one that we could borrow?*]: in this case, it is immediate to reconstruct the sort of motivation that may lead a speaker to consider the relevant issue. We suggest that the different cognitive naturalness of the two issues at stake underlies the difference in the perceived felicity of the associated questions. (Ciardelli et al. 2015: 83-84)

I agree with the judgments and with the insight that the existence of an easily recognizable issue to which both questions pertain is an important factor in the intuitive acceptability of (50)-(51). But reference to decision problems is not explanatory. Van Rooij's Bayesian theory of questioning is not Ciardelli et al's theory of questions; decision problems or utility do not occur anywhere else in their paper. It is not even immediately clear to what extent the two theories are compatible, since van Rooij expressly argues for a partition semantics, whereas Ciardelli et al. abadon partitions. In general, I see no reason (in any case, no reason supplied by Ciardelli et al.) to impose the restriction that an interrogative disjunction should only acceptable if it responds to an easily recognizable decision problem. Thus, the reasoning does not explain why Hungarian and Korean so strongly prefer wide scope `or' readings and, consequently, subordinators in each disjunct, in most veridical contexts.

I raise the possibility that examples such as (50)-(51) represent a special kind of conjunctions that I will call exemplifications. Exemplifications are introduced in the next section.

7. Exemplifications

The distinction between *and* and *or* may appear to be among the simplest ones, but surprisingly, it is not. In exemplifications, the word *or* could easily be replaced by *and* although, I will argue, the replacement would often give the feeling of an exhaustive list, instead of an incomplete, open one.

The reader will note that some of the examples below, and some of the examples he or she may recall having seen or even produced, contain possibility modals or other plural existentials. If all exemplifications were such, it would be relatively straightforward to subsume them under the rubric of free choice (Zimmermann 2000, Menéndez-Benito 2005, Klinedinst 2007, Fox 2007, Zimmermann 2008, and others):

(52)   a.   He may be in London or in Paris =
             He may be in London and he may be in Paris
       b.   Some passengers became nauseous or had trouble
             breathing =
             Some passengers became nauseous and some passengers
             had trouble breathing.
       c.   You may take any of the cards from the discard pile =
             You may take card$_1$ and may take card$_2$ and ...

But not all exemplifications conform to the free choice patterns. Especially
in Hungarian, many of them do not involve either explicit or implicit
modals. Moreover, as the nickname indicates, their most striking character-
istic is that they offer open, incomplete lists. Non-exhaustivity is not a ro-
bust characteristic of free choice at all.

   Below are naturally-occurring examples from Hungarian and English.
Although it is quite clear that "exemplification *or*" also occurs without flags
like *among others* or *for example*, I included such flags in my Google
searches to ensure that we know what the writer actually had in mind. "Ex-
emplification" is attested with all kinds of phrases; it is not specific for *wh*-
interrogatives.

   Here is a small random sample for Hungarian (the sites were all accessi-
ble on 8/1/16). In the first hit, notice that both Szabó and Csapó played in
the soccer team. In the second, each of the three celebrities are claimed to
have worn tooth jewelry. In the third, contracts must specify both the
amount and the due date of the rent (note that this item actually involves
wh-complements!).

(53)   A Kiss Imre által vezetett Tatabányában pályára lépett többek
       között Szabó György, vagy Csapó Károly, akik még ma is jó
       játékerőt képviselnek ...
       `Among others, György Szabó or Károly Csapó, who continue to
       be strong players today, have played in [the team] Tatabánya, led
       by Imre Kiss'
       https://www.szeretgom.hu/content/74680-meglepetessel-zarult-a-
       rozi-kupa

       ... de többek között Chris Brown, Rihanna vagy P. Diddy is
       megjelent már a furcsa aranyráccsal a fogain.
       `... but among others Chris Brown, Rihanna or P. Diddy too have
       appeared with the strange gold grill on their teeth'
       http://www.life.hu/trend/20131003-kulonleges-fogekszerek-
       fogkristaly-aranyfog-fogtetko-es-kreativ-fogszabalyzo.html

       A szerződésbe rögzíteni kell többek között, hogy mekkora a bér-
       letidíj összege, vagy mikor fizetendő a bérletidíj.

`The contract must specify, among other things, <u>how much is the rent or when payment of the rent is due</u>'
<u>http://docplayer.hu/16171585-Udvozoljuk-itthon-suupohja-regi-oban-informacios-fuzet-suupohja-regioban-elo-bevandorlok-szamara.html</u>

Amerikai kutatók összefüggést találtak az időskori elbutulás (demencia) és egyes gyakran használt, többek között <u>altatóként vagy allergia kezelésére adott gyógyszerek</u> szedése között.
`American researchers have found a connection between old age mental decline (dementia) and the taking of certain frequently used medications that are prescribed among others <u>as sleep medications or to treat allergia</u>'
<u>http://www.eletforma.hu/test-es-lelek/elbutulast-okozhat-az-aller-giagyogyszer/</u>

A politikus tíz pontos „Hazaváró-kiáltványt" tett az asztalra, amelyet a következő hetekben többek között <u>Berlinben, Párizsban, Bécsben vagy épp a szintén sokezer magyarnak új otthont adó Máltán</u> fog megvitatni és kibővíteni az érintettekkel.
`The politician put on the table a ten-pont `Come-home manifesto', which will be discussed and expanded in the coming weeks with the help of those concerned, among others <u>in Berlin, Paris, Vienna, or indeed in Malta</u>, which is a new home to many thousands of Hungarians'
<u>http://nepszava.hu/cikk/1069744-ujhelyi-orban-erzeketlenul-letagadta-a-problemat</u>

de az EU több tagállamában, többek között <u>Belgiumban, Franciaországban vagy Görögországban</u> a terjesztésük egyáltalán nem, vagy csak erős korlátokkal legális.
`... in many EU-member countries, among others <u>in Belgium, France, or Greece</u>, their distribution is not legal or is seriously con-strained.'
<u>http://hirhatar.com/buntetest-von-maga-utan-ha-eiffel-tornyos-szel-fit-tesz-a-facebookra/</u>

Az ilyen műkövet használják többek között <u>sírkőként, vagy szabadtéri burkolásra (térkő)</u>, de készülhet belőle...
`Such artificial stone is used among other things <u>for grave stones or as outside pavement</u>; but it can be used to make...
<u>www.atriokert.hu/mukooszlop.html</u>

A kiújulás megjósolhatatlan, de többek között <u>fertőzés, stressz vagy terhesség is</u> kiválthatja.
`Recurrence is unpredictable, but among others <u>infection, stress or pregnancy too</u> can trigger it'
<u>www.egeszsegtukor.hu/.../lupuszazezerarcukor.html</u>

Comparable naturally-occurring data can be found in English. In the first hit, notice that the label must state each and every one of the circumstances listed, and the same item may well involve both a nutritional change and the presence of an allergen. In the second, all of Auden, MacNeice, Isherwood and Orwell are major figures whose reputations may be affected. And so on.

(54)   The label must state, for example, <u>the nature of a nutritional or compositional change, or the presence of an allergen</u>.
http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/normes-standards/internet/032-0315/index-eng.html

In what ways are the reputations of <u>such major figures as Auden, MacNeice, Isherwood or Orwell</u> enhanced or compromised by their continued associations with the period?
https://www.jiscmail.ac.uk/cgi-bin/webadmin?A2=lit-lang-culture-events;58566561.1605

Such cells are, for example, cells <u>like mucosal cells or intestinal cells</u>.
Patent US9243293 - Genes associated with posttraumatic-stress ...
www.google.com/patents/US9243293

Such sectors are, for example, <u>information technology, consumer staples, telecommunications, or utilities</u>, each of which behaves differently.
Portfolio construction via bottom-up - UBS guest speaker - University ...
https://www.coursera.org/.../portfolio-construction-via-bottom-u..

Such sites are, for example, <u>sports associations or music clubs, communal gardens or community centres</u>.
Download www.mmg.mpg....

When you provide personal data to ConRes, the potential uses include, among others, providing <u>requested information or educational materials</u>, <u>providing ConRes services via online access, or training or educational activities</u>.
https://www.conres.com/conres-your-source-for-high-technology-solutions/continental-resources-privacy-policy/

Knowledge of the existing mutations in a given patient facilitates, among others, <u>cancer prevention or the establishment of personal cancer therapy</u>.
http://www.seqomics.hu/index.php?option=com_content&view=article&id=17&Itemid=121

Some examples include <u>a person's age or whether a person smokes</u>.
http://www.cdc.gov/socialdeterminants/Definitions.html

Exemplifications occur in generic, modal, or at least quantificational contexts, i.e. "multiple-event contexts", in contrast to episodic, "single event" ones. (See Szabolcsi 2002 for a similar observation about PPIs.) It is clear, though, that non-modal, non-quantificational, realis contexts will do. See many of the Hungarian examples above, for instance the one that translates as `... but among others Chris Brown, Rihanna or P. Diddy too have appeared with the strange gold grill on their teeth'. (Note also the interesting occurrence of *is* `too' at the end of some of the open lists.)

I grant that there are some cross-linguistic differences. The most striking difference is that in Hungarian, one finds hundreds of Google hits that come from colloquial texts about everyday topics (the tooth jewelry example and the soccer team example are representative), whereas in English, it is difficult to find examples that are not from legal texts or manuals. I base my preliminary proposal on Hungarian, leaving open the issue of the cross-linguistic difference.

I propose that the use of plain *és* `and' suggests an exhaustive list, even when the conjunction occurs in non-focused position (as diagnosed by the particle-verb order in *megjelent*).

(55) a. Kati és   Mari megjelent   a   fogadáson.
     Kate and Mary showed.up   the reception.at
  b. Megjelent   a   fogadáson   Kati és   Mari.
     showed.up   the reception.at Kate and Mary
  `Kate and Mary showed up at the reception [suggests that they are the only relevant people who did]'

In this respect, *és* `and' contrasts with *X is (és) Y is* `X too (and) Y too = X as well as Y':

(56) a. Kati is   (és) Mari is   megjelent.
     Kate too and   Mary too showed up
  b. Megjelent   Kati is   (és) Mari is.
     showed.up   Kate too and   Mary too
  `Kate as well as Mary showed up [if anything, suggests that other people did too]'

Brasoveanu and Szabolcsi (2013) and Szabolcsi (2015: 167-168, 180-184) discuss this latter construction in some detail. The particles in (56) serve to highlight that Kate was similar to someone else in showing up and Mary was similar to someone else in showing up. This meaning is apparently rather resistant to exclusive strengthening. So, in Hungarian, one way to avoid the impression of giving a list that exhausts the contextually relevant cases is to use *X is (és) Y is*, and it could indeed replace *vagy* in the exemplification contexts.

I am not ready to propose a formal analysis of exemplification, but at least two possibilities come to mind. One can be traced back to Szabolcsi (1997), where it was argued that several cases that G&S treated as choice readings were in fact "mention-some" readings:

> Also, there is a type of data that has not been mentioned yet: disjunctive questions.
>
> (iii)   Who did Fido or King bite?   OK King bit John
>
> On Groenendijk and Stokhof's analysis, these are choice questions, too (and, according to their judgment, the intuitively best case).
>   What I am going to suggest is that (iii) is not an instance of the choice reading. Rather, the sole interpretation of the question is one where the wh-phrase has widest scope, i.e., `Who is such that either Fido or King bit him ?' The answer given above is a partial answer (presented in a co-operatively explicit format à la Srivastav and Krifka), which is elicited under particular pragmatic circumstances that Groenendijk and Stokhof (1984) call "mention-some" contexts. In the same vein, I assume that the pertinent distributed group reading of (ii) *Who/which boys did two dogs bite?* is also a "mention-some" example, rather than a choice reading. (Szabolcsi 1997: 323)

Szabolcsi (1997) did not attempt to extend this analysis to the full-clausal disjunctions that are in the focus of the present paper. One reason had to do with the acceptability judgments in Hungarian and Korean discussed above. Another reason was that it was not clear how *Who did Fido bite or who did King bite?* could be compositionally equated with *Who did Fido or King bite?*. However, Hirsch (2016) proposes just that kind of "mention-some" analysis, using current assumptions. So one possibility is that exemplifications in the *wh*-interrogative domain are subsumed under "mention-some" questions.
    Recall though that exemplifications are not restricted to interrogatives. Another possibility is that the exemplification construction is a conjunction, not a disjunction. A little more precisely, it is *equivalent* to a narrow-scope conjunction. This contrasts with the free-choice cases in (52), where the connective would scope over the possibility modal: *may be in London or Paris = may be in London <u>and</u> may be in Paris*.
    There have been multiple consonant proposals in recent literature to the effect that expressions that look like existentials/disjunctions are interpreted as universals/conjunctions via recursive exhaustification without a scalar alternative. Bar-Lev and Margulis (2013), Mitrović (2014), and Bowler (2014) make the case for such analyses of Modern Hebrew *kol* `every, any', Indo-European and Japanese particles of the *mo* kind, and Warlbiri *manu*, in the spirit of Fox (2007). Especially interesting to us is Mitrović's proposal

for constructions that are equivalent to *X is (és) Y is* `X as well as Y', since it might help establish a strong link between the form (*vagy* `or') and the incomplete conjunction interpretation of exemplifications.

Both the "mention-some" analysis and the conjunction analysis may explain why *or*/*vagy* is happily usable without any hallmark of lifting in (50)-(51). It is not difficult to interpret those sentences as giving just two examples of how one could get hold of a car, and indeed, they are perfectly compatible with both renting and borrowing being mentioned as viable options in the given situation.

In the absence of a settled analysis of exemplification it is certainly not possible to discard this important case, provided by Ciardelli et al. (2015), as an argument for the direct disjoinability of questions or *wh*-complements. But the possibility to put exemplification to that use should be borne in mind.

8. Surveys of Hungarian and Korean disjunctions: single-*hogy*/single-*ci* vs. double-*hogy*/double-*ci*

The 1997 claims about Hungarian, cf. (1)-(2), were based on my own observations and judgments. As has been mentioned throughout this paper, the contrasts do not appear to be as black-and-white as reported back then: there are good uses of the single-*hogy* pattern with *wh*-complement disjunctions. This was confirmed primarily by consulting hundreds of naturally-occurring examples obtained by Google searches. I have also attempted to check some of the critical cases against the judgments of other Hungarian speakers. Although I was not able to collect data that can be meaningfully statistically evaluated, it will be useful to report the informal findings. They confirm that Hungarian makes a reliable distinction between the acceptability and/or interpretation of *single-hogy* and double-*hogy* variants.

WooJin Chung, who investigated some Korean counterparts came to the same conclusion.

These data are discussed in Appendix A and Appendix B. They may be eventually presented as online supplements.

9. One potential way to predict the need for indirect *wh*-disjunction

This paper has made two main claims. One is that the presence of a subordinating complementizer in each member of a coordination very strongly correlates with indirect coordination (first lift, then coordinate) in Hungarian and in Korean. The second claim was that especially veridical contexts greatly prefer indirect *wh*-complement disjunction, as diagnosed by subordinators, and it was observed that even non-veridical contexts can be handled that way, using intermediate-scope lifting. Some potential counterexamples

remained, which may or may not be cases of exemplification (conjunction masquerading as disjunction).

If these, mainly descriptive results are by and large correct, we are left with a theoretical question: why is it that *wh*-complements prefer, or even demand, indirect disjunction? Recall that the partition theory predicted this, but there have been good reasons to abandon the partition theory. So the question arises anew.

Szabolcsi (2015b) observed that Inquisitive Semantics could in principle produce such a prediction. Groenendijk & Roelofsen (2009) and AnderBois (2012) make the following assumptions:

> (57) a. A question is both inquisitive and non-informative.
>   b. φ is inquisitive iff it contains more than one alternative.
>   c. φ is non-informative iff its alternatives cover the set of worlds (do not exclude any possibility).

To these we may add a proposal from Roelofsen and Farkas (2015:471):

Following Zimmermann (2000), Pruitt (2007), Biezma (2009), Biezma and Rawlins (2012), and Roelofsen (2013b), we will think of these types of sentences as *lists*. ... The only non-standard provision is that the non-inquisitive projection operator, !, is applied to every list item. The rationale for this is that every list item is to be seen, intuitively speaking, as one block, i.e., as contributing a single possibility to the proposition expressed by the list as a whole. This is ensured by applying !, which, roughly speaking, takes a set of possibilities and returns its union...

> *Rule for translating the body of a list*:
> [*item₁ or . . . or itemₙ*]   ⤳ $!\varphi_1 \vee ... \vee !\varphi_n$.

Now take *Who is the father or who is the mother?* In a small universe, *Who is the father?* would be as in (58a), with two alternatives; similarly for *Who is the mother?*. If *Who is the father or who is the mother?* is formed by plain inquisitive disjunction, all four alternatives are preserved and the result remains inquisitive, as in (58b). If, however, each disjunct undergoes the ! operation that flattens it, then each disjunct will consist of a single block, as in (59). Their $\cup$ will be the same. Note that now *or* $\neq \cup$, it is defined in terms of $\cup$ and !.

(58) a.

adam	adam	Who is the father?
eve	bonnie	$\wp\{w: f_w(a)\} \cup \wp\{w: f_w(c)\}$

$= \{\{ae, ab\}, \{ae\}, \{ab\}, \varnothing\} \cup$
$\{ce, cb\}, \{ce\}, \{cb\}, \varnothing\}$

clyde	clyde
eve	bonnie

adam	adam	Who is the mother?
eve	bonnie	$\wp\{w: m_w(e)\} \cup \wp\{w: m_w(b)\}$

$= \{\{ae, ce\}, \{ae\}, \{ce\}, \varnothing\} \cup$
$\{\{ab, cb\}, \{ab\}, \{cb\}, \varnothing\}$

clyde	clyde
eve	bonnie

b.

adam	adam
eve	bonnie

Who is the father?
$\wp\{w: f_w(a)\} \cup \wp\{w: f_w(c)\}$

$\cup$

clyde	clyde
eve	bonnie

Who is the mother?
$\wp\{w: m_w(e)\} \cup \wp\{w: m_w(b)\}$

(59)   If each disjunct is flattened by !, then both the disjuncts and
              their $\cup$ are as follows:

adam	adam
eve	bonnie
clyde	clyde
eve	bonnie

Since (59) has only one alternative, it is not inquisitive. Then *Q₁ or Q₂* does
not qualify as a question. Thus, this combination of assumptions would de-
rive the result that questions cannot be directly disjoined.

      However, this combination of assumptions is not one that more recent
work in Inquisitive Semantics entertains. Most importantly, the requirement
of inquisitivity has been dropped from the definition of questions (see e.g.,
Ciardelli et al. 2015: 34).[3] This highlights the fact that the predictions do not
simply depend on algebraic properties or compositional semantics; a higher-
level decision as to what we understand questions to be plays a critical role.

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[3] Definition 2.40. We say that a proposition P is:
- a statement iff it is non-inquisitive;
- a question iff it is non-informative;
- a hybrid iff it is both informative and inquisitive;
- a tautology iff it is neither informative nor inquisitive.

Appendix A. Hungarian disjunctions: single-*hogy* vs. double-*hogy*

A.1 *Naturally occurring data and elicited judgments*

The 1997 claims about Hungarian, cf. (1)-(2), were based on my own obser-
vations and judgments. I have attempted to check them against naturally oc-
curring data and the judgments of other speakers. Although I was not able
to collect data that can be meaningfully statistically evaluated, it will be
useful to report the informal findings. They confirm that Hungarian makes a
reliable distinction between the acceptability and/or interpretation of *single-
hogy* and double-*hogy* variants.

    Naturally occurring data. I individually examined ca. 600 distinct Hun-
garian Google hits produced by searches of the form "*(not) verb <u>hogy</u> wh-
word * or (hogy)*", with various different propositional attitude verbs. The
searches turned up hits where the connective *vagy* `or' was immediately fol-
lowed by a second instance of *hogy* and a *wh*-word, as well as hits where it
was immediately followed by just a *wh*-word. The basic finding was that
when the verb is factive (*tud* `know' or *megtud* `find out') and it is not
within the scope of negation or some other operator, *wh*-complement dis-
junctions with double-*hogy* are overwhelmingly more frequent than ones
with a single *hogy*. But indeed, when *(meg)tud* is preceded by *nem* `not',
kevesen `few people', *ritkán* `rarely', or even *mindig* `always', *wh*-comple-
ment disjunctions with a single *hogy* and those with *hogy* in both disjuncts
alternate fairly freely. That is, attested forms agree with my 1997 judg-
ments, modulo Haida and Repp's observation about decreasing contexts.

    Elicited judgments. In Sept. 2015, I compiled a survey for Hungarian
speakers that was distributed to 30 participants by B. Faragó in Hungary.
The survey had 9x4 items (plus fillers), arranged in 4 versions. Each item
was judged by 5 to 8 participants. This is a very small sample, but I also had
the opportunity to discuss the materials with three Hungarian colleagues, B.
Gyuris, A. Lipták, and Zs. Zvolenszky, to whom I am very grateful.
    The quadruplets had the following structure. The first two items laid out
two situations and asked participants to choose which of two situations the
single-hogy and the double-*hogy* sentences better correspond to; the second
two items asked participants to choose which of the *single-hogy* and double-
hogy sentences is better suited to describe those same situations. "Neither"
and "both" were among the possible responses.

A.2 *veridical and negated matrix verb contexts (A-B-C-D)*

    (A)   Kati megmondta nekünk, hogy mennyi idős a néni vagy
           (hogy) mi a betegsége.
           "Kate told us HOGY how old the lady was or (HOGY)

what her health problem was"

(B)　Edit kiderítette, hogy a vendég honnan származik vagy (hogy) mi a foglalkozása.
"Edith figured out HOGY where the guest hailed from or (HOGY) what his profession was"

(C)　Mari lerajzolta, hogy hol kell átvágni az erdőn, vagy (hogy) merre megy a busz.
"Mary sketched HOGY where we can cross the woods or (HOGY) where the bus runs"

(D)　Zoli nem tudja, hogy mikor van a tárgyalás, vagy (hogy) melyik cégnél van a tárgyalás.
"Zoli doesn't know HOGY when the meeting is taking place or (HOGY) at which firm the meeting is taking place"

In veridical (A-B-C), the embedding verb (`told us', `figured out', or `sketched in drawing') was the only operator in the matrix clause. In all those cases double-*hogy* was almost always interpreted with wide scope *or* (indirect disjunction), and the wide scope *or* situation (`this happened or that happened') was almost always expressed using double-*hogy*.

The same wide-scope *or* / double-*hogy* correlation held in (D), where the embedding predicate was negated (`doesn't know'). Note that Hungarian differs from English in two respects. One, *vagy* `or' is a positive polarity item (PPI) for most speakers, and two, *vagy* happily scopes above an immediately c-commanding negation. Its behavior is like that of English *someone*. See Szabolcsi (2002, 2004).

In veridical (A-B-C), single-*hogy* was mostly interpreted in the same way, with wide scope *or*, but one third of the speakers picked situations in which someone told us, figured out, or sketched a disjunction. In situations where a disjunction was told us, figured out, or sketched, the preferable expressions were balanced between single-*hogy* and double-*hogy*, but 40% responded that neither is a suitable expression.

In (D) with the negated verb, few speakers interpreted the *single-hogy* sentence with wide-scope *or*; the majority responded that the sentence is not usable; and no one interpreted it as `not>or'. In situations where neither disjuncts were true (`not>or'), almost no one found either single-*hogy* or double-*hogy* applicable. Again, recall that Hungarian *vagy* `or' is a PPI for most speakers.

In sum, in (A-B-C-D), double-*hogy* is almost always interpreted as `(neg) verb wh-CP_1 or (neg) verb wh-CP_2', and that interpretation is highly preferably expressed by double-*hogy*.

But, single-*hogy* is also preferably interpreted as `verb wh-CP_1 or verb wh-CP_2' by two thirds of the speakers, and when the situation would require

disjunction within the *wh*-complement, many speakers reject both patterns in the veridical examples and almost all speakers reject it in the negated example. Single-*hogy* is never the preferred expression in any of these situations, although it sometimes sneaks by as a possible option. When it is accepted, it is almost always interpreted with wide scoping *or* in the veridical examples.

My conclusion is that single-*hogy* may be dispreferred even as a syntactic pattern in *wh*-complements. But, moreover, the meaning that it would most straightforwardly carry, i.e. direct disjunction of *wh*-complements, is not generally accepted.

The above are consistent with the following; "WH" stands for "wh-complement clause".

1)   hogy WH_1 vagy hogy WH_2 =
        = $\lambda P.P(WH_1) \cup \lambda P.P(WH_2) = \lambda P.P(WH_1) \vee P(WH_2)$

2)   hogy WH_1 vagy WH_2 = $\lambda P.P(WH_1 \cup WH_2)$
        this meaning often rejected as inexpressible in (A-B-C-D)

3)   hogy WH_1 vagy WH_2 = $\lambda P.P(WH_1) \cup \lambda P.P(WH_2)$ =
        = $\lambda P.P(WH_1) \vee P(WH_2)$
        *last resort; usually blocked by double-*hogy *in (A-B-C-D)*

As was discussed in Section 4, there are contexts in which direct disjunctions (narrow-scope *or*) seem to be acceptable: the car-renting example from Ciardelli et al. (2015). See the discussion of (J) below.

A.3 *Decreasing or universal quantifier above the matrix verb (E-F-G)*

(E)   Lillának kevés kollégája sejti, hogy milyen filmeket
        néz, vagy (hogy) kivel jár.
        "Few colleagues of Lilla suspect HOGY what films she
        watches or (HOGY) who she dates"

(F)   Ritkán tudom, hogy a fiam miért van külföldön, vagy
        (hogy) mikor jön haza.
        "I rarely know HOGY why my son is abroad or (HOGY)
        when he is returning home"

(G)   Az orvos mindig megkérdezi, hogy hogy alszom, vagy
        (hogy) mennyit sétálok.
        "The doctor always asks HOGY how I sleep or (HOGY)
        how much I walk"

In (E-F-G), the matrix clause contained *kevés* 'few', *ritkán* `rarely', or *mindig* `always'. The significance of these is that here *vagy* `or' can take intermediate scope: `quantifier >or>verb'. The reading so obtained is indistinguishable from the `quantifier >verb>or' reading (unless the intensionality of the verb is exploited). So, if in these examples we get a larger number of readings where `or' doesn't take maximal scope, that doesn't have to mean that the disjunction scopes inside the *wh*-complement. Note that PPI *vagy*, like PPI *someone*, is not allergic to merely-decreasing operators.

My survey didn't test whether `or' can scope over the quantifiers in the subject or the adverb, because direct object disjunctions do not usually do that in Hungarian. Whether that is possible was not the main question here.

In (E)-(F), both double-*hogy* and single-*hogy* are almost always interpreted as `few>or >suspect' presented a situation in which the subject rarely knows either of the disjuncts; some speakers equally accepted single-*hogy*, double-*hogy*, or both to express this.

In (G), double-*hogy* two-way correlated with `always>or >asks'. On the other hand, single-*hogy* was interpreted equally as `always>or>asks' and as `always>asks>or'. The `always>asks>or' reading is also equally expressible using single-*hogy* and double-*hogy*.

(E-F-G) indicate that *vagy* in both double-*hogy* and single-*hogy* examples can scope between the embedding verb and the matrix quantifier. This is compatible with the above, making the first step towards the `quantifier>or>verb' readings:

4)   hogy WH$_1$ vagy hogy WH$_2$ =
        $\lambda P.P(WH_1) \cup \lambda P.P(WH_2) = \lambda P.P(WH_1) \vee P(WH_2)$

5)   hogy WH$_1$ vagy WH$_2$ = $\lambda P.P(WH_1) \cup \lambda P.P(WH_2)$ =
        = $\lambda P.P(WH_1) \vee P(WH_2)$
            not blocked in G-H-I, in contrast to 3

Why the availability of double-*hogy* doesn't seem to block this interpretation of *single-hogy* remains to be investigated.

Remarkably, in (E-F-G), a situation involving knowledge or utterance of a disjunction (`quantifier>verb>or') could be described using either single-*hogy* or double-*hogy*, to a clearly greater extent than in (A-B-C-D), which contained no quantifier:

6)   hogy WH$_1$ vagy (hogy) WH$_2$ = $\lambda P.P(WH_1 \cup WH_2)$
        (within the scope of a quantifier)

This may suggests that the direct *wh*-disjunction reading qua reading is okay and is freely available to both constructions; but it remains unclear why being within the scope of a quantifier facilitates this.

The results for (G) suggest a possible counter-analysis, namely, that the

readings here are not narrow disjunctions but, rather, non-exhaustive narrow scope conjunctions (exemplifications).

A.4 *Possible exemplifications*

If the reasoning about exemplifications presented in section 4 is by and large correct, then various examples that seemingly contain narrowest-scoping *or/vagy* may in fact have exemplification readings: conjunctions in disguise. And the fact that such readings are much more available in (E-F-G) than in (A-B-C-D) receives a natural explanation. (A-B-C-D) are basically single-event sentences, in which *vagy* means plain-vanilla `or'.

In item (H), almost exactly replicating a naturally-occurring datum, all 4 versions asked about wide-scope `or' versus wide-scope `as well as':

> (H)   A szerződésben rögzíteni kell többek között, hogy mekkora a bérleti díj összege, vagy (hogy) mikor fizetendő a bérleti díj.
> "The contract must specify among other things HOGY what is the amount of the rent or (HOGY) when the rent is to be paid"

Többek között ... hogy WH$_1$ vagy (hogy) WH$_2$ were happily accepted as true in `as well as' situations. And situations in which both "specify WH$_1$" and "specify WH$_2$" were true were judged to be describable using double-*hogy* or using either pattern. In contrast, situations in which only one of the "specify WH$_1$" and "specify WH$_2$" options was true were preferably described using double-*hogy* by most participants; this squares with the above-found correlation between wide-scope *vagy* and double-*hogy*.

Item (J) was directly based on Ciardelli et al. (2015):

> (J)   Tudjuk, hogy hol lehet autót bérelni, vagy (hogy) kinek van egy, amit kölcsönvehetnénk.
> "We know HOGY where cars can be rented or (HOGY) who has one that we could borrow"

The authors speculate, and I agree, that what makes this example different from the others is that the two clauses are variations on the same theme: how we can get hold of a car. Ciardelli et al. suggest that here we have a single decision problem in the sense of van Rooij, and the easy identifiability of this decision problem makes low-scoping *or* possible. In other words, the suggestion is that the direct disjunction of *wh*-complements is semantically acceptable, but it is pragmatically difficult when it is not easy to identify a single decision problem that the disjunction describes.

The Hungarian survey distinguished two interpretations. In one, we are confident that we know of at least one way to get hold of a car, although we

are not yet sure which of the methods under consideration will work out (=at least one option). In the other, we know two or more ways to get hold of a car (=multiple options). The latter interpretation is inspired by the finding that disjunctions can serve to convey `as well as', especially when the possibility of further options is maintained, i.e. as exemplifications.

In (J), double-*hogy* was almost always interpreted as saying that we know of multiple options, which is compatible with exemplification. One speaker responded that it can mean either multiple options or at least one option.

Single-*hogy* was balanced: three speakers interpreted it with at least one option, one with multiple options, and two as good for both. And conversely, situations in which we know multiple options vs. at least one, were described with single-*hogy*, double-*hogy*, or both, evenly distributed. Two speakers responded, though, that the at least one option (the alleged low-scoping disjunction) was not expressible either way. In sum, the multiple options interpretation/situation is more prevalent than the at least one option interpretation/situation. This speaks for the significance of exemplification, and perhaps against that of the identifiable single decision problem.

It is to be stressed that scattered judgments by 4 to 6 speakers do not constitute much of a basis for drawing a theoretical conclusion. But even these preliminary data are suggestive in showing that both the single-option scenario and the multiple-options scenario are possible -- but they make a difference. If we were dealing within a plain disjunction, there should not be a difference between these two.

Returning to (E-F-G), it is possible that the prevalence of these interpretations is not real:

7) hogy WH_1 vagy WH_2 = $\lambda P.P(WH_1 \cup WH_2)$
        (within the scope of a quantifier)

8) hogy WH_1 vagy hogy WH_2 = $\lambda P.P(WH_1 \cup WH_2)$
        (within the scope of a quantifier)

Instead, in at least some of the cases, we probably have (something equivalent to) conjunctions:

9)   hogy WH_1 vagy WH_2 = $\lambda P.P(WH_1) \wedge P(WH_2) \wedge ...$
            (in a multiple-event context)

10)   hogy WH_1 vagy hogy WH_2 = $\lambda P.P(WH_1) \wedge P(WH_2) \wedge ...$
            (in a multiple-event context)

Appendix B. Korean single-*ci* and double-*ci* (thanks to WooJin Chung)

The Korean examples and judgments in Szabolcsi (1997) were contributed by Seungho Nam (p.c.). In 2015, WooJin Chung constructed counterparts of the Hungarian survey questions; they were judged by him and several other Korean speakers. I am grateful for his help. This appendix does not contain all the data or all the discussion that he contributed.

The Korean morpheme that I take to be the analog of the subordinating complementizer in *wh*-interrogatives is *ci*, because its occurrence has a similar effect, as originally suggested to me by S. Nam. However, W. Chung informs me that *ci* is probably not a subordinator.

Single-*ci* and double-*ci* coordinations in Korean further differ in ways that Hungarian coordinations do not that we do not have space to discuss here.

The Korean data overall support the same generalizations as the Hungarian data. But interestingly, conjunctive readings surfaced even more robustly than Hungarian exemplifications.

The counterparts of veridical (A-B-C) were systematically judged to be unacceptable with one *ci,* and to carry the wide-scope `or' reading with two *ci*'s. One example:

(B)   Single-*ci* -- unacceptable
        *John-un   sonnim-i   eti-eyse   o-ass-kena   ku-uy
         John-TOP   guest-NOM   where-from   come-PAST-or   he-GEN
        cikep-i   mwues-i-n-ci   alanay-ss-ta.
        profession-NOM   what-COP-PRES-CI   figure.out-PAST-DECL
        'John figured out where the guest comes from or what his profession is.'

        Double-*ci* -- `figured out this or figured out that'
        John-un   sonnim-i   eti-eyse   o-ass-nun-ci   hokun
        John-TOP   guest-NOM   where-DAT   come-PRES-CI   or
        ku-uy   cikep-i   mwues-i-n-ci   alanay-ss-ta.
        he-GEN   profession-NOM   what-COP-PRES-CI figure.out-PAST-DECL
        'John figured out where the guest comes from or what his profession is.'

For some reason, the negated example (D) does not allow the intermediate-scoping reading. Disjunction in Korean (in contrast) to Hungarian, is not a positive polarity item.

(D)   Single-*ci* -- unacceptable
        *John-un   hoyuy-ka   encey   iss-kena   etten   hoysa-eyse
         John-TOP   meeting-NOM   when   COP-or   which   firm-at
        hoyuy-ka   iss-ul-ci   al-ci   mos-ha-n-ta.
        meeting-NOM   COP-FUT-CI   know-CI   not-do-PRES-DECL

'John doesn't know when the meeting will take place or at which firm the meeting will take place.'

Doubl*e-ci* -- `doesn't know this or doesn't know that'
John-un   hoyuy-ka   encey iss-ul-ci   hokun   etten
John-TOP meeting-NOM when   COP-FUT-CI or   which
hoysa-eyse hoyuy-ka   iss-ul-ci   al-ci   mos-ha-n-ta.
firm-at   meeting-NOM COP-FUT-CI know-CI not-do-PRES-DECL
'John doesn't know when the meeting will take place or at which firm the meeting will take place.'

Korean does not have merely-decreasing quantifiers, so (E)-(F) are absent.

(G)   Single-*ci* -- only the conjunction reading arises
na-uy uysa-nun   pangmwunha-l ttay-mata   nay-ka   ettehkey
I-GEN doctor-TOP visit-FUT   time-each   I-NOM   how
ca-kena   elmana   ket-nun-ci   mwulepo-n-ta.
sleep-or   how much   walk-PRES-CI   ask-PRES-DECL
'My doctor asks at every visit how I sleep AND how much I walk.'

Double-*ci* -- both conjunction and disjunction readings are possible
na-uy uysa-nun   pangmwunha-l ttay-mata nay-ka ettehkey
I-GEN doctor-TOP   visit-FUT   time-each   I-NOM how
ca-nun-ci   hokun elmana   ket-nun-ci   mwulepo-n-ta.
sleep-PRES-CI or   how much walk-PRES-CI ask-PRES-DECL
'My doctor asks at every visit how I sleep or/and how much I walk.'

(H)   Single-*ci* -- unacceptable
*kyeyakse-nun yele kes-tul   cwung welsey-ka elma-i-kena
 contract-TOP   many thing-PL   among rent-NOM how.much-COP-or
encey imtay-ka   manlyo-toy-nun-ci   myengsiha-eya ha-n-ta.
when   rent-NOM expire-INCH-PRES-CI   specify-must-PRES-DECL
'The contract must specify among other(many) things what the rent amount is or when the rent is due.'

Double-*ci* -- either non-exhaustified inclusive OR, or conjunction (but the latter may be due to world knowledge)
kyeyakse-nun yele kes-tul   cwung welsey-ka elma-i-n-ci   hokun
contract-TOP many thing-PL among rent-NOM how.much-PRES-CI or
encey imtay-ka   manlyo-toy-nun-ci   myengsiha-eya ha-n-ta.
when   rent-NOM expire-INCH-PRES-CI   specify-must-PRES-DECL
'The contract must specify among other(many) things what the rent amount is or when the rent is due.

More on exemplification: Korean has a morpheme *tung*, which has two meanings according to the dictionary:
- (i) a word which expresses that there are more of the same kind
- (ii) a word which is used after enumerating two words or more, and restricts the target of description to the enumerated words.

It seems that this morpheme explicitly marks exemplification.

(I) kyeyakse-nun welsey-ka elma-i-n-ci   hokun   encey imtay-ka
     contract-TOP rent-NOM how.much-PRES-CI or   when rent-NOM
     manlyo-toy-nun-ci   <u>tung</u>-ul   myengsiha-eya ha-n-ta.
     expire-INCH-PRES-CI TUNG-ACC specify-must-PRES-DECL
     'The contract must specify (among other things) what the rent amount is or when the rent is due.'

The (J) judgments contrast with the Hungarian ones in ways we do not yet understand.

(J) Single-*ci* -- unacceptable
     *wuli-nun wuli-ka   eti-eyse   cha-lul   pilli-l   swu iss-kena
     we-TOP   we-NOM   where-at   car-ACC   rent-FUT way COP-or
     nwu-ka   wuli-ka   pilli-l   swu   iss-nun   cha-lul   kaci-ko
     who-NOM   we-NOM   rent-FUT   way   COP-REL   car-ACC
     iss-nun-ci   alanay-ss-ta.
     have-PROG-PRES-CI find.out-PAST-DECL
     'We found out where we can rent a car or who has one that we can borrow.'

     Double-*ci* -- we found out at least one way to get hold of a car (preferably found out just one way).
     wuli-nun wuli-ka   eti-eyse   cha-lul pilli-l swu iss-nun-ci   hokun
     we-TOP   we-NOM   where-at   car-AC rent-FUT way COP-PRES-CI   or
     nwu-ka   wuli-ka   pilli-l   swu   iss-nun   cha-lul kaci-ko
     who-NOM   we-NOM   rent-FUT   way   COP-REL   car-ACC
     iss-nun-ci   alanay-ss-ta.
     have-PROG-PRES-CI find.out-PAST-DECL
     'We found out where we can rent a car or who has one that we can borrow.'

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