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Quantifier Words and Their Multi-functional(?) Parts*

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Formal semantic analyses often take words to be minimal building blocks for the purposes of compositionality. But various recent theories of morphology and syntax have converged on the view that there is no demarcation line corresponding to the word level. The same conclusion has emerged from the compositional semantics of superlatives. In the spirit of extending compositionality below the word level, this paper explores how a small set of particles (Japanese *ka* and *mo*, Chinese *dou*, and Hungarian *vala*/*vagy*, *mind*, and *is*) form quantifier words and serve as connectives, additive and scalar particles, question markers, and existential verbs. Our main question is whether the meanings of these particles across the varied environments are highly regular, or they are lexicalized with a variety of different meanings that bear a family resemblance. This paper does not reach definitive conclusions, but it raises analytical possibilities using Boolean semantics and Inquisitive Semantics (the semantics of alternatives). It also draws attention to systematic similarities and some differences between the multiple uses of *mo* and *dou* that have not been studied in the literature, and reviews accounts in terms of maximality and additivity.

Key words: additive, Boolean, indeterminate pronoun, Inquisitive, maximality, morphology, quantificational particle, semantics, syntax, typology

1. Compositionality

Research in semantics is guided by the principle of compositionality.

(1) The meaning of a complex expression is a function of the meanings of its parts and how they are put together.

What are the 'parts' that the principle refers to? This question has been phrased in many ways and answered in many ways, depending on the semanticist's views on the theory of grammar. Are the relevant parts surface constituents? LF constituents? Only audible parts? Possibly also phonetically empty ones? How do type-shifting and coercion fit into the picture? This paper proposes yet another way of asking the question.

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(2) Are (phonological) words the smallest parts that a compositional grammar should take into account? If not, what smaller parts are to be recognized?

Although there is no doctrine that says that word meanings are the minimal building blocks of sentence meanings, in practice semanticists often make that assumption. For example, we readily assign very complex interpretations to quantificational words without specifying how the semantic ingredients are anchored in the components of those words. That practice is probably motivated by the time-honored lexicalist tradition in syntax. It is, therefore, of some interest to observe that, in the past two decades, different lines of research have been converging on the view that words do not have a distinguished status in morpho-syntax. If that is on the right track, then it does not go without saying that words are minimal building blocks for compositional semantics.

Section 2 of the paper briefly recapitulates some results pertaining to the continuity of morphology/lexicon, syntax, and semantics. Expanding upon Szabolcsi (2010:Chapter 12), §3 through §6 draw attention to a domain of data in which recognizing the components of quantifier words seems especially interesting from a semantic point of view. Focusing on Japanese, Chinese, and Hungarian, we examine how a small set of operator particles (Japanese *ka* and *mo*, Chinese *dou*, and their Hungarian counterparts) form quantifier words and serve as connectives, additive and scalar particles, question markers, and existential verbs. The main point we wish to make is that, if semanticists are willing to abandon the safety of word boundaries and ask how the individual morphemes contribute to the complex meanings of quantifier words, they are likely to find some robust regularities and new insights. Cross-linguistic comparisons are especially rewarding. It is often difficult to determine, within one language, whether two particles are just homonyms or really the same thing, and whether a set of semantic functions form a natural class. The recurrence of patterns across languages is of great help, much like it is in other areas of grammar.

The ultimate question is whether the meanings of these particles across the varied environments are highly regular or are lexicalized with a variety of different meanings that bear a family resemblance. This is a big question, and the present paper cannot reach a definitive conclusion. It makes the first steps towards finding the answers by (i) presenting the cross-linguistic data in a way that is conducive to asking our new questions, and (ii) by exploring some unifying perspectives. These are Boolean semantics (possibly for all the particles), Inquisitive Semantics (as of this date, primarily for what we will call members of the '*ka*-family'), and proposals building on maximality and the additive function (as of this date, primarily for members of the '*mo*/*dou*-family').

2. Lessons from distributed morphology, minimalist syntax, and formal semantics

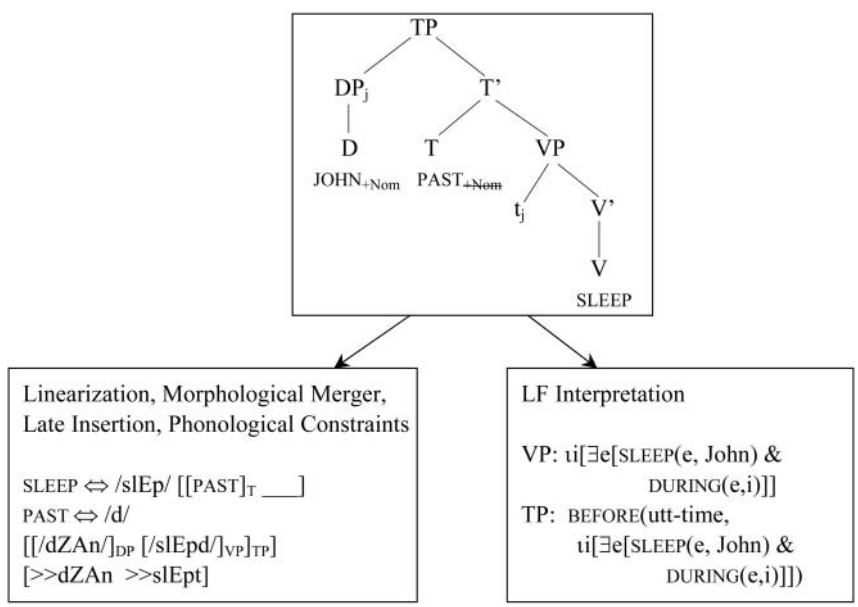
Section 2 reviews theories in morphology, syntax, and semantics that converge on abandoning words as building blocks. It proposes that the next task is to find out whether uniform interpretations can be assigned to the constituent morphemes across the various environments in which they occur.

2.1 Distributed Morphology

Two of the assumptions of Distributed Morphology (DM) (Halle & Marantz 1994) that are especially relevant to us are 'Hierarchical syntactic structure all the way down' and 'Late insertion of vocabulary items'. DM builds syntactic structures of the usual sort out of morpho-syntactic features of two types, l-morphemes (roots) and f-morphemes (e.g. plural, past). DM does not build sentences out of traditional lexical items like *destroy* (which has a causative meaning without overt causative morphology), *weaken* (causative meaning with causative morphology), *sleeping* (with regular inflection), or even *slept* (with somewhat irregular inflection). Lexical items in the traditional sense do not even exist in the theory. Once syntactic structure is built out of roots and abstract features, it is input to logical form operations, and to morphological and phonological operations, among others the insertion of phonological expressions, dubbed vocabulary items. Logical Form, Phonological Form, and the Encyclopedia each feed the meaning of the sentence on their own. Given these assumptions, the typological differences between polysynthetic and isolating languages do not require the postulation of radically different combinatoric and compositional mechanisms in universal grammar (UG), and the phonological word has no special status in semantic interpretation. See Harley (2012) for detailed discussion of semantic interpretation in DM.

The diagram below summarizes Harley's discussion of an extremely simple example, *John slept*. It illustrates that even in the presence of a verb that has a special allomorph in the context of PAST, DM keeps the verb root and the inflectional morpheme separate in the syntactic derivation, and allows each to contribute to interpretation where it belongs.

(3)



2.2 Minimalist syntax

Some versions of Minimalist Syntax make assumptions that are rather similar in spirit to those of DM (see Julien 2002; Kayne 2005, 2010; Koopman 2005; Koopman & Szabolcsi 2000; Sigurðsson 2004; Starke 2009; and many others). One of these assumptions is that each syntactic head carries one and only one feature. It follows that phonological words correspond to potentially large chunks of syntactic structure. Especially when remnant movement is allowed, many words will not even correspond to complex heads assembled by head movement in syntax, because at least some of the building blocks are phrases.

For illustration let us consider the recent analysis of *jede Frau* 'every woman' in Leu (2010), which builds on a theory of the internal structure of German adjectival phrases and determiners developed in Leu (2009). The semantic core of the phrase is formed by the distributive morpheme *je* and the NP *Frau*, which correspond to the traditionally recognized constituents of English *every woman*. In contrast to *every*, *jede* also contains *-d* and the agreement morpheme *-e*. One might assume that *-d* is the definite article, but that would predict that the choice of the agreement morphemes matches article agreement. Leu observes that, instead, it matches adjectival agreement. He argues that the *-d* in *jede* is the relative pronoun.

(4)	je-d-er	Mann 'every man'		gut-er	Mann 'good man'
			vs	d-er	Mann 'the man'
	je-d-**e**	Frau 'every woman'		gut-**e**	Frau 'good woman'
			vs	d-**ie**	Frau 'the woman'
	je-d-**es**	Kind 'every child'		gut-**es**	Kind 'good child'
			vs	d-**as**	Kind 'the child'

Therefore, the NP *Frau* must enter into a canonical specifier–head configuration with the Adjectival Agreement (AgrA) head. The sequence that is spelled out as *jede Frau* is a result of four phrasal movement steps, displayed in (5).

First, the NP *Frau* moves from *je*-P to the specifier of AgrA; second, the remnant *je*-P moves to a position above the relative D; third, the NP *Frau* moves out the phrase so formed, which Leu considers an adjectival projection xAP; lastly, a phonetically silent determiner D* is merged, and the remnant xAP *jede* moves to its specifier. The phonological word *jede* is dominated by a single xAP node, but xAP does not exclusively dominate *jede* in the course of the derivation, and *jede* could not be assembled purely by a sequence of head movements.

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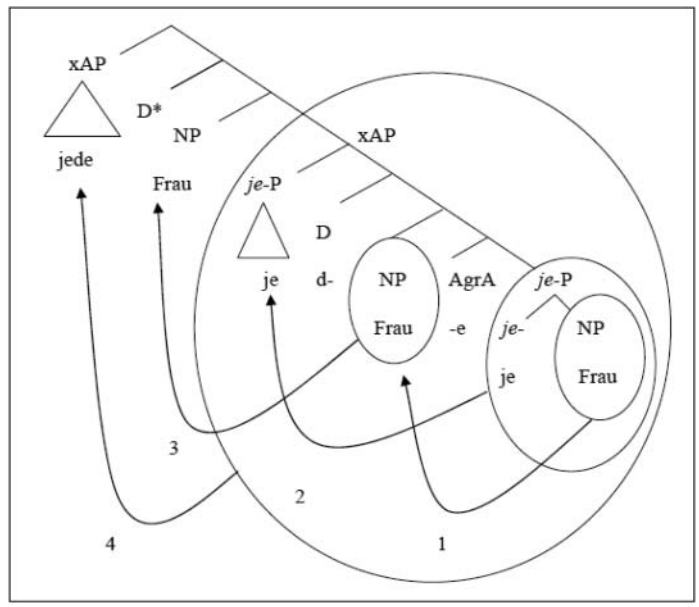


In this example the movements involving *je* and *Frau* are syntactically motivated; the semantically significant constellation is the initial one, where the two form *je*-P. It is important to point out that remnant movement reconstructs, because the remnant contains a trace that needs to be bound by its antecedent. Therefore, the movements listed above do not alter interpretation.

2.3 The semantics of superlatives

The determiner *most* is perhaps the best-explored example of a quantifier word that needs to be composed from smaller parts and whose smaller parts also reach beyond its boundaries, in order to obtain the correct interpretations in a compositional manner. As was observed in Heim (1985) and Szabolcsi (1986), sentences with superlative adjectives exhibit an ambiguity:

(6) Who climbed the highest mountain?
   a. Absolute: Who climbed the highest among mountains?
   b. Relative: Who climbed a higher mountain than how high a mountain anyone else climbed?

Both Heim (1985) and Szabolcsi (1986) described the ambiguity in terms of the scope of the superlative morpheme. On the absolute reading the scope of *-est* is DP-internal: the definition of the comparison class involves only DP-internal material. The highest mountain is understood to be the highest among mountains. On the relative reading *-est* takes sentence-level scope: the comparison involves who climbed what mountains. The syntax and semantics of comparatives and

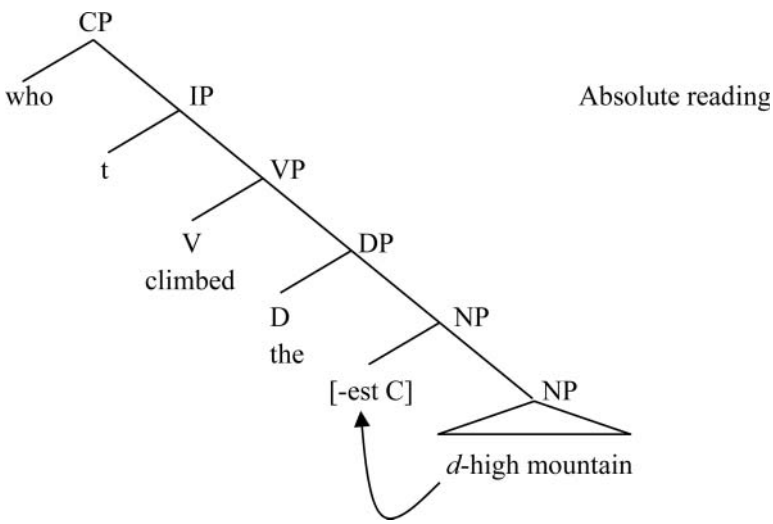
superlatives was the first domain where a part of a word was assumed to take scope over a larger chunk of the sentence, defying word boundaries—in this case, at LF.

Hackl (2009) represents the two readings as follows, adopting Heim's (1985, 1999) semantics. The variable C introduces a contextually relevant set of entities; mountains in (a), climbers in (b). *max* picks the maximal degree *d* in the set defined in {*d:* . . . *d* . . .}.

(7) Interpretation of NP-adjunction of [-est C]:
[[[-est C]$_i$ [d$_i$-high mountain]]] = λx.∀y∈ C [y≠x →
max{d: x is a d-high mnt} > max{d: y is a d-high mnt}]

(8) Interpretation of VP-adjunction of [-est C]:
[[[-est C]$_i$ climbed [d$_i$-high mountain]]] = λx.∀y∈ C [y≠x →
max{d: x climbed a d-high mnt} > max{d: y climbed a d-high mnt}]

(9)



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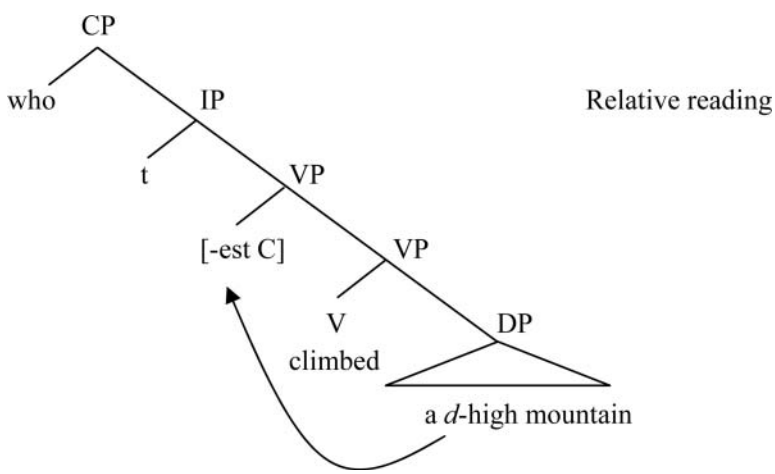

Amount superlatives exhibit a similar absolute/relative contrast. In English the two readings correspond to two slightly different constructions, *most* (*of the*) and *the most*, but other languages, German and Hungarian among them, have a single, ambiguous expression that completely parallels adjectival superlatives.

(11) Ki mászta meg a legtöbb hegyet? (Hungarian)
who climbed prt the most mountain-acc
i. Absolute reading: Who climbed most (of the) mountains?
'Who climbed a set of mountains whose cardinality was greater than the cardinality of any competing set of mountains?' = 'Who climbed a majority of the mountains?'
ii. Relative reading: Who climbed the most mountains?
'Who climbed more mountains than how many mountains anyone else climbed?'

The two readings of the amount superlative can be derived and interpreted in analogy to those of the adjectival superlative, replacing *d-high* with *d-many* (cf. *how many*).

Hackl (2009) argues that accounting for *most* in this way has conceptual and empirical advantages. The traditional treatment of the proportional determiner *most* (e.g. in Barwise & Cooper 1981) takes *most* to be a primitive. It does not recognize the fact that *most* is to *more* as *highest* is to *higher*, and an interpretation is assigned to *most* by a lexical stipulation. Hackl shows that proportional *most* is nothing other than the absolute reading of superlative *most*, in terms of both distribution and truth-conditional contribution. His approach furthermore offers an account of the fact that *fewest* and its cross-linguistic counterparts only support a relative reading.

(12) a. *Who climbed fewest (of the) mountains? (absolute)
b. Who climbed the fewest mountains? (relative)

Hackl (2009) observes that the compositional semantics that he proposes for the absolute reading of *most* simply does not yield a viable result when applied to the decreasing counterpart, although it works fine for relative *the fewest*. (For the details we refer the reader to his article.) This predicts the contrast in (12a and b). If both *most* and *fewest* were lexical primitives, and their interpretations were not derived compositionally, one could not even begin to ask why *fewest* (*of the*) is left without a meaning—for example, why it does not mean 'a minority of the [NPs]'.

As a matter of fact, Bobaljik (2012) observes that evidence from suppletion suggests that Hackl (2009) does not decompose *most* as much as needed. Cross-linguistically, positive, comparative, and superlative forms exhibit just two, rather than four, suppletive patterns.

(13)						
a.		ABC	bonus	melior	optimus	(Latin)
b.		ABB	good	better	best	
c.	*unattested*	ABA	good	better	*goodest*	
d.	*unattested*	AAB	good	*gooder*	best	

Bobaljik proposes that fundamental assumptions of Distributed Morphology account for these data if superlatives are not formed directly from the positive base but, instead, properly contain the comparative. Now notice that comparative *more* and superlative *most* also represent the ABB pattern, whatever we take the positive form (*d-many*) to be. So, *most* needs to be broken down even more; but none of the general conclusions are threatened. Importantly, suppletion provides more evidence for 'syntactic structure all the way down,' and does not point to a need to return to a lexicalist position. For analyses of absolute and relative *most* in this spirit, see Szabolcsi (2012).

In sum, the case of *most* illustrates beautifully how useful it is to build a word from smaller parts using regular syntax and a matching compositional semantics, and to allow those parts to reach out to the higher regions of syntactic structure as well. In other words, it illustrates how irrelevant the wordhood of *most* is.

2.4 Interim summary and the next task

In each of the three cases reviewed above, it was important to build word meanings from constituent parts and to allow those parts to interact with each other and with the rest of the sentence. In the case of the English past tense, the tense morpheme conditions the choice of the verbal allomorph, but it scopes over VP. In the case of German universals, *je* combines with *-d* and adjectival agreement to yield *jede*, but *jede Frau* 'every woman' is interpreted based on [*je Frau*]. Finally, in the case of superlatives, recognizing the relationship between the absolute and relative readings, obtaining the readings themselves, and accounting for the cross-linguistic patterns of suppletion, all require decomposing *most* and *fewest* and allowing their operator parts to scope out to the DP or the sentential level.[1] In short,

(14) Words are not distinguished building blocks in syntax or morphology.
(15) Words are not distinguished building blocks for compositional semantics.

With these conclusions in mind, we turn to a new domain of data that allows us to explore further aspects of how compositional analysis can, and should, extend below the word level in quantificational expressions.

Suppose we have three quantifier words that are clearly dimorphemic: $M_1 + M_2$, $M_1 + M_3$, $M_4 + M_2$. We build the meanings of the three words from meanings that we attribute to the four constituent morphemes, based on their contributions to these words. Is that sufficient for making the analysis compositional?

[1] The question whether scope assignment is implemented using movement is orthogonal to present concerns, and the decision may vary from theory to theory. The important point is that empirical generalizations do not force us to recognize words as distinguished building blocks outside phonology. With an appropriate logical apparatus it is possible to assign correct interpretations to surface constituents, phonological words among them (cf. Jacobson's 2002 notion of direct compositionality).

If the four morphemes only occur in these words and perhaps a few others that come from the same mold, then the answer may be yes. If, however, these morphemes also occur in very different further environments, then only paying attention to our initial little paradigm will not do. We need to assign interpretations to M_1, M_2, M_3, and M_4 in a way that is valid for their occurrences in other environments as well—in all environments that reliably contain the same morphemes.

Such requirement is commonplace in the compositional semantics of phrases. The same standards should apply to compositional semantics involving parts of words. But now the task is more difficult, in part because we semanticists have much less experience with it. It may be difficult to ascertain that the identical, or similar, elements actually represent the same morpheme, and it may be difficult to find the fairly abstract common semantic core. It is tempting to give up and assume that morpheme combinations are lexicalized with particular meanings that cannot be obtained compositionally, or that the morphemes themselves are 'multi-functional'. In this situation it is very useful to look for a domain of data where similar patterns can be observed in many languages, both related and unrelated ones. If the recurrence of the same morpheme in a set of roles is cross-linguistically fairly stable, that indicates that we are not dealing with homonymy in the individual languages. Sub-patterns are probably also suggestive in connection with which of the roles are more closely related and which others may be derived, perhaps with the help of type-shifters or phonetically null morphemes.

Quantifier words of the 'someone'/'everyone' type and the occurrences of their constituent parts in other environments offer a rich domain of cross-linguistic data for such study. This paper cannot hope to propose a definitive analysis for them. Its goal is

(16) a. to provide an initial description of the data;
b. to address some concerns, voiced in the typological literature, regarding the cross-linguistics significance of the patterns;
c. to suggest some unifying semantic perspectives; and
d. to indicate some of the currently problematic points and open questions.

In other words, the aim of this paper is to initiate and inspire a systematic study of quantifier words and their constituent parts, rather than to complete the project in one fell swoop.

3. Quantifier words and their multi-functional(?) parts

Section 3 surveys the basic patterns pertaining to quantifier words composed of indeterminate pronouns and quantificational particles. In some languages the same particles also occur in other environments; the section argues that the patterns are cross-linguistically significant and deserve to be examined. In particular, Japanese *ka*, *mo*, and their Hungarian counterparts are compared.

3.1 The basic patterns

3.1.1 *Many languages systematically compose their quantifier words from a set of particles and a set of bases*, the latter often called indeterminate pronouns. Slavic languages are perhaps the best known for this. Below we provide a small sample from Hungarian, a language that belongs to the Finno-Ugric branch of the Uralic family. A description of Hungarian quantifiers can be found in Csirmaz & Szabolcsi (2012), with many full-sentential examples. For a general discussion of Hungarian syntax and the syntax/semantics interface, the reader is referred to Kiss (2002).[2,3]

(17)	ki	vala-ki	minden-ki	bár-ki	akár-ki	sen-ki
	PERSON	some-PRSN	every-PRSN	[may]-PRSN	[want]-PRSN	[even]-PRSN
	'who'	'someone'	'everyone'	'anyone'	'anyone'	'no one'
	hol	vala-hol	minden-hol	bár-hol	akár-hol	se-hol
	PLACE	some-PLCE	every-PLCE	[may]-PLCE	[want]-PLCE	[even]-PLCE
	'where'	'somewhere'	'everywhere'	'anywhere'	'anywhere'	'nowhere'

Following Hamblin (1973), the bases are thought to be predicates or sorted variables. For example, *ki* and *who* will be interpreted as {x: PERSON(x)} or x_{PERSON}. On either analysis they contribute sets of alternatives of a grammaticized kind to the sentence. They are not thought to have an inherent interrogative force, despite the fact that in their bare form they function as 'question words'.

What does recent literature say about the quantificational particles that participate in such quantifier words? This paper will only be concerned with the equivalents of *vala-* 'some' and *mind-* 'every', so we focus on these below.

Reinhart (1997) proposed to account for the island-free scope of indefinites in English by postulating that they contain a choice-function variable, bound by freely available existential closure. This variable has the same semantic type as determiners, but Reinhart did not consider *some* and *a*(*n*) as its lexical realizations; she considered *some* and *a*(*n*) meaningless. Yatsushiro (2009) proposes that *ka*, the Japanese counterpart of *vala* and *some* in indefinites, is a choice-function variable, bound by existential closure.

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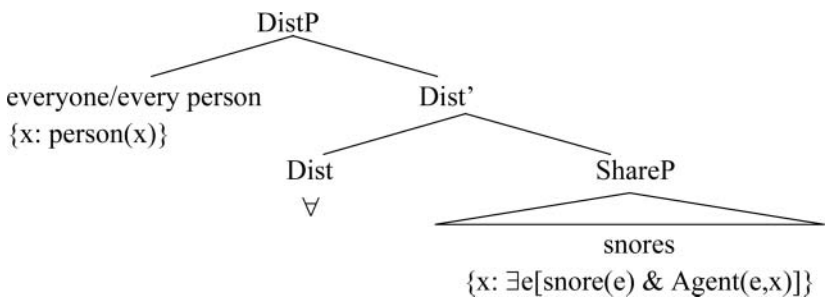
[2] Square bracketed [may], [want], and [even] indicate etymologies; see the translations in single quotes for approximate meanings. *Bár* is a concessive or optative complementizer (*Bár esik* 'Although it rains', *Bár*(*csak*) *esne* 'If only it rained'). *Se*(*n*/*m*) is a negative concord (NC) marker that also surfaces as the NC counterpart of 'also' and 'even' ((*még*) *Kati se*(*m*) 'nor Kate, not even Kate'). Etymologically *se*(*n*/*m*) is thought to be a combination of *is* and *nem* 'not'.

[3] *Hol* and *where* are not monomorphemic, but this set of examples makes the correspondences easier to illustrate with English glosses and translations. *Ho-l* consists of an indeterminate pronoun base and an archaic locative suffix; cf. also *ho-va* 'where to' and *ho-nn-an* 'where from'.

Among the quantificational elements, *every*, *minden* and their cross-linguistic counterparts, such as Chinese *dou* and Japanese *mo*, have received particular attention in the theoretical literature. Beghelli & Stowell (1997), Szabolcsi (1997a), Lin (1998), and Kratzer & Shimoyama (2002) all arrived at the conclusion that distributivity is the contribution of a sentence-level functional head, not of the DP-internal determiner. Following Beghelli & Stowell, this functional head is often referred to as Dist, and *dou*, *mo*, or some phonetically null element as the lexical content of Dist. In this view, DP-internal *every*, *minden*, and *mei* signal association with the sentence-level Dist operator and are not distributive operators themselves.

(18)



The relationship between *every*/*minden* and Dist is likened to that between negative-concord markers and sentence-level negation. Negative-concord markers signal the association, rather than express negation themselves. See Szabolcsi (2010:Chapter 8) for more detailed discussion.

3.1.2 *But the particles themselves are not confined to the above quantifier words or contexts*. Japanese presents especially extensive paradigms (Kobuchi-Philip 2009; Nishigauchi 1990; Shimoyama 2006; and others). The list of functions below is probably incomplete.[4]

(19)	a.	dare-**ka**	'someone'
	b.	gakusei-no dare-**ka**	'some student (=one of them)'
	c.	jyuu-nin-to-**ka**-no gakusei, gakusei jyuu-nin-to-**ka**	'some ten students (=approx. ten)'
	d.	Tetsuya-**ka** Akira(-**ka**)	'Tetsuya or Akira'
	e.	Dare-ga odorimasu **ka**	'Who dances?'
	f.	Akira-ga odorimasu **ka**	'Does Akira dance?'
(20)	a.	dare-**mo**	'everyone/anyone' (dep. on stress)
	b.	jyuu-nin-**mo**-no gakusei, gakusei jyuu-nin-**mo**	'as many as ten students'
	c.	Tetsuya-**mo** Akira-**mo**	'both Tetsuya and Akira'
	d.	Tetsuya-**mo**	'also/even Tetsuya' (dep. on stress)

[4] For example, Kobuchi-Philip (2010) discusses *gakusei-ga nan-nin-**mo** hashitta* 'Many students ran' and proposes that this interpretation is due to a pragmatic effect. We set this use of *mo* aside.

In the spirit of §2.4, we have the following main questions. Do the above data sets represent etymological freak accidents? If not, are the *ka* and *mo* particles multi-functional, or do they admit of unified semantic analyses? If yes, what kind of semantic analyses?

3.2 The cross-linguistic significance of the *ka* and the *mo* families

3.2.1 *Are the Japanese data in §3.1.2 cross-linguistically significant?* Haspelmath (1997) doubts the significance of what we dub 'the *ka* family'.

> When we go beyond the Japanese data, the empirical evidence confirms that there is no direct formal connection between 'or' and existential indefinites. . . First of all, although many languages have indefiniteness markers that are formally identical to disjunctive conjunctions, the situation in Japanese is quite exceptional. . . . Most of the 'or' indefinites in [Japanese, Kannada, Korean, Russian, Hungarian, Portuguese, Basque, Latvian, Romanian, Ossetic, Nanay, Hausa, and West Greenlandic] are primarily free-choice indefinites, not nonemphatic indefinites like Japanese WH-*ka*. The only exception[s] are Kannada and Nanay, which are specific (and partially Russian and West Greenlandic, insofar as these forms can also be used in irrealis-nonspecific functions). . . . The Japanese situation does not even seem to represent a tendency. . . .
>
> [W]hy is 'or' used in indefinite pronouns at all? . . . It could be that both 'or' and the indefiniteness marker arise from the same source independently. . .

(368) 'want'/'it may be' → 'or'
→ indefiniteness marker
→ *xot'*-type focus particle → indefiniteness marker

(Haspelmath 1997:165–169)

Since Hungarian is one of the languages on which Haspelmath bases his conclusions, it is of some interest to take a closer look at Hungarian. Haspelmath's main source is Hunyadi (1987), an article that specifically aimed at explaining the behavior of the particles *mind* 'every' and *akár* 'any.' Hunyadi's claims are in line with Haspelmath's positive conclusion above. But there are other particles in Hungarian, highly relevant to Haspelmath's negative conclusion, that neither Hunyadi nor Haspelmath's other sources happened to address. The data below, that is, the identification of the morphemes and their interpretations, come from the Historical-Etymological Dictionary of Hungarian (Benkő 1967–1984).

The etymological dictionary supports Hunyadi's and Haspelmath's idea that free-choice *akár* (quantificational and connective) is related to *akar* 'want'. However, the dictionary also presents a range of elements that are related to *vala-* 'some', the component of nonemphatic, specific indefinites. *Vagy* serves as the run-of-the-mill cross-categorial disjunction in Hungarian. In addition, *vagy* means 'approximately, at least' when attached to a numeral. The dictionary relates *vala-* 'some' and *vagy* 'or; approximately, at least' to the participial stem *val-* of the existential verb and to its affricative finite allomorph *vagy-* (*vagyok*, *vagy*, *vagyon* > *van*, etc.), respectively.

In other words, the functions of Japanese *ka* are mirrored by Hungarian *vala*/*vagy*, except for its question-marker (interrogative clause-type indicator) function, which Haspelmath did not even consider.[5,6]

(21)	a.	**vala**ki	‘someone’
	b.	**vala**-mi diák	‘some student (=whose identity is unknown or irrelevant)’
	c.	**vala**-mi tíz diák	‘some ten students (=approx. ten)’
	d.	Kati **vagy** Mari	‘Kate or Mary’
	e.	**vagy** Kati **vagy** Mari	‘either Kate or Mary, not both’
	f.	**vagy** tíz diák	‘some ten students (=approx. ten)’
	g.	**vagy-**, **val-**	allomorphs of ‘be’ (existential, locative, predicative copula)
	h.	**vaj**on	‘puzzlement’ (optional modifier)

Moreover, the disjunctions *A vagy B* and *A-ka B* are both positive polarity items of the same type as *something* (Crain & Thornton 2006; Goro & Akiba 2004; Szabolcsi 2002), which further supports their semantic relationship to indefinite pronouns. Contrary to Haspelmath’s impression, Hungarian has a robust set of elements that exemplify those properties of Japanese *ka* that he deems cross-linguistically exceptional.

To clarify the issue of question markers, Hungarian has no overt interrogative clause-type indicator in constituent questions. It has a clause-type indicator that is obligatory in embedded yes/no questions and is in complementary distribution with yes/no question intonation in main-clause questions: the morpheme *-e*, suffixed to the finite verb. This suffix is clearly not related to *vala*/*vagy*. To save space, only embedded examples are given below.

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[5] Regarding (a) and (b), notice that English *some* leads a double life as a bound morpheme (as in *someone*) and as a determiner (as in *some doctor* ‘a doctor whose identity is unknown or irrelevant’). In the latter role it is probably accompanied by a silent element that surfaces in Hungarian and German. Compare:

(i)	vala-ki	vala-mi doktor	*vala doktor	(Hungarian)
	some-PERSON	some-THING doctor	some doctor	
	‘someone’	‘some doctor’		
(ii)	irgend-wer	irgend-ein Doctor	*irgend Doctor	(German)
	some-PERSON	some-ONE doctor	some doctor	
	‘someone’	‘some doctor’		

Valami doktor corresponds to Japanese (*to*)*aru isha* ‘some doctor’, not to *isha-no dare-ka*. The latter is specific in Enç’s (1991) sense: it refers to an unspecified member of a previously mentioned group.

[6] Doubled *vagy* in (21e), much like Russian doubled *ili* and French doubled *ou*, has, roughly, an exclusive disjunction interpretation. The literature on Japanese and Sinhala does not mention an exclusive interpretation, although Japansese *ka* may, and Sinhala *də* must, appear on both disjuncts. Note also that English *either . . . or . . .* can, but need not, be exclusive. The effect of doubling in Hungarian, Russian, and French thus seems like a separate matter.

(22) a. Kíváncsi vagyok / Mondd meg hogy félnek-*(e).
curious be.1sg tell.imp.2sg perf SUBORD afraid.3pl-Y/N
'I am curious / Tell me whether they are afraid'

b. Kíváncsi vagyok / Mondd meg hogy ki fél-(*e).
curious be.1sg tell.imp.2sg part SUBORD who afraid.3sg-Y/N
'I am curious / Tell me who is afraid'

Gärtner & Gyuris (2007) discuss the particle *vajon*. *Vajon* is not a clause-type indicator, it is an optional question modifier that expresses puzzlement in both yes/no and constituent questions. It is only acceptable when the answer is neither known nor directly requested. *Vajon* occurs equally in main and embedded questions; only embedded examples are given below. The use of 'might' in the idiomatic translations merely approximates the meaning. *Vajon* is etymologically related to *vala*/*vagy*; understandably, Gärtner & Gyuris's formal pragmatic paper does not mention this fact.

(23) a. Kíváncsi vagyok / *Mondd meg hogy vajon félnek-e.
curious be.1sg tell.imp.2sg perf SUBORD VAJON afraid.3pl-Y/N
'I am curious whether they might be afraid'
unacceptable in 'Tell me (I know, etc.) whether they might be afraid'

b. Kíváncsi vagyok / *Mondd meg hogy vajon ki fél.
curious be.1sg tell.imp.2sg perf SUBORD VAJON who afraid.3sg
'I am curious who might be afraid'
unacceptable in 'Tell me (I know, etc.) who might be afraid'

3.2.2 *Let us turn to the* mo-*family*. The cross-linguistically prevalent fact that the particles expressing 'every', 'any', 'also', and 'even' are related has been studied from both a semantic and a typological perspective, most prominently by Gil (1995, 2008); see Gil's comments in §4.3.

Many of the roles played by members of the *mo*-family are replicated in Hungarian but, remarkably, by distinct elements, *mind* versus *is*. Interestingly, *mind* and *is* overlap in their distributive conjunction interpretation ('both'). *És* 'and' is etymologically related to *is*, but it is not an inherently distributive conjunction.[7]

(24) a. **mind**enki 'everyone'
b. **mind**en diák 'every student'
c. A diákok **mind** VP 'The students all VP'
d. **mind** Kati **mind** Mari 'both Kate and Mary'

[7] See Koopman & Szabolcsi (2000:201) for discussion of so-called emphatic *is*, exemplified in (24i). Emphatic *is* attaches to the main polarity projection of the clause (here, to the focus *Kati*), and expresses that the situation described by the clause is as was expected.

e.	Kati **is** (és) Mari **is**	'both Kate and Mary'
f.	Kati **is**	'Kate too'
g.	(még) Kati **is**	'even Kate'
h.	tíz diák **is**	'as many as ten students'
i.	[. . . és] Kati **is** lett az első.	'[. . . and] indeed Kate came in first (=as was expected)'
j.	Kati **és** Mari	'Kate and Mary'

3.2.3 *The following tables summarize the main roles of* ka, mo, *and their Hungarian counterparts*.

(25)	Japanese	Hungarian
indefinite pronoun	dare-ka	vala-ki
number is approximate	10-CL-TOP-ka	vagy 10, vala-mi 10
disjunction	X-ka Y(-ka)	X vagy Y
constituent-question marker	$[_{CP}$ dare . . .] ka	--
yes/no question marker	$[_{CP}$ . . .] ka	--
question modifier	--	vaj-on $[_{CP}$ . . .]
existential verb stem	--	vagy-, val-

(26)	Japanese	Hungarian	
universal/negative pronoun	dare-mo	mind-en-ki	
floating universal quantifier	--	mind $[_{VP}$ . . .]	
distributive conjunction	X-mo Y-mo	mind X mind Y	X is Y is
additive/scalar particle	X-mo		X is
number is large	10-CL-mo		10 N is

3.2.4 *The broader cross-linguistic picture.* Going beyond these languages, Slade (2011) demonstrates that Old Malayalam *-oo* occurs in all the roles of Japanese *ka*, and Modern Sinhala *də* in almost all its roles; declarative, as opposed to interrogative, disjunction is the exception. Similar data are discussed by Ramchand (1997) for Bengali; Jayaseelan (2001, 2011) for Malayalam; Amritavalli (2003) for Kannada; Borzdyko (2004) for Belorussian; Paul (2005) for Malagasy; Zimmermann (2009) for Korean and Hausa; Cable (2010) for Tlingit.

Xiang (2008) discusses multiple roles of *dou* in Mandarin, and Bumford et al. (2011) observe systematic similarities between Japanese *mo* and Chinese (Mandarin/Cantonese) *dou*. We turn to these in §6.

The moral, we believe, is that it is legitimate and potentially rewarding to investigate these data sets from the perspective of compositional semantics. But, indeed, languages are not all alike. The

task is to make sense of the shared patterns as well as the cross-linguistic differences, as one would do in syntax or phonology.

4. One unifying perspective: Boolean semantics

Section 4 discusses a unifying perspective for all the above-discussed particles in terms of Boolean operations, and mentions some problematic points.

4.1 ∃ and ∨, ∀ and ∧

We have seen that Hungarian *vala*/*vagy* and Japanese *ka* both function as disjunctions and participate in the formation of existential/indefinite pronouns. In addition, *vala*/*vagy* is also the stem of the existential verb, and *ka* is a question-marker (clause-type indicator, Force head). We have also seen that Hungarian *mind*(*en*) and *is* jointly express distributive conjunction, 'also', and 'even', and form universal pronouns; Japanese *mo* does all these single-handedly.

Can these interpretations be unified? As is observed by Haspelmath (1997:165) with reference to Reichenbach (1947:92) and others, a natural starting point for unification is the fact that existential quantification is reducible to disjunction, and universal quantification to conjunction. Assume that we have a finite universe where all individuals have names, for example, U = {Kate, Mary, Joe}. Then, the expressions on the left-hand side are equivalent to those on the right-hand side.

(27)	**Some**one dances	iff	Kate dances **or** Mary dances **or** Joe dances
	∃x[dance(x)]		dance(kate) ∨ dance(mary) ∨ dance(joe)
	Everyone dances	iff	Kate dances **and** Mary dances **and** Joe dances
	∀x[dance(x)]		dance(kate) ∧ dance(mary) ∧ dance(joe)

The simple facts above may provide a unified semantics for our particles, because ∃/∨ can be seen as being at work in all uses of *ka* and *vala*/*vagy*, and ∀/∧ can be seen as being at work in all uses of *mo*, *mind*, and *is*.

Being 'at work' means that the operator plays a major role in explicating the semantics of the given expression, although it may or may not exhaust its semantics. To demonstrate this, we have to go a little beyond the classical observations.

4.2 Question-markers in the ∃/∨ family

In the ∃/∨ family, the question-marker role of *ka* especially deserves some comment. Both Hamblin (1958, 1973) and Karttunen (1977) interpret a question as the set of propositions that serve as its possible answers. Unlike Hamblin, Karttunen also requires answers to be true; we set this aside for the moment. Neither theory requires answers to be exhaustive. *Kate dances* as well as *Mary dances* count as separate and true answers if both individuals dance.

In the case of yes/no questions, there are just two possible answers, the positive and the negative ones. In the case of individual wh-questions there are as many possible answers as there are individuals in the universe.

(28) *Does Kate dance?* à la Karttunen[8]
{p: p = {w: dance(kate)(w)} ∨ p = {w: ¬dance(kate)(w)}}
'the set of propositions that are identical to "Kate dances" or to "Kate doesn't dance"'

(29) *Who dances?* à la Karttunen
{p: p = {w: dance(kate)(w)} ∨ p = {w: dance(mary)(w)} ∨
p = {w: dance(joe)(w)}}
'the set of propositions that are identical to "Kate dances," or to "Mary dances," or to "Joe dances"'

Above, the sets of possible answers are defined as {p: (p = . . .) ∨ (p = . . .) ∨ . . .}, a propositional disjunction schema. The same definitions can be equivalently expressed in the following ways. (30a) defines the same set as (29), because (30a) enumerates exactly those three atomic propositions that make the disjunction in (29) true in our toy universe. (30b) defines the same set as (29) and (30a): it picks out all propositions of the form 'α dances' where α is one of the persons in the universe.

(30) *Who dances?*
a. { {w: dance(kate)(w)}, {w: dance(mary)(w)}, {w: dance(joe)(w)}}
b. {p: ∃x[person(x) ∧ p = {w: dance(x)(w)}]}

In other words, classical logical ∃/∨ is critically used in the definition of the set of propositions that questions denote. In that sense the question-marker role of *ka* is consistent with treating it as a member of the ∃/∨ family, even though questions do not make existential assertions or disjoin propositions, that is, ∃/∨ is not the main operation in their semantics.

Recall, however, that Hungarian, for example, does not use *vala*/*vagy* as a question-marker. Is this an accidental gap? Or, does it raise a red flag and indicate that unifying all uses of *ka* in the particular way suggested above is wrong? Kobuchi-Philip (2010) proposes that *ka* forms questions together with a silent CHOOSE function, namely 'choose the true answer'. Something along these lines could be a natural refinement of the unification proposal because, as was pointed out right above, ∃/∨ is 'at work,' but not the sole or main operation, in questions. One could say that Hungarian differs from Japanese in that *vala*/*vagy* fails to team up with silent CHOOSE and so it does not

[8] Each proposition is identified with that set of possible worlds {w: . . .w. . .} in which the sentence is true. Following Montague's notation, Karttunen wrote ^dance(kate) for what is written today as {w: dance(kate)(w)} or, using the λ-operator, as λw.dance(kate)(w).

participate in question formation; some other operator, or combination of operators, performs that complex job. Such a solution would rest on the following assumption.

(31) Not a bi-unique relation
It is possible for all occurrences of particle P to share the same semantic value S without P being the only particle that has that semantic value S.

We come back to the *ka* versus *vala*/*vagy* contrast in §5. Whatever the ultimate conclusions may be, it is an advantage of the present approach that it brings the puzzles about the various guises of *ka* and other operators out into the open.

4.3 Presuppositions in the ∀/∧ family

In the article on 'Conjunctions and universal quantifiers' in the *World Atlas of Language Structures* (*WALS*), Gil (2008) comments:

> [S]ome semanticists have proposed deriving the interpretations of universal quantifiers from those of conjunctions. For example, in the Boolean Semantics of Keenan & Faltz (1986), conjunctions and universal quantifiers are both represented in terms of set-theoretic intersections.
>
> How well do such semantic representations correspond to the observable lexical and grammatical patterns of languages? . . . [O]ne might suspect that they do not correspond at all well. Thus, in English, the conjunction *and* and the universal quantifier *every* are distinct words with quite different grammatical properties.
>
> However, a broader cross-linguistic perspective suggests that there are indeed widespread lexical and grammatical resemblances between conjunctions and universal quantifiers, thereby lending support to the logicians' analyses . . . .
>
> For the purposes of the [WALS] map, conjunctions are taken to include not only forms with meanings similar to that of *and*, but in addition expressions that are sometimes characterized as **conjunctive operators** or **focus particles**, with meanings resembling those of *also*, *even*, *another*, *again*, and in addition the restrictive *only*. As for universal quantifiers, these are assumed to encompass not only forms with meanings such as those of *every*, *each*, and *all*, but also expressions that are sometimes referred to as **free-choice**. . . .
>
> While the connection between conjunctions and universal quantifiers is well-motivated semantically, it is still necessary to work out the detailed mechanisms by which the relevant complex expressions derive their meanings from those of their constituent parts.
>
> (Gil 2008; emphases in the original)

For the purposes of the WALS classification, Gil assumes that conjunctive (with another common term, additive) particles are natural members of the ∀/∧ family. This requires some

comment. Minimally, one has to say that Boolean conjunction ∧ is 'at work' in 'too, also' and 'even' but does not exhaust their contribution. This weaker claim is intuitively correct, but its technical implementation is not easy. Both *Kate*, *too*, *dances* and *Even Kate dances* are thought to presuppose that someone other than Kate dances.

(32) *Kate*, *too*, *dances*
Even Kate dances
both entail 'someone other than Kate dances, **and** Kate dances'

Presuppositions are often treated as definedness conditions: the sentence containing *too* or *even* is neither true nor false if the presupposition is not satisfied. If the conjunctive contribution of *too* and *even* is only a definedness condition and not an assertion, then it is not justified to group them with 'every' and 'and'. In another approach, Schlenker (2008) proposes to treat presupposed propositions as conjuncts that are suppressed under appropriate pragmatic circumstances. This may be more of a justification for the assimilation of 'too, also' and 'even' to 'and'. But this implementation would overgenerate, because it would predict that all expressions that carry a presupposition of any kind are candidates for having a ∀/∧ marker, including definite descriptions, factive verbs, inchoative verbs, and so on. This does not seem to be the case in any language we are aware of. For example, factive verbs such as *know* and *regret* presuppose the truth of the complement clause, but neither these verbs nor their complements are marked with *mo*-like elements.

In sum, while the intuition that ∧ is part of the contribution of 'too' and 'even' seems correct, it is not obvious exactly how that intuition should be made precise. It is also relevant to point out that although Japanese *mo* and Hungarian *mind*(*en*) each play many roles, neither functions as plain 'and'. Japanese 'and' is *-to*, and Hungarian 'and' is *és*. Hungarian *is* and *és* are etymologically related, but they are never interchangeable. In Hungarian, only *és* supports collective and cumulative readings, and only *és* serves as a sequencing sentential connective.

(33) Kati **és** Mari megevett összesen tíz almát.
'Kate and Mary ate altogether ten apples (collectively or cumulatively)'
(34) Lement a nap, **és** lehűlt a levegő.
'The sun went down, and the air cooled'

Furthermore, the particle *mind-* that forms universals is entirely distinct from *és*/*is*, although the paired versions (*mind A*, *mind B* and *A is*, *B is*) coincide in meaning 'both, as well as'; recall the table in (26).

As Gil notes, a compositional analysis that unites these elements under the ∀/∧ roof, if feasible, requires much further work. It may involve the semantic decomposition of the particles and the postulation of various silent elements, somewhat in the spirit of Kobuchi-Philip's proposal for *ka* + CHOOSE.

4.4 Making the logic more general

The unresolved issues notwithstanding, it is important to point out that recognizing the ∃/∨ and the ∀/∧ relationships does not really commit us to the assumption that the universe is finite and every one of its inhabitants has its own name. (The second assumption would be more devastating. Whether or not the infinity of the world is linguistically significant, the expressions *every fork* and *some fork* definitely do not require for each fork to have its own name.) These constraints stem from expressing the relationships using predicate logic and propositional logic, as we did for expository purposes. But it is easy to move to a more general domain that is not constrained that way.

Existential quantification and disjunction both fall under the rubric of taking the set-theoretic union of more abstract semantic objects that we may use to interpret linguistic expressions; similarly, universal quantification and conjunction both fall under the rubric of taking intersections; see, especially, Keenan & Faltz (1986). For example, if DPs are assumed to denote generalized quantifiers, that is, sets of properties, then *dare-ka* 'someone' denotes the union of the sets of properties that at least one person has in the possibly infinite and nameless universe; and *Akira-ga odorimasu ka* 'Does Akira dance?' denotes the union of the set of propositions equivalent to 'Akira dances' with the set of propositions equivalent to 'Akira doesn't dance,' and so on.

The preliminary unification hypothesis in §4.1 can be stated in terms of Boolean operations as follows.

(35) *ka*, *vala*/*vagy* are union operators.
(36) *mo*, *mind*(*en*), *és*, *is* are intersection operators.

Even more generally, disjunction and union are both special cases of the join operation of lattice theory that finds the least upper bound of two appropriate things, without restricting them to be propositions or sets. Likewise, conjunction and intersection are both special cases of the meet operation of lattice theory that finds the greatest lower bound. (See Landman 1991:Chapter 6 for a thorough introduction to lattices, and Szabolcsi 1997b for a very brief one.) We may want to use these more general notions if it turns out that *ka*, *mo*, and their brothers also operate on objects that are not Boolean in nature. Events and collectives would be such. Furthermore, as Roelofsen (2013) points out, lattice theory provides an umbrella under which both the Boolean and the alternative-semantic views can be subsumed. Section 5 explores this latter view.

5. Another unifying perspective: alternatives and issue-raising

Section 5 reviews how Inquisitive Semantics has assimilated the interpretations of disjunctions and indefinites to that of questions, thus providing a more perfect match with members of the *ka*-family. (Whether this perspective will extend to the *mo*-family is left open.) The section goes on

to look at cross-linguistic differences and raises the question whether they are syntactic or semantic in nature.

5.1 The *ka*-family in inquisitive semantics

Starting with Discourse Representation Theory (DRT) and Dynamic Semantics (DS) in the 1980s, semantic theories became attentive to aspects of meaning beyond plain truth-conditions. DRT and DS were specifically concerned with anaphora and presupposition projection. Roughly at the same time, Rooth (1985) proposed a two-dimensional semantics in which the role of focus is to introduce a set of contextually relevant alternatives. Focus alternatives either remain hanging in the air or are used by operators, such as *only*, that quantify over them; if that happens, they get incorporated into the ordinary meaning of the expression. Rooth's set of focus alternatives and Hamblin's set of possible answers are the exact same set and, moreover, they are built and expanded in the same way in the course of assembling the sentence from its constituent parts (see Rooth 1992:84 for discussion of the parallelism).

(37) *Who dances?* à la Hamblin:
{{w: dance(kate)(w)}, {w: dance(mary)(w)}, {w: dance(joe)(w)}}

(38) $[KATE]_F$ *dances* à la Rooth:
ordinary meaning: {w: dance(kate)(w)}
focus alternatives: {{w: dance(kate)(w)}, {w: dance(mary)(w)}, {w: dance(joe)(w)}}

Formally speaking, these sets of propositions are familiar semantic objects, but now a new intuition is attached to them.

Kratzer & Shimoyama (2002) proposed to recast semantic composition in general, and quantification in particular, in terms of Hamblin's semantics, also known as alternative semantics (i.e. semantics based on alternatives). On this approach, all expressions denote sets of alternatives. The big difference is that expressions like *John* and *sleep* denote singleton sets of alternatives, {John} and {sleep}: no real choice is offered. In contrast, question words/indeterminate pronouns (*who*/*one*) introduce genuine, that is, nonsingleton sets of alternatives. Syntactic merge corresponds to merging alternatives; if there is a genuine choice, it projects up to the larger expression. Operators like *only* and *mo* assert that just one, or that every single one, of the alternatives is true. If no operator quantifies over the alternatives, silent existential closure is invoked to assert that at least one of the alternatives is true.[9]

Crucially to us, Alonso-Ovalle (2006) makes the case for a new treatment of disjunction, with reference to conditionals. He argues that *or* forms a set of propositions, as in (39), and **not** a single proposition whose truth may be guaranteed in multiple ways, as in (40a and b).

[9] See Martí & Abels (2011) for criticism of that aspect of Kratzer & Shimoyama's system that it quantifies over propositions, and Shan (2002) for another problem with their propositional logic.

(39) *Kate dances*, *or Mary dances*, *or Joe dances* à la Alonso-Ovalle:
{{w: dance(kate)(w)}, {w: dance(mary)(w)}, {w: dance(joe)(w)}}

(40) a. *Kate dances*, *or Mary dances*, *or Joe dances* in classical logic:
{w: dance(kate)(w)} ∪ {w: dance(mary)(w)} ∪ {w: dance(joe)(w)}

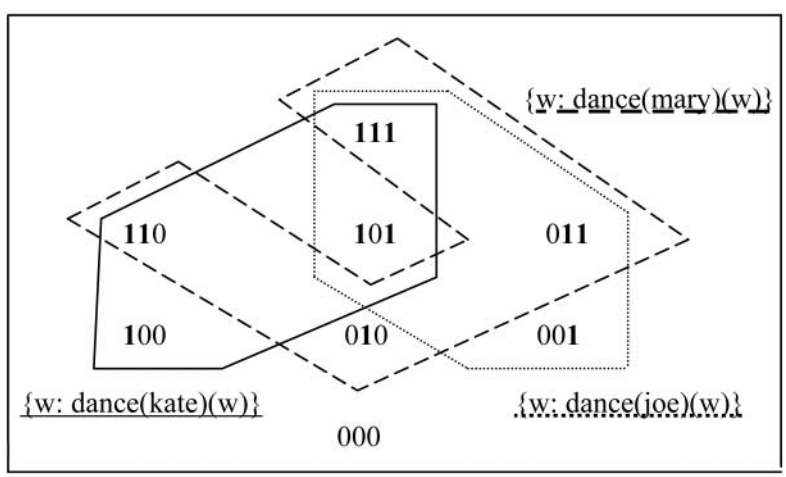
b. *Kate dances*, *or Mary dances*, *or Joe dances* in an alternative semantics that implements classical logic:
{{w: dance(kate)(w)} ∪ {w: dance(mary)(w)} ∪ {w: dance(joe)(w)}}

Inquisitive Semantics (Groenendijk & Roelofsen 2009; Mascarenhas 2009; see also the Inquisitive Semantics home page) is a new development of this approach that focuses on the cases in which neither a quantificational operator nor existential closure applies to the set of alternatives. In that case the sentence is dedicated to raising an issue by presenting the set of alternatives and demanding that one of them be chosen. Central to Inquisitive Semantics is the observation that questions and 'main' disjunctions share this basic feature of inquisitiveness. Notice that the interpretation of *Kate dances*, *or Mary dances*, *or Joe dances* in (39) is identical to that of *Who dances?* in (37). The same holds for indefinites; see (41), as pointed out especially by AnderBois (2012).

(41) *Someone dances* à la AnderBois:
{{w: dance(kate)(w)}, {w: dance(mary)(w)}, {w: dance(joe)(w)}}

In sum, the semantics of alternatives, and especially Inquisitive Semantics, unites the core of the interpretations of questions, disjunctions, and indefinites under one umbrella. The claim is that they all contribute issues, namely sets of open possibilities, to discourse.

Inquisitive Semanticists often use diagrams to depict issues. In that spirit, the diagram below depicts the issue that each of (i) *Who dances?*, (ii) *Kate dances*, *or Mary dances*, *or Joe dances*, and (iii) *Someone dances* raises in our universe.



In the diagram, every world is represented with three digits that specify the truth values of three atomic sentences (the only sentences that we care about). For example, '100' stands for 'Kate dances, Mary does not, Joe does not,' and the red box encloses the set of all those worlds in which *Kate dances* is true. Each of the boxed areas constitutes a possibility, and the three possibilities together constitute the issue: we are uncertain as to which area the actual world lies in. The world '000' in which all three sentences are false is excluded, in the declarative cases by assertion, and in the question case by presupposition.

In §4 we suggested that the uses of Japanese *ka* form a natural class, because the Boolean union (join) operation occurs in the semantics of questions, disjunctions, and indefinites. Recall that on that approach questions were sticking out a little from under the umbrella. In the present section we have reviewed theories that revise the traditional interpretations of disjunctions and indefinites and make them more similar to the interpretation of questions. It seems, therefore, that the Inquisitive Semantic perspective offers a more perfect unification of these three roles of *ka*.

5.2 Cross-linguistic differences in inquisitiveness

Slade (2011) discusses cross-linguistic differences in the distribution of Japanese *ka* and its counterparts in Sinhala, Malayalam, and Tlingit. (For example, Tlingit *sá* participates in indefinites and wh-questions, but not in disjunctions or yes/no questions; see Cable 2010.) Slade proposes that all the particles share the same semantics, and the cross-linguistic differences in their distribution are morphosyntactic: they can be characterized in terms of (un)interpretable and (un)valued features.[10] Slade's analysis is elegant, but we would like to consider the possibility that at least some of the cross-linguistic differences, for example those between Japanese and Hungarian, have more to do with semantics.

Let us look back on the data regarding Hungarian *vala*/*vagy*. Although the roles of *ka* and *vala*/*vagy* overlap, each has an important role that the other lacks.

(42)	*ka*	question-marker	disjunction	indefinite	
	vala/*vagy*		disjunction	indefinite	exist. verb

The fact that *vala*/*vagy* does not function as a question-marker but it does as a verb that asserts existence may suggest that the common denominator of its uses is the classical $\exists/\vee$ discussed in §4. In contrast, the common denominator of the uses of *ka* is readily characterized as issue-raising, which does not subsume the assertion of existence. The overlap can be accommodated in either way, and it should be. As far as we can see, Hungarian sentences involving 'or' and 'someone' do not differ substantially from their Japanese counterparts.

[10] Following Hagstrom (1998), Cable (2010) extends the choice-functional analysis of *ka* in indefinites to *ka* in constituent questions, and Slade (2011) further extends it to yes/no questions and disjunctions. We do not follow these authors, but arguing against the choice-functional semantics is not a goal of the present paper.

On the other hand, questions are not quite alien to *vala*/*vagy*. In §3.2.1 we noted the existence of the optional question-modifier *vajon* and the fact that it is only acceptable in questions that express 'puzzlement' without an ability, or attempt, to resolve the issue. A *vajon*-modified interrogative may be the complement of 'wonder' or 'be curious', but not of 'know', 'tell', or even 'ask', and as a main clause it likewise cannot be used to seek a straight answer. Going beyond Gärtner & Gyuris (2007), we suggest that *vajon* indicates issue-raising in a pure form. Its distribution makes it plain that issue-raising and answer-seeking are different things. Inquisitive Semantics is not yet equipped to make this distinction, but analysis of the data at hand is expected to help further work.

We see, then, that the Hungarian relatives of *ka* are sometimes less inquisitive and sometimes more inquisitive than *ka*. We hypothesize that *vala*/*vagy* and *ka* share a core and diverge in their surface distribution, because they are aided by, or are conflated with, different silent operators. The propositional logic version of Inquisitive Semantics already has a declarative operator *!* ('double negation') and an interrogative operator *?* ('or not') (see Ciardelli et al. 2012:Chapter 4). The former (*!*) eliminates the issue-raising potential of a sentence and thus could be used to turn an inquisitive operator into a Boolean one. The latter (*?*) creates a yes/no question, and thus could be used to turn a Boolean operator into an inquisitive one. Kobuchi-Philip's CHOOSE might make yet another pertinent silent actor.

Even though we are already breaking words down into morphemes, the analysis needs to be finer-grained. The cross-linguistic investigations can be expected to put flesh on the bones and help address the theoretical questions in empirically motivated ways.

5.3 Updating the logic

How different is the Inquisitive perspective from the Boolean perspective? Roelofsen (2013) points out that, abstractly, the two are very similar. For example, on both perspectives *or* is interpreted as the join operation in a Heyting algebra.[11] But in the case of classical logic, that Heyting algebra is also a Boolean algebra, whereas in the semantics of alternatives, it is not. Therefore, from a logical point of view, it would make sense if we found that operators like *ka* basically embody the more general notion, with special cases surfacing in different constructions; and it would also make sense if we found that the Boolean and the non-Boolean versions are separate items, and languages differ as to which of them they have. In the latter case the grand generalization would only obtain at some meta-level.

5.4 Issues in the *mo*-family?

Although Heyting algebras happily accommodate the meet operation, the issue-raising perspective outlined in §5 does not immediately suggest a comparable unifying principle for *mo* and

[11] See http://en.wikipedia.org/wiki/Heyting_algebra.

its cross-linguistic relatives beyond the general suggestion in Kratzer & Shimoyama (2002) that *mo* is a quantifier over alternatives. We leave the exploration of extending this approach to the *mo*-family to further research, and consider existing non-Inquisitive approaches in §6.

6. Competing insights for *mo* and *dou*

Section 6 observes that the Japanese *mo* and Chinese *dou* have a highly similar distribution, and lays out the functional similarities, as well as important differences. There is extensive literature pertaining to *mo* and *dou*, but comparative studies are rare or nonexistent. Moreover, typical approaches only concern themselves with one facet of each particle. This section considers two of the rare accounts that strive to be relatively comprehensive—Kobuchi-Philip (2008, 2009, 2010) for *mo* and Xiang (2008) for *dou*.

6.1 *Mo* and *dou*, similarities and differences

To lay some groundwork for further research, the present section sets out to compare Japanese *mo* and Chinese (primarily Mandarin) *dou*. Bumford et al. (2011) find that the two particles have a highly similar distribution and support highly similar interpretations; but minor distributional and interpretive differences remain. Drawing on this work, §6.1 surveys the data and §6.2 considers an account for each of *mo* and *dou* from the literature. The two accounts are based on quite different intuitions that correlate with certain descriptive differences between the two particles.

6.1.1 Similarities

[A] Both *mo* and (Cantonese, though not Mandarin) *dou* function as **focus-sensitive additive particles** (cf. *too*, *also*).

Like the English 'also', *mo* is focus sensitive, and presupposes that at least one alternative in the sentence's focus set has been established in the common ground. Examples (43) and (44) show that *mo* can be attached to both the subject and object of a sentence, superseding the default nominative or accusative case marker. The noun phrase that *mo* attaches to is interpreted as focus, with no special prosody required for the reading.

(43) kare-**mo** sono-gakusei-wo tetsudatteage-ta (Japanese)
he-MO that-student-ACC help-PAST
'$[\text{He}]_F$ also helped that student'

(44) kare-ga sono-gakusei-**mo** tetsudatteage-ta (Japanese)
he-NOM that-student-MO help-PAST
'He helped $[\text{that student}]_F$ also'

While Mandarin does not have a corresponding usage of *dou* as an additive particle, Cantonese does. In this dialect, *dou* functions just as *mo* in the examples above, although unlike Japanese, the particle has to immediately precede the main verb. Example (45) may have different presuppositions depending on the placement of the stress. When the subject receives a focus accent as in (45a), the sentence presupposes that someone else wants to eat ice-cream. When the verb *sik* 'eat' is stressed as in (45b), on the other hand, it presupposes that the subject wants to do something else. Note that the F-marked phrases (i.e. constituents that contain bearers of pitch accents) have to be adjacent to *dou*. Thus the object moves to the preverbal position in (46) when it is focused.

(45) a. [ngo^{5}]$_{F}$ **dou**^{1} soeng^{2} sik^{6} syut^{3} gou^{1} (Cantonese)
I DOU want eat ice-cream
Assertion: I want to eat ice-cream
Presupposition: someone else [also] wants to eat ice-cream

b. ngo^{5} **dou**^{1} [soeng^{2} sik^{6} syut^{3} gou^{1}]$_{F}$ (Cantonese)
I DOU want eat ice-cream
Assertion: I want to eat ice-cream
Presupposition: I want to do something else [also]

(46) ngo^{5} [syut^{3} gou^{1}]$_{F}$ **dou**^{1} soeng^{2} sik^{6} (Cantonese)
I ice-cream DOU want eat
'I want to eat [ice-cream]$_{F}$ also'

[B] Both *mo* and *dou* function as **focus-sensitive scalar particles** (cf. *even*).

While it is not the only method, both *mo* and *dou* in their respective languages can be used to induce focus-sensitive scalar presuppositions in the appropriate contexts with appropriate intonations. Very much like English 'even', sentences with *mo* and *dou* presuppose that their ordinary denotations are unlikely propositions in their focus sets to obtain. For example, in Japanese, when stress is placed on *kare* 'he' as in (47), the speaker presupposes that, of all the people in the relevant context, 'he' was an unlikely person to help the student in question. Likewise in (48), the presupposition is that of all the people in the relevant context, *sono gakusei* 'that student' was an unlikely person for 'he' to help.

(47) [kare]$_{F}$-**mo** sono-gakusei-wo tetsudatteage-ta (Japanese)
he-MO that-student-ACC help-PAST
'Even [he]$_{F}$ helped that student'

(48) kare-ga [sono-gakusei]$_{F}$-**mo** tetsudatteage-ta (Japanese)
he-NOM that-student-MO help-PAST
'He helped even [that student]$_{F}$'

The examples below show that the same is true for *dou* in Mandarin. Still, *dou* has to immediately precede the verb and the F-marked phrase has to be adjacent to *dou*.

(49) a. [wǒ]$_F$ **dōu** xiǎng chī xuěgāo (Mandarin)
I DOU want eat ice-cream
Assertion: I want to eat ice-cream
Presupposition: I am the least likely person to crave for ice-cream

b. wǒ **dōu** xiǎng chī [xuěgāo]$_F$ (Mandarin)
I DOU want eat ice-cream
Assertion: I want to eat ice-cream
Presupposition: Eating ice-cream is the least likely thing I would want to do

(50) wǒ [xuěgāo]$_F$ **dōu** xiǎng chī (Mandarin)
I ice-cream DOU want eat
'I want to eat even [ice-cream]$_F$'

In the environment of a numeral, 'even' amounts to 'as many as'. For instance, in examples (51) and (52), the presupposition is that of the number of apples 'he' could have eaten, 15 was unexpectedly high.

(51) kare-ga ringo-jyuugo-ko-**mo** tabe-ta (Japanese)
he-NOM apple-fifteen-CL-MO eat-PAST
'He ate as many as fifteen apples' (Kobuchi-Philip 2008:497)

(52) tā shíwǔ-ge píngguǒ **dōu** chī-le (Mandarin)
he fifteen-CL apple DOU eat-ASP
'He ate as many as fifteen apples'

Similarly, in a negative environment, both *mo* and *dou*, when attached to a minimal amount expression, can serve to emphasize the utter failure of a predicate to be satisfied. This effect is similar to that of *not even* in English.

(53) hito-ri-**mo** hohoem-ana-katta (Japanese)
one-CL-MO smile-NEG-PAST
'Not even a single person smiled' (Kobuchi-Philip 2009:172)

(54) yí-ge-rén **dōu** méi xiào (Mandarin)
one-CL-person DOU not smile
'Not a single person smiled'

[C] Both *mo* and *dou* form **universal quantifiers** with indeterminate pronoun bases (cf. *everyone*) and with *which*-phrases (cf. *every professor*), although *dou* is not morphologically attached to the noun phrase and, when in subject position, it may require a generic context (Henry Chang, personal communication).

When *mo* is attached to an indeterminate noun phrase, it results in a universal generalized quantifier. In examples (55) and (56), the *wh*-word is immediately followed by *mo*.[12]

(55) dare-**mo**-ga hohoen-da (Japanese)
who-MO-NOM smile-PAST
'Everyone smiled'

(56) doko-**mo** chuugoku-da (Japanese)
where-MO China-DECL
'Everywhere is China'

The Mandarin counterpart *dou* functions analogously, although unlike *mo*, it is not suffixed to the *wh*-words. Rather, it sticks to its preverbal position. It is the *wh*-word that moves to get close to *dou*, as shown in (58).

(57) zhè ge wèntí, shéi **dōu** huì huídá (Mandarin)
this CL question who DOU be.able answer
'Everyone can answer this question'

(58) tā nǎr **dōu** qù-guò (Mandarin)
he where DOU go-EXP
'He's been everywhere'

When the indeterminate pronoun is 'which', both languages allow the discontinuous *which . . . mo*/*dou* to flank the nominals they modify. The result in both cases is that the nominal is interpreted as a sorting key over which a subsequent predicate universally quantifies, as shown in the following examples.

(59) dono-kyouju-**mo** hohoen-da (Japanese)
which-professor-MO smile-PAST
'Every professor smiled'

(60) tā nǎ-ge xuéshēng **dōu** xǐhuān (Mandarin)
he which-CL student DOU like
'He likes every student'

[D] Both *mo* and *dou* produce **strictly distributive** readings, but do not necessarily distribute to atomic individuals.

[12] While beyond the focus of this paper, we should note that the *dare-mo* 'who-MO' construction in Japanese as in (55) is special, in that *mo* does not supersede the case marker in positive contexts, but it does in negative contexts.

For instance, in the examples below, the collective reading (i.e. everybody chipped in and bought one car altogether) is unavailable. Both *mo* in (61) and *dou* in (62) give rise to distributive readings.

(61) dare-**mo**-ga ichi-dai-no kuruma-wo katta (Japanese)
who-MO-NOM one-CL-GEN car-ACC bought
'Everyone bought a car (*together)'

(62) tāmen **dōu** mǎi-le yì-bù chēzi (Mandarin)
they DOU buy-ASP one-CL car
'They all (each) bought a car (*together)' (Lin 1998:201)

However, *mo* and *dou* do not need to distribute down to atomic individuals. Examples (63) and (64) show that they can pick out pairs and distribute over those pairs of individuals. This analysis of Mandarin is due to Lin (1998).

(63) dono akachan-**mo** niteiru (Japanese)
which baby-MO look alike
'All babies look alike'

(64) nàxiē rén **dōu** shì fūqī (Mandarin)
those person DOU be husband-and-wife
'Those people are all couples' (Lin 1998:227)

[E] Both *mo* and *dou* help form **free relatives** that carry a positive expectation.

Compare examples (65) and (66), for instance. In (65), with the use of *mo* in the first clause, the speaker is expecting to receive calls. By contrast, with the *if*-clause, as in (66), there is no such implied expectation.

(65) dare-ga denwa-shite-**mo** ore i-nai-tte it-te (Japanese)
who-NOM phone-do-MO I be-NEG-that say-REQ
'Whoever calls, (I request that you) say that I'm not here'

(66) moshi dare-ka denwa-shi-tara ore i-nai-tte it-te (Japanese)
if who-KA phone-do-COND I be-NEG-that say-REQ
'If anyone calls, (I request that you) say that I'm not here'

Examples (67) and (68) are direct Mandarin translations of (65) and (66), and illustrate the same point. Note that unlike *mo*, *dou* occurs in the main clause, rather than the free relative clause. Sentence (67) implies that there will be people calling. This expectation disappears in (68) with the absence of *dou*.

(67) (wúlùn) nǎ-ge rén dǎ-diànhuà, wǒ **dōu** bú zài
(no matter) which-CL person call I DOU not be
'Whoever calls, I'm not here' (Giannakidou & Cheng 2006:174)

(68) (rúguǒ) nǎ-ge rén dǎ-diànhuà, jiù shuō wǒ bú zài
(if) which-CL person call then say I not be
'If anyone calls, say I'm not here' (Giannakidou & Cheng 2006:173–174)

6.1.2 Differences

[F] Only *dou* functions as a **floating quantifier** associated with a plural (cf. floated *each*, *all*).

As mentioned several times in the previous section, *dou* consistently occurs in the preverbal position. It can distribute over a plural that precedes it, as in (69), but the plural in question does not need to be adjacent to *dou*, as in (70). This is different from the focus-sensitive uses of *dou* (cf. (46) and (50)), which must be adjacent to the phrase that receives the focus accent.

(69) zhè-ge háizi wǒmen **dōu** xǐhuān (Mandarin)
this-CL child we DOU like
'We all like this child'

(70) zhè-xiē háizi wǒ **dōu** xǐhuān (Mandarin)
this-PL child I DOU like
'I like all these children'

The particle *mo* on the other hand, is suffixed to the plural nominals, although together with a *wh*-base it also functions as an adjunct.

(71) gakusei-ga dono-hito-**mo** hashitta (Japanese)
student-NOM which-person-MO ran
'Every student ran' (Kobuchi-Philip 2009:179)

[G] Only in Mandarin do various quantifier phrases require the **support** of *dou*.

Lin (1998) notices that certain strong quantifiers, such as *meige* 'every', demand the presence of *dou*, as in (72).

(72) měi-(yí)-ge rén *(**dōu**) mǎi-le shū (Mandarin)
every-one-CL person DOU buy-ASP book
'Every person bought a book' (Lin 1998:219)

It is worth noting that *mei*-phrases do not need *dou* when there is a numeral expression in the object, as shown in (73).

(73) měi-(yí)-ge hóuzi (**dōu**) chī-le yí-ge xiāngjiāo (Mandarin)
every-one-CL monkey DOU eat-ASP one-CL banana
'Every monkey eats a banana' (Huang 1996:36)

In Japanese, however, the universal quantifiers *subete* (distributive) and *minna* (*collective*) appear prenominally without *mo*.

(74) subete-no-kyouju-ga subete-no-gakusei-wo tetsudatteage-ta
every-LK-professor-NOM every-LK-student-ACC help-PAST
'Every professor helped every student'

[H] **Adverbs of quantification** are compatible with *mo*, but not with universals formed with the aid of *dou*.[13]

In (75), the adverb *taitei* 'usually' and the *wh-mo* phrase can co-occur.

(75) dare-ga kai-ta ronbun-**mo** taitei shuppan-sare-ta
who-NOM write-PAST paper-MO usually publish-PASS-PAST
'People's papers were usually published' (Tancredi 2004:4)

Unlike Japanese, the universals formed with *dou* in Mandarin do not allow quantificational adverbs such as *jīngcháng* 'usually', as opposed to nonquantificational adverbs such as *hěnkuài* 'quickly'.

(76) shéi xiě de lùnwén hěnkuài /*jīngcháng **dōu** fābiǎo-le
who write REL paper quickly/*usually DOU publish-ASP
'The papers that anyone wrote were quickly/usually published'

[I] Only *mo*, but not *dou*, functions as a **conjunction**. Then, unlike English *and*, it is strictly distributive.

The sentence in (77) below does not describe a single event. Rather, there are two separate smiling events. See examples (79)–(82) for further comments.

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[13] Pair-list questions formed with *every* in English exhibit quantificational variability effects:

(i) Mary knows, for the most part, who everyone loves.
'For most persons, Mary knows (completely) who that person loves.'

For a discussion of the data and some of the literature, see §4.2 of Szabolcsi (1997c). It would be interesting to see if those analyses extend to Japanese.

(77) John-**mo** Peter-**mo** hohoen-da (Japanese)
John-MO Peter-MO smile-PAST
'John as well as Peter smiled; John smiled and Peter did too'

6.1.3 Summary

The above survey indicates that the overall distribution and interpretation of *mo* and *dou* are extremely similar. In §3.2.2, we have also shown the parallelism between Japanese *mo* and Hungarian *mind*/*is*. To put all these pieces together, we extend table (26) by including Chinese in the picture.

(78)	Japanese	Hungarian		Chinese
universal/negative pronoun	dare-mo	mindenki	---	shéi dōu
floating universal quantifier	---	mind [$_{VP}$ . . .]	---	dōu [$_{VP}$ . . .]
distributive con-junction	X-mo Y-mo	mind X mind Y	X is Y is	---
additive/scalar particle	X-mo	---	X is	NP dōu, or dōu [$_{VP}$ . . .]
number is large	10-CL-mo	---	10 NP is	10 CL (NP) dōu

6.2 Theories and subtle interpretive differences

Most of the literature pertaining to *dou* and *mo* concentrate on smaller subsets of the data. We briefly consider two accounts that strive to be relatively comprehensive, Xiang (2008) and Kobuchi-Philip (2008, 2009, 2010). Xiang, building on Lin (1998) and Giannakidou & Cheng (2006), places **maximality** in the center of her account of *dou*. In contrast, Kobuchi-Philip's starting point is the **additive** ('also') interpretation of *mo*. Clearly, the two approaches are quite different. We focus on how their basic intuitions correlate with the slight distributional and interpretive differences between the two particles.

6.2.1 *Regarding* mo, *Kobuchi-Philip* (*2009*) *starts from examples such as the following*.

(79) (gakusei-ga) John-**mo** hashitta
'(Among the students,) John also ran'
(80) (gakusei-ga) [John-to Mary]-**mo** hashitta
'(Among the students,) John and Mary also ran'
(81) (gakusei-ga) John-**mo** Mary-**mo** hashitta
'(Among the students,) both John and Mary ran'

(82) (gakusei-ga) dono-hito-**mo** hashitta
'(Among the students,) every person ran'

Just like its English equivalent, sentence (79) requires that there be a salient individual other than John who ran. This individual must be drawn from the set of students, if the subject *gakusei-ga* is present, or from a contextually given set if the sentence has a null subject. The same holds for (80); it requires for someone beyond John and Mary to have run. But (81) and (82) do not have a similar requirement. Sentence (81) is perfectly true and felicitous if no one besides John and Mary ran. Kobuchi-Philip's elegant proposal is that *mo* plays the same role in all these examples. The difference between (79) and (80) and (81) and (82) is due to the fact that in (81), where *mo* attaches both to *John* and to *Mary*, John's running satisfies the requirement posed by *Mary-mo*, and Mary's running satisfies the requirement posed by *John-mo*. Sentence (82) works analogously to (81), with the different elements in the set of students satisfying the 'other runner' requirement for each other.

Kobuchi-Philip distinguishes quantificational *mo*, as above, from what she dubs the focus particle *mo*, and builds the scalar interpretations of the latter using focus and a likelihood-scale, similarly to the literature on English *even*.

6.2.2 Mo *compared to* mind *versus* is. Prior to moving on to *dou*, let us recall that Hungarian covers the distribution of *mo* with two distinct elements: *mind* and *is*, as shown in table (78). Of these two, only *mind* forms universal quantifiers, and only *is* functions as an additive ('also') and scalar ('even') particle. They overlap in that both paired *mind A mind B* and paired *A is B is* express strictly distributive conjunction ('both' or 'as well as'). Just like Japanese *mo*, *mind* and *is* do not correspond to plain English *and*. Kobuchi-Philip's analysis of (79), (80), and (81) captures the intuition for nonscalar *is* very well. Given the overlap between the interpretations of *is* and *mind*, the analysis may be seen to extend to the universal quantifier *mind*(*en*).

(83)	Kati **is**	Kati-**mo**	'**also/even** Kate'
	[Kati és Mari] **is**	[Kati-to Mari]-**mo**	'**also/even** Kate and Mary'
	Kati **is** (és) Mari **is**	Kati-**mo** Mari-**mo**	'Kate **as well as** Mary'
	mind Kati **mind** Mari	Kati-**mo** Mari-**mo**	'Kate **as well as** Mary'
	mind-en-ki	dono-hito-**mo**	'**every**one'

Yet the fact that Hungarian uses two entirely distinct particles to cover these grounds gives us pause. The division of labor between *mind* and *is* gains significance from Shimoyama's (2006) suggestion that *mo* as a universal and *mo* as an additive particle are distinct. Shimoyama bases this on the fact that the intervention of the additive particle *mo* between quantificational *mo* and its target *wh*-word does not block the quantificational link.

One would also like to better understand the relation between the additive and the scalar versions of *mo*. Given that English *too* and *also* are not morphologically related to *even*, the two

interpretations certainly can be built independently. But, as we learn from Gil (2008), it is cross-linguistically not unusual for the same particle to have both additive and scalar interpretations. Our preliminary suggestion here is the same as in §5.2. *Mo*, *mind*, and *is* are probably not single-handedly responsible for all the semantic action in the examples at hand. It is more likely that they are aided by either type-shifters or phonetically null elements. The differences in their distribution are likely to follow from what silent helpers they team up with.

6.2.3 *A comprehensive proposal for* dou. Given that the key element of Kobuchi-Philip's analysis is the additive use of *mo*, it is important to recall that although Cantonese has additive *dou*, Mandarin does not. We do not know whether the gap in Mandarin is due to the blocking effect of *ye* 'also, even' or, conversely, *dou* spills over to fill a vacant spot in the absence of *ye* in Cantonese. For the time being we regard the Mandarin situation as representative. Furthermore, both Mandarin and Cantonese *dou* lack the 'conjunction' function exemplified in (77). Therefore, if the above analysis of *mo* is on the right track, then *dou*'s overall profile, however similar it may be to that of *mo*, must be built on a different foundation.

Indeed, Xiang (2008) approaches *dou* quite differently. The key element of her account is **maximality**, following Giannakidou & Cheng (2006). She proposes that *dou* 'gives rise to different meanings by applying maximality to a contextually determined plural set. This could be a set of covers, a set of focus-induced alternatives, or a set of degrees ordered on a scale [with the aid of *lian*]' (Xiang 2008:227).

A subtle interpretive difference between *dou* on the one hand and *even* and *mo* on the other pertains to how unlikely an alternative has to be to satisfy the particles' scalar requirements. Although Xiang (2008:230) says that *even* and (*lian*) . . . *dou* are alike in requiring the most unlikely alternative to be true, it appears that neither *even* nor *mo* is that demanding: they are satisfied with an alternative that falls within the unlikely range but is not the most unlikely. To fix the contextual alternatives, imagine an old lady who is not used to eating anything but meat and potatoes. She is invited to a buffet dinner that offers, among many other things, plain rice, asparagus soufflé, and exotic seafood. Someone says,

(84) [The old lady enjoyed the dinner!] She even tried the . . .

(85) (kanojo-wa) . . .-mo tabe-ta
(she-TOP) . . .-MO eat-PAST
'She even ate/tried the. . .'

(86) tā (lián) . . . **dōu** chī-le
she FOC DOU eat-ASP
'She even ate . . .'

What '. . .' did the old lady have to eat to make these claims true and felicitous? For *even* and *mo*, it suffices if she tries the asparagus soufflé, which is already very unusual for her, whereas for

dou, she has to try exotic seafood. This is in line with Xiang's claim that maximality is a crucial component in the interpretation of *dou*.[14]

Xiang relates the distributivity properties of *dou* to its being a maximality operator:

(16) tamen dou mai-le fangzi
they dou buy-Perf house
a. 'They each bought a house/houses'
b. 'They bought houses'

> This sentence could not mean that all the people bought a house together. In other words, there has to be some kind of distributivity involved. But it is ambiguous as to how to distribute the house-buying event. It could have a strong distributive reading such that each individual bought houses separately, as shown in (16a). But it could also mean something vague like (16b). Essentially (16) only says that each individual participated in some house-buying event, but we do not know who bought a house by himself, and who bought a house/houses with other people collectively.... This flexibility makes the generalized distributor analysis very attractive (Lin 1998). The original motivation of using generalized distributors (Schwarzschild 1996) is exactly to account for the vagueness problem in the interpretation of plurals.... The concept of covers is needed in interpreting plural nouns. *Dou*, as a maximality operator, operates at the level of a set of covers and outputs a maximal plural individual that consists of all the covers.... [T]his ensures that every individual in the set is included. I will also suggest that being a maximality operator, *dou* has a plural presupposition, such that the domain on which it operates has to contain more than one cover. It is this presupposition that in general rules out the single-cover reading.
>
> (Xiang 2008:232–237)

6.3 The methodological questions raised by *mo* and *dou*

Mo vis-a-vis *dou* raise a strategic question. We have seen one proposal for each that is basically successful in accounting for a range of properties exhibited by the given particle. The two proposals have different key elements (additivity versus maximality), and that does not seem arbitrary: it correlates with certain differences in both distribution and interpretation.

So what is the status of the great similarities in the behavior of *mo* and *dou*? This is an important methodological question that will present itself again and again in studies of this sort, as discussed in Szabolcsi (2010:Chapter 12.5).

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[14] On the other hand, in none of the three languages does it seem to be required for the old lady to have tried all the dishes that are more likely than the one named, contrary to claims by both Xiang and Kobuchi-Philip. When one property logically entails another, for example *eat at least five apples* entails *eat at least four apples*, then this follows automatically; but it is not required in the absence of a logical entailment.

(i) It is possible that the similarities are simply consequences of the semantic content that arises in two different and independent ways. Two expressions that are composed differently can perfectly well have the same meaning. It is an important advantage of having a model-theoretic semantics, in addition to logical form, that it makes it possible to prove such equivalences.

(ii) On the other hand, the situation presented by *mo* versus *dou* is reminiscent of question formation versus topicalization in early generative grammar. Question formation and topicalization exhibit great similarities and also important differences. The response back then was to factor out the similarities in the shape of *wh*-movement, and to account for the differences with reference to other factors. One wonders whether the same approach could be applied here. If it is viable, then the two approaches can be evaluated with reference to which of them enables the *mo* and *dou* type data to fit into a bigger picture that also accommodates the *ka* type data.

To wrap up, this section compared the distribution and interpretation of *mo* and *dou*, in their roles as additive and scalar particles, connectives, components of free relatives, and universal/distributive quantifiers. The overall cross-linguistic comparison is a new contribution to the literature. We observed that from a bird's eye perspective *mo* and *dou* are extremely similar. How their compositional analyses should account for the similarities as well as the remaining differences is an important open question that we hope to take up in future work.

7. Summary

This paper pointed out a trend in recent research that questions the assumption that there is a dividing line between morphology and syntax, as well as the assumption that multi-morphemic units are simply lexicalized with idiosyncratic properties. The new view naturally leads to a notion of compositionality that operates on the smallest bits that sentences and words can be analyzed into, and assumes that they contribute to meaning in a systematic fashion.

We highlighted a set of cases, especially pertaining to some particles that build quantifier words and also attach to phrases, which may serve to test and refine the new approach. We argued that it is plausible that their contribution is compositional. But many questions arise, due both to gaps in the system and to our currently incomplete understanding of how the exact range of meanings we find arise and relate to each other. We believe that these questions are productive ones and they should not scare us away.

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數量詞及其多功能部件

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形式語意學經常基於組合原則，以詞為建構語意的最小單位。然而，近期各種語法理論都指出，詞並非語法劃分的最小單位；類似的觀點也見於分析最高級的組合語意學上。本文採用這種向下延伸組合語意學的理論，探討一些助詞（如日語的 ka 和 mo、中文的「都」、匈牙利語的 vala/vagy、mind 以及 is）如何組成數量詞，並且充當連接詞、遞增詞、程度詞、疑問詞以及存在動詞。本文主要的目的在於討論這些跨語境助詞是否具有高度規律化的語意相似性，抑或僅是一些具有家族相似性的不同語意詞彙化後的結果。本文雖無具體結論，但卻運用布林語意學及詢問語意學的原理提出許多可能的分析。本文同時也有系統地比較 mo 和「都」的異同，並且透過極大性與遞增性來評論先前的分析。

關鍵詞：量化助詞，無定代詞，布林語意學，詢問語意學，極大性，遞增性，語言類型，語意學，句法學，構詞學