THE MORPHOSEMANTIC MAKEUP OF EXCLUSIVE-DISJUNCTIVE MARKERS

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ABSTRACT. The spirit of this paper is strongly decompositional and its aim to meditate on the idea that natural language conjunction and disjunction markers do not necessarily (directly) incarnate Boolean terms like '$\wedge$' and '$\vee$', respectively. Drawing from a rich collection of (mostly dead) languages (Ancient Anatolian, Homeric Greek, Tocharian, Old Church Slavonic, and North-East Caucasian), I will examine the morphosemantics of 'XOR' ('EXCLUSIVE OR') markers, i.e. exclusive (or strong/enriched) disjunction markers of the "either . . . or . . . "-type, and demonstrate that the morphology of the XOR marker does not only contain the true (generalised) disjunction marker (I dub it κ), as one would expect on the null (Boolean hypothesis), but that the XOR-marker also contains the (generalised) conjunction marker (I dub it μ). After making the case for a fine-structure of the Junction Phrase (JP), a common structural denominator for *con-* and *dis-junction*, the paper proposes a new syntax for XOR constructions involving five functional heads (two pairs of κ and μ markers, forming the XOR-word and combining with the respective coordinand, and a J-head pairing up the coordinands). I then move on to compose the semantics of the syntactically decomposed structure by providing a compositional account obtaining the exclusive component, *qua* the semantic/pragmatic signature of these markers. To do so, I rely on an exhaustification-based system of 'grammaticised implicatures' (Chierchia, 2013b) in assuming silent exhaustification operators in the narrow syntax, which (in concert with the presence of alternative-triggering κ- and μ-operators) trigger local exclusive (scalar) implicature (SI) computation.

1 INTRODUCTION

The general question that this paper addresses is the following: how may we rectify morphological *complexity* (of disjunction markers) with

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the seeming logical-semantic *simplicity* of the *prima facie* atomic meaning behind logical disjunction (‘∨’)?

This paper meditates on the question of elementary morhosyntactic building blocks that encode logical meanings. In more specific terms, what is the disjunction word, say, *or* composed of? Assume, for the sake of the temporary argument, that it decomposes, either in a historical (etymological) or contemporary synchronic sense, into two roots, *o-* and *-r*. Adopting the standard and rather natural assumption that ⟦‘or’⟧ metalinguistically incarnates the logical disjunction operator ‘∨’, then our temporary assumption of its morhosyntactic decomposition into *o-* and *-r* triggers a natural question: which one, if any, of the two (sub-) morphemes *o-* and *-r* encodes the disjunctive meaning, assuming the[1] meaning of ‘or’ is an atomic obverse of the logical ‘∨’ operator? Let us say that one of them, say *o-*, does the semantic job of disjunction. This entails another inevitable question: what is the function of the other morpheme (or root) *-r*? The answer to the latter question may, of course, be rather trivial, or boring, at most: it is a matter of historical accident that the *-r* root lost all its meaning through some form of semantic bleaching (but, then again, what was the original function of *-r* that eventually underwent bleaching?).

The temporary decompositional assumption that *or* break down into *-o* and *-r* is, of course, an artificial construct that served the sole purpose of exposition of the problem at hand. Instead, this paper looks at a cross-linguistically rather commonly instantiated case of (exclusive) disjunction markers, semantically rather parallel to English ‘or’, but which are morphosyntactically complex in the bimorphemic or double-root sense sketched above. I will cite evidence from five languages to support this view. What is more, I will show that such disjunction markers not only have a transparent disjunctive morphological core which seems to encode for semantic disjunction (and, indeed, interrogativity and existential quntification), but that the other (non-disjunctive) morpheme in fact corresponds to a conjunction particle (which, aside from conjunction, also encodes focal additivity, indefinite polar-sensitivity and universal quantification).

The methodological, and indeed conceptual, backbone of the paper is strongly decompositional in so far as it assumes the following principle:

(1) Compositional analysis cannot stop at word-level.
(Szabolcsi, 2010: 189, ex. 1)

The principle in (1) is empirically motivated by independent factors, namely by independent research results from morpho-syntax (cf. the seminal

1 *Pace* Klinedinst and Rothschild (2012).

work of Halle and Marantz (1994) that gave birth to an entire research programme of Distributed Morphology). Following the word-internal compositional programme (1) of Szabolcsi (2010: 189ff.; *et seq.*), we adopt a methodological, and conceptual, stance which assumes that the variable semantic and pragmatic behaviour of some words, such as negative polar and free-choice items (NPIs and FCIs, respectively), among others, can be traced back to their morpho-syntax (especially with regards to their featural makeup). The specific model we adopt in this respect is the one of Chierchia's (2013b) who unifies the semantics/pragmatics of NPIs and FCIs (among some other meanings) by appealing to their scalar core, viz. the Scalar Implicatures (SIs) they give rise to, and, consequently, to the differential inferences such items trigger. Chierchia (2013b) posits these (differential) triggers in form of narrow syntactic (NS) features which are specified on the relevant lexical items (we will assign them to specific morphemes). The conceptual anchoring and encoding of these inferential processes, primarily pragmatic in nature, in morpho-syntax, Chierchia (2013b) succeeds in successfully subjecting NPIs and FCIs to principles of Minimalist syntax, including featural mechanisms, such as Agree, and restrictions on such featural mechanisms, such as minimality (Rizzi, 2001, 1990). Section 1.1 provides an introduction to and further argumentation for this view of NS-grounded ingredients of pragmatic inferences, brought together under the umbrella of SIs.

In the remainder of the introduction, I sketch a background account of 'superparticles' (the kinds of particles that build disjunction words) in ∫1.2 with which an articulated Junction phrase is motivated in ∫1.3 to account for a syntactic unification of 'superparticle' headed constructions, ranging from con- and dis-junction to quantification. The polysemous meanings of 'superparticles', or denotations obtained by syntactically conditioned allosemy (cf. Marantz 2011), are reduced to three lexical entries which I propose in ∫1.4 in order to arrive at a semantic unification of the 'superparticle' allosemy.

With these syntactic motivations and semantic formatives defined, I move on, in ∫2, to present the empirical support for the problem at hand: morphosemantically complex disjunction marker which include, at the morphemic, a conjunction marker. Novel evidence from five different, living and dead, languages are presented in order to support the empirical stability of this claim, namely the polysyndetic bimorphemicity of disjunction.

In the following section (∫3), an analysis is proposed according to which the complex disjunction markers make no redundant, or semantically null, contribution to the meaning.[2] Our compositional analysis will

2 In connection to this assumption, we implicitly assume Gajewski's (2002) Analyticity

thus rest on the empirical evidence of polysyndetic bimorphemicity of disjunction coupled with the idea that all morphemes have a compositional part to play. A computation built out of five morphemes (operators), which are motivated in §1.4 and which relies on locally calculated (embedded) implicature, is shown to deliver the desired result, namely the exclusive disjunctive meaning.

1.1 Ambiguous disjunction: a look at English

As a starting exemplar of SIs, we take disjunction which, in English at least, carries an obligatory implicature, as Chierchia (2013b: 429) notes: either an epistemic one, where a disjunctive expression $p \vee q$ implicates speaker's ignorance since the speaker doesn't know whether $p \vee q$; this yields epistemic possibilities that $\diamond p$, $\diamond q$, $\diamond[p \vee q]$ or $\diamond[p \wedge q]$ as per (2a). We do not concern ourselves with ignorant readings of disjunctive sentences here. What we do concern ourselves with is the other possible, and opposite (i.e., counter-ignorant), implicature that disjunction generates, namely the scalar implicature (SI) where $p \vee q$ is enriched by denying conjunction so as to mean $[p \vee q] \wedge \neg[p \wedge q]$ as sketched in (2b).

(2) Mary saw John **or** Bill.
  a. IGNORANCE IMPLICATURE
    i. $\diamond[j] \wedge \diamond[b] \wedge \diamond[j \vee b] \wedge \diamond[j \wedge b]$
    ii. 'The speaker doesn't know whether Mary saw John and the speaker doesn't know whether Mary saw Bill and the speaker doesn't know whether Mary saw John and Bill.'
  b. SCALAR IMPLICATURE
    i. $[j \vee b] \wedge \neg[j \wedge b]$
    ii. 'Mary saw John or Bill **but not both**.

The explicans for SIs we adopt rests on the process of exhaustification. More specifically, the preliminary framework within which we locate our analysis is that of Chierchia (2013b), *int. al.*, who locates the aetiology of SIs, an inherently pragmatic phenomenon, in a grammatical, or more precisely, a narrow-syntactic, module. This is achieved, in simple terms, by positing a covert exhaustification operator ($\mathfrak{X}$) in the narrow syntax which attaches to the root of some proposition-level syntactic

hypothesis, according to which logically trivial meanings are ungrammatical. We take this view further to (at least) abductively conjecture the following (in informal terms): if meanings are compositional, then the composition should not contain any trivial, or null, meanings. For background on Analyticity and related methodological and conceptual principles of this kind, consult Gajewski (2002), Chierchia (2013b) and Romoli (2015a). There is nothing inherently compromising to this footnote that hinges on the conslusions of the present paper.

structure, say IP (for Chierchia 2013b) or CP (for Mitrović 2014), and post-syntactically exhaustifies the proposition against a particular set of alternatives pre-determined in an Agree-wise fashion in the syntax. The lexical entry for this exhaustification operator, of type $\langle\langle\langle s,t\rangle\, t\rangle\, \langle s,t\rangle\rangle$ and labelled $\mathfrak{X}$ here, is given in (3) and reads in informal language as bearing the following meaning: the assertion, p, is true and any non-entailed alternative to the assertion, q an alternative, is false.

(3) $\mathfrak{X}(p) = p \wedge \forall q \in \mathfrak{A}(p)\Big[[p \nvdash q] \rightarrow \neg q\Big]$[3]

We recognise two kinds of alternative sets that may be generated. One is the set of sub-domain (δ) alternatives, which excludes any Boolean or (strictly) scalar terms. This set of δ-alternatives is assumed to be particularly relevant in Focus calculation (cf. Fox and Katzir 2011). The other alternative kind comprises a (strictly) scalar set of alternatives (σ), which includes only the scalar alternatives of a given expression. Scalar terms like *all*, *some*, *and* or *or* are just some of scalar terms with only scalar alternatives (pace Sauerland 2004, *int. al.*, but see ∫3.1). Thus an $\mathfrak{X}$-operator specified with a [σ]-feature will post-syntactically (pragmatically) exhaustify a given proposition (syntactically, its sister) against the scalar alternatives to that proposition (and only the scalar alternatives). A [δ]-carrying $\mathfrak{X}$ will exhaustify a proposition and deny the sub-domain alternatives, and only those alternatives, to that proposition. The featural specification on $\mathfrak{X}$ are relegated to syntactic rules on Agree, via which the range of exhaustification is determined. The entire alternative set to a disjunctive proposition like (2), thus takes a two-dimensional shape consisting of sub-domain δ- and strictly scalar σ-alternatives, as sketched in (4). The sub-domain (δ) alternatives are plotted horizontally and comprise two singleton propositions: j for 'Mary saw John' and b standing in for 'Mary saw Bill'. The vertical axis features the two scalar alternatives: $j \wedge b$ which reads 'Mary saw John *and* Mary saw Bill' and $j \vee b$ which is a shorthand for 'Mary saw John *or* Mary saw Bill' (the assertion).

(4) $$\mathfrak{A}\big((2)\big) = \begin{tikzcd}[row sep=small] & j \vee b \arrow[dr, dash] & & \longleftarrow \text{assertion} \\ j \arrow[ur, dash] \arrow[dr, dash] & & b \longleftarrow \delta\text{-alternatives } (\delta\mathfrak{A}) & \\ & j \wedge b \arrow[ur, dash] & & \longleftarrow \sigma\text{-alternatives } (\sigma\mathfrak{A}) \end{tikzcd}$$

Enriched (exclusive) disjunction may be derived through both means of exhaustification: either globally through $\mathfrak{X}$ attaching to the disjunctive phrase and triggering scalar exhaustification, where the effect of

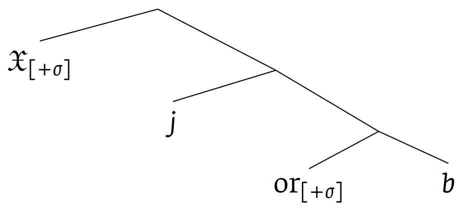
3 Caching in the presupposition of p, then $\mathfrak{X}(p) = \forall q \in \mathfrak{A}(p)\Big[[p \nvdash q] \rightarrow \neg q\Big]$. We will also, in ∫3, modify the LF of $\mathfrak{X}$ minimally with reference to Innocent Exclusion.

(2b) is derived, as per (5a). Alternatively, exclusive disjunction is also derived locally via $\mathfrak{X}$-attachment to each of the (two) disjuncts and exhaustifying them with respect to their respective δ-alternative set in a Focus-like fashion, as shown in (5b). The two exhaustification strategies yielding the exclusive implicatures are calculated by negating different alternative (sub-) sets as per (5a-ii) and (5b-ii).

(5) Two ways of calculating the SI of (2) and deriving the exclusive component:

a. GLOBAL CALCULATION of the exclusive component via $\mathfrak{X}_{[\sigma\mathfrak{A}]}$

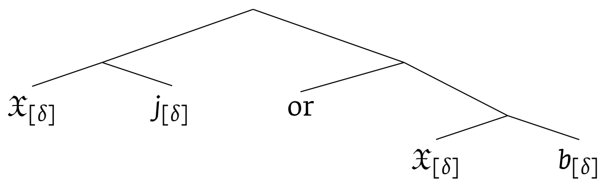
i. Syntactic structure (simplified):



ii. Logical form:
$\mathfrak{X}_{[\sigma\mathfrak{A}]}(j \vee b) = [j \vee b] \wedge \neg[j \wedge b]$

b. LOCAL CALCULATION of the exclusivity component via $\mathfrak{X}_{[\delta\mathfrak{A}]}$

i. Syntactic structure (simplified):



ii. Logical form:
$\mathfrak{X}_{[\delta\mathfrak{A}]}(j \vee b) = \mathfrak{X}(j) \vee \mathfrak{X}(b) \vdash \neg[j \wedge b]$

These two exhaustification strategies are equally reasonable hypotheses for deriving enriched disjunction in English. The disjunction morpheme ⟦or⟧, under very natural assumptions pervading the field, directly maps onto the denotation of '∨', a logical disjunction in itself a scalar-alternative-sensitive operator that is targeted by a silent (probing) $\mathfrak{X}$. What about languages which express disjunction using either (i) more complex morphology (What if there is more than one 'logical' marker?) or a (ii) a more polysemous morphology?

In the following subsection, we turn to the second (ii) group of languages to show that the meaning of disjunction morphologically overlaps with expression of interrogativity and existential quantification. The same overlap will be shown to hold for conjunction. We will call these 'semantically overlapping' markers 'superparticles'.

1.2 Superparticles & Boolean primitives: formal ≈ natural-linguistic?

This subsection briefly looks at the the ways in which natural language incarnates logical constants such as conjunctive and disjunctive connectives or interrogative, additive and quantificational expressions using a single set of two morphemes. Previous research by Szabolcsi (2010, 2014b), Kratzer and Shimoyama (2002) and Slade (2011), among many others, has established that languages like Japanese may use only two morphemes, *mo* and *ka*, to construct universal/existential as well as conjunctive/disjunctive expressions respectively. Throughout this paper, we abbreviate the Japanese *mo* particle and *mo*-like particles cross-linguistically as *μ* and the Japanese *ka* and *ka*-like particles cross-linguistically as κ.

In Japanese, *mo* also serves as an additive and *ka* as an interrogative element. This semantic multifunctionality of superparticles is clearly exhibited by the following four pairs of examples in (6) and (7), where the left column (6) shows the *mo*-series and the right column (7) shows the *ka*-series.

(6) The *μ*-series (*mo*)

a. Bill **mo** Mary **mo**
B *μ* M *μ*
'(**both**) Bill **and** Mary.'

b. Mary **mo**
M *μ*
'**also** Mary'

c. dare **mo**
who *μ*
'**every-/any-**one'

d. dono gakusei **mo**
INDET student *μ*
'**every/any** student'

(7) The κ-series (*ka*)

a. Bill **ka** Mary **ka**
B κ M κ
'(**either**) Bill **or** Mary.'

b. wakaru **ka**
understand κ
'Do you understand**?**'

c. dare **ka**
who κ
'**some**one'

d. dono gakusei **ka**
INDET student κ
'**some** students'

When a superparticle like *mo* or *ka* in Japanese combines with two nominal arguments, like *Bill* and *Mary*, coordination obtains, i.e. an expression of conjunction and/or disjunction in presence of the *μ* and/or κ superparticle, respectively. When *mo* combines with just one argument (*Mary*), additive (antiexhaustive) expression comes about. When a proposition combines with *ka*, we end up with a polar question (i.e., a set of two propositions). A combination of a superparticle with an indefinite *wh*-expression, like *dare* 'who' (6c/7c), delivers a quantificational expression, either with an existential flavour('*some*one', dare-*ka*) or a universal flavour ('*every*one', dare-*mo*).[4] Similarly, non-simplex quantificational expressions like '*some/every* student/s' obtain in Japanese when an indeterminate *wh*-phrase, like *dono*, combines with a nominal like 'student(s)'.[5]

We assume that the two series of superparticle meanings in (6) and (7) do not result from homophony, *contra* Hagstrom (1998) and Cable (2010), as argued by Slade (2011) and Mitrović and Sauerland (2014).

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1.3 An articulated Junction system: Mitrović (2014)

Assuming a binary branching structure for coordination, den Dikken (2006) argues that exponents such as *and* and *or* do not in fact occupy the coordinator-head position but are rather phrasal subsets of the coordinator projection, with their origins in the internal coordinand. The actual coordinator head, independent of conjunction and/or disjunction which originate within the internal coordinand, is a junction head, J^0, a common structural denominator for conjunction and disjunction.

4 A combination of a *wh*-term with μ is, *prima facie*, ambiguous between a universal distributive and a polar indefinite expression. Prosodic cues to disambiguation have been proposed: see Szabolcsi (2010: 202), Nishigauchi (1990), Yatsushiro (2002), Shimoyama (2006, 2007), among others, for an account of the synchronic distribution of facts. I have shown in Mitrović (2014: Chap. 5) that the universal distributive semantics of *wh*-μ is diachronically primary in the history of Japonic and developed a diachronic analysis of the the rise of polarity sensitivity. Nothing in this paper, however, hinges on this.

5 See Shimoyama (2007) for an elegant and convincing analysis.

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Employing (in his words, the abstract head) J^0, den Dikken's account covers and explains not only the *either…or* coordinate constructions but also the *whether…or* and *both…and*, which are unified under the structural umbrella of JP structure. For den Dikken, J^0 is an abstract 'junction' category inherently neutral between conjunction and disjunction for which no overt evidence is provided since his account rests on J^0 not being lexicalised. I take it as a reasonable hypothesis that there may be (and there indeed are) languages, which overtly realise this junctional component of coordination.

While den Dikken (2006) first motivated the Junction head based on evidence from English *either/or* construction,[8] there is clearer empirical support for a more J-headed structure for conjunction. Given in (8) is evidence that languages may express conjunction using three morphemes.

(8) Three languages with tripartite conjunction marking:

a. Kati **is és** Mari **is**
   K μ J M μ
   'Both Kate and Mary' (Hungarian; Szabolcsi 2014a)

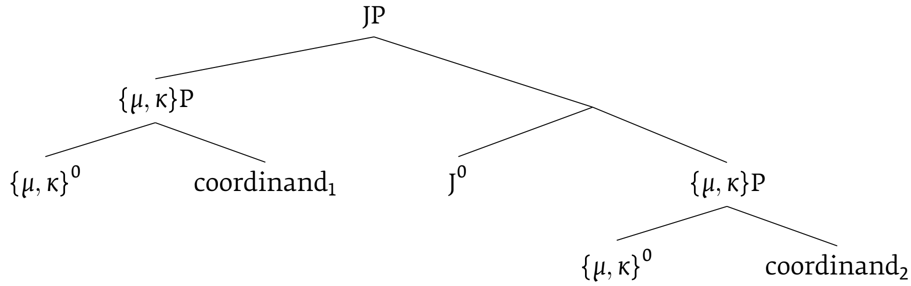
b. keto **gi va** hve **gi**
   cat μ J dog μ
   'cat and dog' (Avar; Ramazanov, p.c.)

c. **i** Roska **i i** Ivan
   μ R J μ I
   "Roska and also Ivan." (Macedonian; Stojmenova, p.c.)

It is an independent fact that the non-medial (J-level) conjunction morphemes (*is, gi, i* in (8a)–(8c), respectively) are independently additives (in all three languages) and quantifiers or FCI-/NPI-markers (in Slavonic). Based on the evidence from Mitrović and Sauerland (2014) and Mitrović (2014), *inter. al.*, the non-J conjunction morphemes correspond to μ superparticles. Hence the novel and fine-grained syntactic structure for coordination is that of (9).

8 For an independent motivation for a double-headed coordination structure based on polysyndeticity, see Mitrović (2011).

(9) A JP structure for coordiantion:



In the following subsection, we turn to the lexical entries for the three heads: J^0, μ^0 and κ^0.

1.4 Lexical entries for the three heads

1.4.1 (Anti-) exhaustive μ

Lexical items, such as *any*, *-ever*, *all*, *also*, and *and* are morphologically marked in many languages with a uniform μ morpheme. The analysis I briefly sketch here is taken from Mitrović (2014: Chapt. 4) and states that μ superparticles have a dual semantic (or pragmatic) function. The first is to bring into play active alternatives, that is, they activate alternatives of their hosts (structurally, complements, or at least sisters). The second function is rather independent of the instrinsic semantic makeup of μ: the grammatical system then acts—following Chierchia (2013b), has to act—on such alternatives in the derivation by *exhausti(fy)ng (over)* them.

The μ marker (superparticle), then, fundamentally makes sure that the alternatives ($\mathfrak{A}$) of its host are obligatorily active, an idea proposed for morphologically marked Free Choice items (FCIs) by Chierchia (2013a).[9] An exhaustifier then 'filters' such alternatives either by denying them (in case $\mathfrak{X}$ applies once) or asserting them (in case $\mathfrak{X}$ applies iteratively; discussed below). What we adopt, then, is a syntactically present focus-sensitive exhaustification operator that we introduced in §1.1 and labeled $\mathfrak{X}$ (itself essentially a silent variant of *only*).

The lexical entry for μ in (10) below (somewhat awkwardly) states the aforementioned dual function that μ particles have: alternative activation (second line) and exhaustification (third line) against the background of activated alternatives.

9 Empirically, we broaden the range of this semantic class of μ-morphemes so as to include FCIs, NPIs, universals, additives, and conjunction.

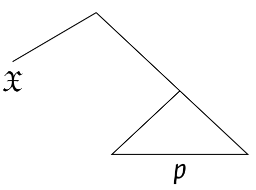
(10) Lexical entry for $[\![\mu^0]\!]$

$$
\begin{aligned}
\left[\!\!\left[\begin{array}{ccc} & \mu\mathrm{P} & \\ \mu^0 & & \mathrm{XP}\end{array}\right]\!\!\right] &= [\![\mu]\!]^{M,g,w}\Big([\![\mathrm{XP}]\!]\Big)\\
&= \big\{[\![\mathrm{XP}]\!]\big\}^{\mathfrak{A}}\\
&\rightarrow \mathfrak{X}^{(\mathrm{R})}\Big(\big\{[\![\mathrm{XP}]\!]\big\}^{\mathfrak{A}}\Big)\Big([\![\mathrm{XP}]\!]\Big)
\end{aligned}
$$

The core building block of the semantics of μ will be alternative activation and exhaustification procedure as proposed in Chierchia (2013b). Exhaustification is taken to be a syntactically grounded pragmatic instruction to "run the Gricean reasoning". We also adopt a more detailed instruction "run the Gricean reasoning *iteratively*", where we accept an iterative mode of application of the relevant maxims, as noted by Chierchia (2013b: 113, fn. 22). The main reason for adopting this 'extended' Gricean reasoning and defining exhaustification iteratively (i.e., allowing $\mathfrak{X}$ to apply iteratively) is that this iterativity characterisation grants us a transition between exhaustivity and antiexhaustivity. As Fox (2007) has shown, a double application of $\mathfrak{X}$ returns $\neg\mathfrak{X}$ and therefore allows us to see a natural switch between *only* and *also* (since *not only = also*). See Fox's (2007) for a detailed account and complete proof of this theorem.

In syntactic terms, we take $\mathfrak{X}$ to attach to the root of propositions, as briefly sketched below.

(11)

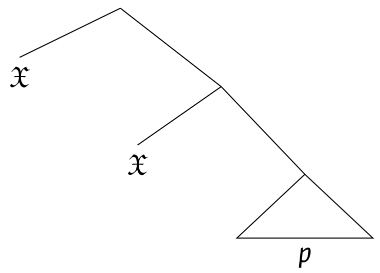


What about a syntactic analogue of its iterativity. While Fox assumes that C_2 is held constant, I assume—in line with Mitrović and Sauerland (2014)—that $\mathfrak{X}$ is not constant, which will allow it to associate with larger contexts and operate on (focus) alternatives not necessarily present locally.

Structurally, this recursion of $\mathfrak{X}$ is represented via a notion of copying, which is explicitly proposed by Bowler (2014) and is given in (12).[10]

10 For further, and independent, arguments for positing an iterative mode of exhaustification, see Singh et al. (2014) and references therein.

(12)



Therefore, in negative contexts, μ will activate the alternatives, which will lead to exhaustification by $\mathfrak{X}$. However, the entailment condition hardwired in the definition of $\mathfrak{X}$ (3) will make sure the original proposition is returned as true since no alternatives are deniable. In non-negative contexts, μ will make sure that a conjunction of its host and all active alternatives to its host are true. In more general terms, non-scalar exhaustification can be rescued from leading to contradictions in three ways. Consider exhaustification of subdomain alternatives of a proposition p and let q and r be subdomain alternatives to p.

(13) $$\mathfrak{X}_{[\delta\mathfrak{A}]}(p) = \begin{cases} \text{polarity reading} & \text{if under } \neg \\ \text{FC reading} & \text{if under } \diamond \\ \text{additive reading} & \text{if } \mathfrak{X} \text{ is iterative } (\mathfrak{X}^2) \\ \bot & \text{otherwise} \end{cases}$$

In (14) we expand (13) and briefly state reasons (with informal paraphrases) why non-iterative exhaustification (14a) leads to a contradiction unless in company of negation (14b) or a modal (14c), or unless it applies iteratively (i.e., twice) (14d) .

(14)
a. $\mathfrak{X}_{[\delta\mathfrak{A}]}(p) = \mathfrak{X}(p) \wedge \mathfrak{X}(q) \wedge \mathfrak{X}(r) \vdash \bot$
'only p is the case and only q is the case and only r is the case'
b. $\mathfrak{X}_{[\delta\mathfrak{A}]}(\neg p) = \neg p \wedge \neg q \wedge \neg r$
'neither p is the case and neither q is the case and neither r is the case'
c. $\mathfrak{X}_{[\delta\mathfrak{A}]}(\diamond p) = \diamond\mathfrak{X}(p) \wedge \diamond\mathfrak{X}(q) \wedge \diamond\mathfrak{X}(r)$
'only p may be the case and only q may be the case and only r may be the case'
d. $\mathfrak{X}^{\mathrm{R}}_{[\delta\mathfrak{A}]}(p) = \neg\mathfrak{X}(p) \wedge \neg\mathfrak{X}(q) \wedge \neg\mathfrak{X}(r) \vdash \neg\bot$
'not only p is the case and not only q is the case and not only r is the case'

If the proposition contains negation, then all its alternatives will be entailed and the alternatives cannot be exhaustified away—contradiction will therefore not arise. The presence of the modal also rescues the structure from a contradiction and yields a FC effect with respect to opening up modal options: informally, many different situations in which each of the alternatives may be the case. When exhaustification is iterative, additivity and cross-compatibility of all alternatives obtains.

In this paper, we only look at unmodalised and positive propositions which, according the present system, force iterative exhaustification (14d).

1.4.2 Inquisitive κ

We now turn to the κ-series, which morphosyntactically covers disjunctive, existential and interrogative constructions, among some other meanings.

In Inquisitive Semantics (IqS), the notion of 'proposition' is different to its definition in standard semantics. Rather, a proposition is a set of downward closed possibilities. In turn, a possibility is defined as a set of worlds. Therefore a proposition like 'John runs' in (15) is interpreted as a powerset of worlds in which John runs.

(15) $[\![\text{John runs}]\!] = \wp\{w : run_w(j)\}$

The guiding intuition behind IqS is bidimensional insofar as it recognises two dimensions of semantic content: the informative and the inquisitive. From the perspective of IqS, classical truth-conditional semantics is generally considered monodimensional in that it embodies only the informative content of propositions. (Ciardelli and Groenendijk, 2012: 3) With an 'inquisitive turn', we are led to a notion of meaning that reflects not only its informative content but also its meaning exchange potential (raising/resolving issues). Provided in (**??**) are some core semantic categories and information states that IqS posits based on the two-dimensional system of *informativity* and *inquisitivity*.

We hypothesise that the semantic role of the κ marker is purely inquisitive, i.e., to yield a non-tautological disjunction addition to its host. This is also the function of the inquisitive operator '?' defined in (16), where p stands for a proposition and Π for Inquistive semantic possibilities.[11] For a similar implementation, see Lin (2014).

11 I assume a classical analogue to (i) as in (ii) and (iii).

(i) $\lambda\Pi\lambda p[\Pi(p) \vee \neg\Pi(p)]$

(ii) $\lambda p[p = 1 \vee p = 0]$

(iii) $\lambda p[p \vee \neg p]$

In composition, I will use (iii) as a short-hand, which (under Inquisitive assumptions), is not (necessarily) tautological. I don't see the result of composition hinging on the choice of precision between (i)–(iii) given our assumptions, hence (iii) is used.

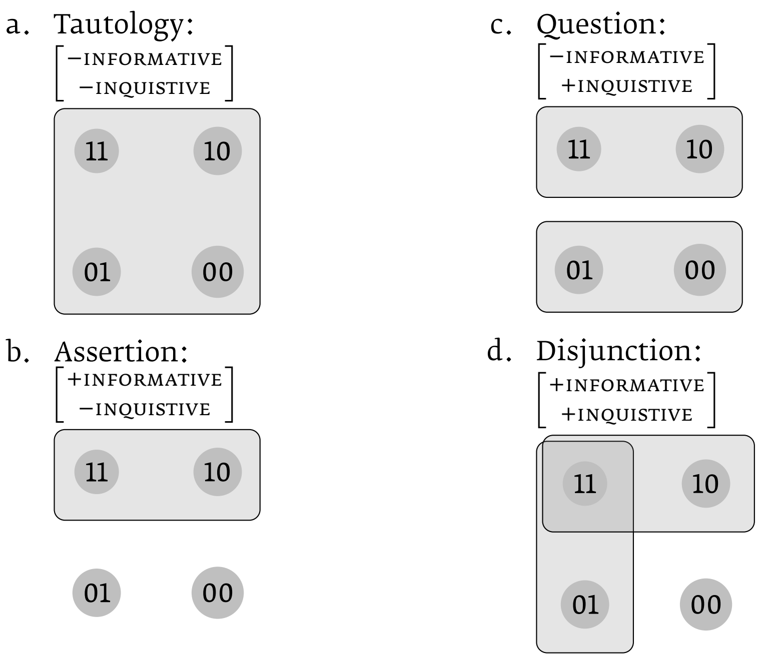


FIGURE 1: *Some Inquisitive Semantic diagrams*

(16) $[\![\,?\,]\!] = \lambda\Pi\lambda p\big[\Pi(p) \vee \neg\Pi(p)\big]$

(17) Lexical entry for $[\![\kappa^0]\!]$

$$\left[\!\!\left[\ [_{\kappa P}\ \kappa^0\ \ XP\,]\ \right]\!\!\right] = [\![\kappa]\!]^{M,g,w}([\![XP]\!])$$
$$= [\![\kappa]\!]^{M,g,w}([\![XP]\!])$$
$$= [\![XP]\!] \vee \neg[\![XP]\!]$$
$$= \{[\![XP]\!], \neg[\![XP]\!]\}$$

While we adopt here the most basic IqS theory (a.k.a. InqB), not much at all will hinge on the choice of theoretical framework since we will only use a notion of inquisitiveness, which is readily translatable into a non-IqS framework—such as the classical Hamblinian alternative semantics.[12] The main appeal of IqS is the deep-rooted and ontological differentiation between tautological (a) and non-tautological (d) information state of disjunction—we take the latter semantics to be the signature of κ particles.

12 See Alonso-Ovalle (2006) for a convincing prospect of such (inadvertent) translation.

1.4.3 Pair-forming J

The J(unction) head, as we will interpret it, will denote a neutral structural common denominator for conjunction and disjunction and so its role will be to pair arguments up without stating whether the pair is conjoined or disjoined. Just as its syntax was neutral, so will we try to achieve a conceptually unbiased denotation of J^0 along the lines just stated. To do so, we carry over, and extend, the assumption from ∫1.3 that it is in the κ and μ particles, which head coordinands that J^0 eventually pairs up, and that the meaning of disjunction and conjunction, respectively, is encoded *in syntax*. We will also posit an abstract Boolean operator that attaches to JP and enters into a checking relation with the heads of the coordinands. (We develop this below.)

In semantics, we will, in line with Szabolcsi (2014b), take the J head to be interpreted as a bullet-operator (•) functioning as a pair former (itself rather meaningless, following Winter 1995, 1998). Given in (18), is a compositional sketch of the meaning of the J(unction) head.

(18) Lexical entry for $[\![J^0]\!]$

$$\left[\!\!\left[\;[_{\mathrm{JP}}\ \mathrm{XP}\ [\ \mathrm{J}^0\ \mathrm{YP}\ ]\,]\; \right]\!\!\right] = [\![\mathrm{J}]\!]^{M,g,w}\Big([\![\mathrm{XP}]\!]\Big)\Big([\![\mathrm{YP}]\!]\Big)$$
$$= \mathrm{XP} \bullet \mathrm{YP}$$
$$= \langle [\![\mathrm{XP}]\!], [\![\mathrm{YP}]\!] \rangle$$

We depart from Winter (1998), and generalise his system, in extending the 'non-Boolean base' of interpretation to disjunction.[13] On top of Universal Meet (UM), given in (19), we propose our inventory also has Universal Join (UJ), defined in (20), which is also what Szabolcsi (2014c: ∫2.3) admits to.

(19) UNIVERSAL MEET (UM): $x \bullet y \mapsto x \sqcap y$

a. type transition: $\dfrac{\tau \bullet \tau}{\tau}$

b. semantics: $\dfrac{\langle A, B \rangle}{A \sqcap B}$

(20) UNIVERSAL JOIN (UJ): $x \bullet y \mapsto x \sqcup y$

a. type transition: $\dfrac{\tau \bullet \tau}{\tau}$

13 For a detailed formal implementation of a tuple-based approach to conjunction, see Winter (1995) and Winter (1998), and a generalised approach to coordination (including both conjunction and disjunction), see Szabolcsi (2013), *et seq.*, and Mitrović (2014).

b. semantics: $\dfrac{\langle A, B\rangle}{A \sqcup B}$

1.4.4 β-valuation

How will an interpretational system know which of the two Boolean operations kicks in? We follow the general spirit of Chierchia (2013b) in this respect, who proposes a syntactic presence of some operators, as we have already reviewed in §1.1, which yield pragmatic effects (hence the notion of 'grammaticised implicatures', since a pragmatic effect is rooted in narrow syntax).

Similarly we propose that the non-Boolean denotational of a JP is mapped onto Boolean meaning via an application of a Boolean operator, which is fully in line with Winter (1995, 1998). What was not on Winter's agenda was a syntactic backtracking, which would posit an original syntactic presence of the operators he calls into play. Assuming that semantics does not pull magic tricks by incarnating operators required for *ad hoc* interpretations—which is the claim that Chierchia (2013b) inadvertently also defends—we will propose a syntactically present Boolean operator, call it $\beta^{(0)}$, which will assign a Boolean mapping of tuples, i.e. from 'denotation-less' pairs into Boolean expressions. If $\beta^{(0)}$ is taken to be be syntactically projected in the syntax, then the choice of $\sqcap$ (19) versus $\sqcup$ (20) can be relegated to principles such as Minimality underlying Agree. We call this interpretation-deciding (allosemic, cf. Marantz 2011) syntactic conditioning β-valuation.

Derivational and interpretational procedures are thus conceptually rather the same. The interpretation of F-checked β is given in (21), both in set-theoretic and propositional logical (forms for conjunctive (a) and disjunctive (b) Boolean operations.

(21) a. BOOLEAN MEET ($\vdash$conjunction)

$$[\![\beta^0[\text{F} : \mu]]\!] = \begin{cases} \lambda X[\sqcap X] & \text{if } \mu \text{ not embedded in JP} \\ \lambda \langle x, y\rangle\,[x \wedge y] & \text{otherwise} \end{cases}$$

b. BOOLEAN JOIN ($\vdash$disjunction)

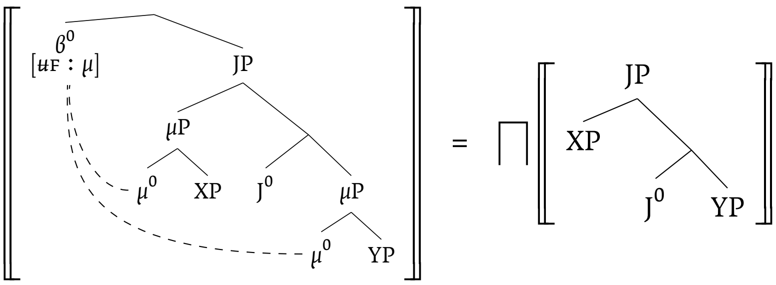
$$[\![\beta^0[\text{F} : \kappa]]\!] = \begin{cases} \lambda X[\sqcup X] & \text{if } \kappa \text{ not embedded in JP} \\ \lambda \langle x, y\rangle\,[x \vee y] & \text{otherwise} \end{cases}$$

Since κ and μ superparticles contribute a join-type and meet-type meanings to the structures they appear in, respectively, we posit they carry interpretable features like [iF : κ] and [iF : μ], resp., which undergo Agree with the Boolean β^0 operator, which is unspecified, hence carries an uninterpretable [uF :]. Once valued and checked, the structure upon Transfer to the CI interface computes the meaning and maps a JP tuple onto Boolean meaning. The features on the superparticle heads are not entirely formal: the interpretable feature [iF : κ] on κ^0 translates into UJ (20) and [iF : μ] on μ^0 is interpreted as UM (19).

The foundational mechanics and the spirit of the proposal is in line with Chierchia's (2013b) system of valuing a feature set on the exhaustification operator ($\mathfrak{X}$[uF :]), where the checked feature(s) on $\mathfrak{X}$ translates in the semantic module as the restriction on quantification. As Chierchia (2013b: 388) writes, "[n]ever have the syntax of feature checking . . . and the semantics . . . been more beneficial to each other."

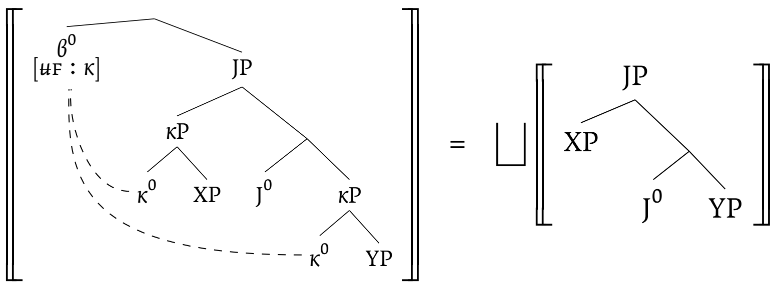
In (22) and (23), we sketch this idea and show the mapping from syntactic features onto semantic (Boolean) operations, which are now assigned the function of turning JP-denoting tuples into conjunctions or disjunctions.

(22) Syntactically rooted MEET:



$$= \ \sqcap \langle [\![\text{XP}]\!], [\![\text{YP}]\!] \rangle$$
$$= \ \vdash [\![\text{XP}]\!] \wedge [\![\text{YP}]\!]$$

(23) Syntactically rooted JOIN:



$$= \ \sqcup \langle [\![\text{XP}]\!], [\![\text{YP}]\!] \rangle$$
$$= \ \vdash [\![\text{XP}]\!] \vee [\![\text{YP}]\!]$$

We can thus define a Minimality condition on β valuation, based on Rizzi (1990) and adapted from Chierchia (2013b: 388, ex. 32).

(24) MINIMALITY (relativised to β-valuation)

a. β bearing [*u*F :] must target the closest potential [*i*F]-bearer

b. An [*i*F]-bearer XP is closest to β iff:

i. β asymmetrically c-commands XP.

ii. There is no other [*i*F]-bearer YP such that β asymmetrically c-commands YP and YP c-commands XP.

c. *A* c-commands B iff *A* does not dominate B and the first branching node that dominates *A* also dominates B.

Note that Chierchia's (2013b) system of grammaticised implicatures also heavily relies on Minimality which ensures that the $\mathfrak{X}$-operator's quantifier restriction (to δ- or σ-alternatives) obtains by virtue of a syntactic checking relation between the scalar, or polar, item and the root-level $\mathfrak{X}$.

In sum, we derived a technical apparatus which deliver the allosemy of the JP tuple relying on a simple feature-checking and Minimality-compliant mechanism. Following the tenets of Bobaljik (2012), we take the necessary configuration for a singly cyclical domain of spell-out to be constrained to a maximal projection, namely JP to the root of which β attaches.

(25) β-VALUATION AND SYNTACTICALLY CONDITIONED ALLOSEMY OF $[\![\text{JP}]\!]$
For a pair of coordinands (juncts) XP and YP denoting ϕ and ψ, respectively, the Boolean value of $[_{\text{JP}}\ \text{XP}\ [\ \text{J}^0\ \text{YP}\ ]]$ to be structurally conditioned:

a. $[\![\text{JP}]\!] \Leftrightarrow \phi \wedge \psi \ /\ \beta_{[\cancel{u}\text{F}:\mu]}$

b. $[\![\text{JP}]\!] \Leftrightarrow \phi \vee \psi \ /\ \beta_{[\cancel{u}\text{F}:\kappa]}$

Once β-valued, we take the conjunction/disjunction of the two coordinands (con-/dis-juncts) to denote the relevant assertion. The μ and κ particles that are additionally at play, as we empirically review in the next sections, are taken to function as alternative triggering operators that generate competitors to the assertion.

2 SO MANY PARTICLES IN SO MANY LANGUAGES

With the formal system in place, we now turn to the actual problem at hand. This paper looks at, and accounts for, the novel cross-linguistic data where both μ and κ markers are used to build words marking exclusive disjunctions.

In doing so, we defend two interlocking generalisations:

(26) a. GENERALISATION 1
Disjunction markers (κ-class) tend to feature in morphologically more complex expression than the conjunction markers (*μ*-class) do.

b. GENERALISATION 2
Morphologically complex disjunction markers may include the conjunction markers (*μ*-class).

The following subsections (§§2.1–2.5) present the cross-linguistic evidence supporting the generalisations in (26).

2.1 Homeric Greek

We start with Homeric Greek, where one of the disjunction markers, *ēte*, is morphologically complex in the sense that is comprises the disjunctive/interrogative κ-particle *ē* and a conjunction-signalling *μ*-particle *te*.

(27)

ἦ τ’	ἐχρέμεν	παρὰ	σοί
ē-t(e)	ehremen	para	soi
κ-*μ*	keep	with	self

‘. . . or [else] to keep with yourself’ (Il. T. 148)

Interrogativity of *ē* is discussed at length in Denniston (1950: 282–284). The authoritative *Homeric dictionary* of Autenrieth (1895: 134) additionally glosses *ēte* as ‘(either. . .) or’, or ‘whether . . . or’. Denniston (1950: 532) notes, in his short entry on the combination of particles giving rise to disjunction, “[t]his combination [of particles *ē* and *te*] presents peculiar difficulties on any theory of *te* [and].”

There is evidence that ἤ on its own does not necessarily trigger an exclusive inference:

(28)

ἦν	δ’	ἄν	οὗτος	**ἤ**	. . .	τῶν	ἱππικῶν	. . .
ēn	d’	an	outos	**ē**		tōn	ippikōn	
be.3.SG.IMPF	PRT	PRT	this	**or**		the	equestrian.GEN.PL	

τις	**ἤ**	. . .
tis	**ē**	
someone	**or**	

‘He would be a horse-trainer or . . . [a husband].’
(Plat. *Apol.* 20b; Beck et al. 2012)

Another complex Homeric particle combination is *eite*, comprising of a conditional-signalling *ei* (‘if’) and the aforementioned conjunctive *μ*-particle *te*.[14]

(29) **ei-te** boulesthe polemein emin **ei-te** filoi einai
κ-*μ* wish to be at war for myself κ-*μ* friend be
‘whether you wish to wage war upon us or [else] to be our friends’
(Cyrop. 3.2.13.)

2.2 Old Church (and modern) Slavonic

In Old Church Slavonic (OCS), as well the contemporary descendants of Old Common Slavonic, the disjunction marker *ili* is composed of an additive/conjunction marker *i* and an interrogative marker *li*. The first formal decomposition in this spirit was made by Arsenijević (2011), to whom I refer the reader for further arguments on the decomposition.[15]

Given below is a pair of examples from OCS of polysyndetic and inherently additive coordination in in (30) featuring the superparticle *i*, functioning as an additive marker when combined with a single argument and as a(n optionally polysyndetic) conjunction marker when there is more than one argument. This construction and the alternation between additive and conjunction marking is on a par with the Japanese pair of examples in (6a) and (6b), respectively. Note, however, that the same pair of additive *i* markers features in the construction of exclusive and polysyndetic disjunction. In case of exclusive disjunction marking, the *i* morpheme is joined by an interrogative morpheme *li*. On its own, *li* is a κ-type superparticle, of the kind exhibited by Japanese in (7), and thus features in expressions of disjunction, interrogativity and existential quantification in OCS.[16]

(30) ⰹ ⰴ҃ⱎⱘ ⰹ ⱅⱑⰾⱁ
i dšǫ **i** tělo
μ soul (J) *μ* body
‘(both) body and soul’ (CM. Mt. 10:28)

(31) ⰺ ⰾⰹ ⰶⰵⱀⱙ ⰹ ⰾⰹ ⰴⱑⱅⰹ
i -**li** ženjǫ **i** -**li** děti
μ -κ wife (J) *μ* -κ children
‘. . . either wife or children’ (CZ. Mt. 19:29)

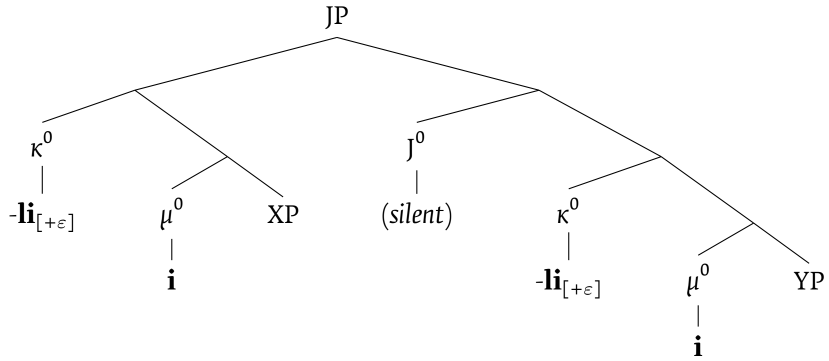
14 For further empirical discussion see Denniston (1950), Smyth (2014: §2650ff.) and, for a more diachronic and comparative perspective, also Elliott (1981), *int. al.*

15 We follow Arsenijević (2011) in his decompositional spirit but depart from his analysis with respect to the semantic contribution of the two markers.

16 For empirical coverage of the three incarnations of the κ-marker *li* in OCS, see Mitrović (2014: 131–138) and references therein.

Provided in (32) is the proposed morphosyntactic analysis of the bisyndetic exclusive disjunction.

(32)



Note that the Slavonic κ morpheme *li* is a second-position clitic which triggers head-movement of the closes terminal by virtue of some (here stipulated) head-movement triggering feature [$+\varepsilon$]. Since nothing hinges on the syntax clitics, I refer the reader to consult the second-position and enclisis literature concerned with the Slavonic *li* marker; in Mitrović (2014), the [$+\varepsilon$]-driven head-movement analysis is motivated against the background of previous literature, including Bošković (2001), Bošković and Nunes (2007), and mostly Roberts (2010) and Roberts (2012) who develops a narrow-syntactic account of incorporation.[17]

2.3 Hittite

In Hittite, too, the disjunction marker contains an additive morpheme, just as this was the case with OCS above.

As Hoffner and Melchert (2008: 405) note, disjunction is regularly expressed in Hittite by *našma* 'or' or by *naššu*…*našma* 'either . . . or'. The crucial observation is that the *ma* marker is in fact a conjunction marker (and indeed a μ-superparticle; see Mitrović 2014: 150–154) and its morphological presence in the expression of disjunction is quite mysterious.

Diachronically, we also know that the marker *našma* must have developed by syncope from *naššu+ma*, which definitely contains the conjunction (and universal distributive) marker *-(m)a*. We do not, however, have any evidence on the meaning of the other particle, *naššu*.

(33)

nu-šši	**naššu**	adanna	peškezzi	**naš-ma**-šši	akuwanna	peškezzi
now-him	$\kappa^{?}$-(μ) =either	eat	give	$\kappa^{?}$-μ-him	drink	give

17 For alternative, prosody-based analyses, see Franks and King (2000); Hale (1996); Halpern (1995, 2001), among other.

'He either gives him to eat or he gives him to drink' (KUB 13.4 i 24)

Another pair of enclitic disjunctive markers, attested from the oldest written stage of the language, is *-(a)ku …-(a)ku* translating as 'whether … or'.

While Hoffner and Melchert (2008) do not remark on the morphological composition of the expression, the *-ku* component reflects the PIE conjunctive (super)particle **k^w e* (Kloekhorst, 2008: 483), which is of *μ* character across IE (Mitrović, 2014: Chap. 3).

(34) LU$_{LU}$=**ku** GUD=**ku** [UD]U=**ku** ēšzi
human being-(κ+)*μ* ox-(κ)-*μ* [she]ep-(κ)-*μ* be
'… whether it be human being, ox or [she]ep.' (KBo 6.3 iv 53)

2.4 Tocharian A

Tocharian A (TA) also shows the same morphological complexity of its disjunction marking. In TA, the additive marker is *pe* and the complex disjunction marker clearly featuring *pe* is *e-pe*, with an additional *e-* morpheme. The pair of examples in (35) and (36) show the additive and (exclusive) disjunctive construction, respectively.

(35) **pe** klośäm nāñi
μ ears.DU 1.GEN
'also my ears' (TA 5: 53, b3/A 58b3 in Zimmer 1976: 90)

(36) ckācar **e**-**pe** śäṃ **e**-**pe**
sister κ-*μ* wife κ-*μ*
'(either) sister or wife' (TA 428: a4, b2; Carling 2009: 74)

While the historical record did not shed information on the Hittite *našu* morpheme above, etymology can help us identify the historical source of the *e-* morpheme in TA. Most probably, following the analysis of Adams (2013: 89) and, to a lesser extent, Edgerton (1953), the TA morpheme *e-*, which was subsequently borrowed by and into Tocharian B (TB), is cognate with the Proto-Indo-Iranian **wā* (cf. Vedic *vā*, Old Avestan *va, vā*, 'or') which in turn can be traced back to Proto-Indo-European which very probably possessed a disjunction marker **wē* (cf. Latin *ue*).

2.5 North-Eeastern Caucasian

Our last set of decomposition-supporting data comes from a non-IE and non-extinct group of North Eastern Caucasian, Dargi and Avar.

2.5.1 Dargi

We start with Dargi. Take an example featuring negative disjunction of the "*n*either…*n*or"-type, which shows the disjunctive morpheme *ya* head-initially and bisyndetically coordinating two DPs ('pilaf' and 'hen').

(37) nu-ni umx̂u sune-la mer.li-či-b b-arg-i-ra, amma **ya**
me-ERG key(ABS) self-GEN place-SUP-N N-find-AOR-1 but κ
pulaw, **ya** 'är'ä he-d-arg-i-ra
pilaf(ABS) κ hen(ABS) NEG-PL-find-AOR-1
'I found the key at its place, but neither the pilaf nor the chicken was there.' (van der Berg 2004: 203)

Just like disjunction, conjunction also obtains polysyndetically through expression of an additive particle *ra*, as shown in (38), combining with several DPs to deliver conjunction.

(38) il.a-la buruš **ra** yurğan **ra** 'änala **ra**
this-GEN mattress(ABS) μ blanket(ABS) μ pillow(ABS) μ
kas-ili sa⟨r⟩i
take-GER be.PL
'(They) took his mattress, blanket and pillow.'
(van der Berg 2004: 199)

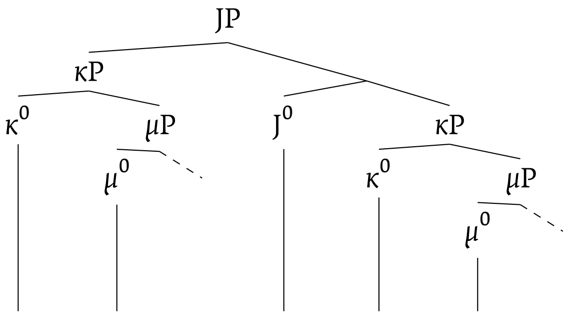
Exclusive disjunction, on the other hand, and perhaps by now not as surprisingly, features both *ya* (κ) and *ra* (μ) particles, as evidence in (39) shows.

(39) **ya ra** pilaw b-ir-ehe, **ya ra** nerğ b-ir-ehe
κ μ pilaf(ABS) N-do-FUT.1 κ μ soup(ABS) N-do-FUT.1
('What shall we make for lunch?') 'We'lll make (either) pilaf or soup.' (van der Berg 2004: 204)

2.5.2 Avar

The same compositional pattern is found in Avar, which expresses exclusive disjunction using a composed morpheme expression, containing a κ particle *ya*, being identical to the κ marker in Dargi, and a conjunctive/additive particle *gi*, which we introduced in (8b) and now repeat in (40) to show its conjunctive, or additive, semantics when not in presence of a disjunctive particle.

(40) keto **gi va** hve **gi**
cat μ J dog μ
'cat and dog' (Avar; Ramazanov, p.c.;=8b)



Homeric	**ē**	**te**	∅	(**ē**	**te**)
OC & Modern Slavonic	**li**$_{[+\varepsilon]}$	**i**	∅	**li**$_{[+\varepsilon]}$	**i**
Hittite	**naš**	(**ma**)	∅	**naš**	**ma**
Tocharian A	**e**	**pe**	∅	**e**	**pe**
Dargi	**ya**	**ra**	∅	**ya**	**ra**
Avar	**ya**	**gi**	∅	**ya**	**gi**

Table 1: *Complex disjunction markers are their morphosyntax cross-linguistically:*

(41) **ya gi** Sasha **ya gi** Vanya
κ μ S (J) κ μ V
'either Sasha or Vanya.' (Avar; Mukhtareva, p.c.)

What has been demonstrated in §§2.1–2.5 is that a vast range of languages, living and dead, do something very unintuitive, and even bizarre: they express disjunction using a conjunction marker. We provide in Tab. 1 a summary of morhosyntactic facts.[18]

3 Towards an analysis: making (and composing) sense of so many particles

What the preceding sections have demonstrated is that coordination expressions (especially polysyndetic) result from a rather rich morphosyntactic structure. This syntactic structure has been plotted using a Junction phrase, which pairs us two superparticle-headed coordinands. In the last section, evidence from five languages have empirically have

18 The [ε] feature on the Slavonic *li* particle in Tab. 1 refers to its second-position status which is derived via incorporation of the conjunctive/universal *i* particle. For details, see Mitrović (2014: Ch. 3) and references cited therein.

signalled a complexly headed structure for each of the coordinands, where both a μ and κ are present.

Given in (42a) is the result of the motivated syntactic structure for polysyndetic (exclusive) disjunction; (42b) sketches the corresponding compositional pathway of structural interpretation, where the β-operator turns the $[\![\mathrm{JP}]\!]$, a tuple, into a disjunction, given UJ determined by the minimality-determined checking relation between β^0 and κ^0. A level below, a tuple-forming J^0 takes two coordinands as arguments, each of which is a composite function of $\kappa \circ \mu$ functions applied over respective coordinands ($[\![\mathrm{XP}]\!]$, $[\![\mathrm{YP}]\!]$).

The main theorem of the paper (42c), therefore, is that exclusive disjunction is the (only available) result of this long-winded composition: from forming an anti-exhaustive μP, which is fed into an inquisitive κP and then having two such κPs saturate the two coordinate (argument) positions of a JP, resulting in a tuple which is turned into a disjunction by a β operator.

(42) a. $\left[_{\mathrm{JP}^+}\ \beta^0_{[\mathrm{F}:\kappa]}\ \left[_{\mathrm{JP}} \left[_{\kappa\mathrm{P}_1}\ \kappa^0_1 \left[_{\mu\mathrm{P}_1}\ \mu^0_1\ \ \mathrm{XP}\right]\right] \left[\mathrm{J}^0 \left[_{\kappa\mathrm{P}_2}\ \kappa^0_2 \left[_{\mu\mathrm{P}_2}\ \mu^0_2\ \mathrm{YP}\right]\right]\right]\right]\right]$

b. $\bigsqcup\Big([\![\mathrm{J}^0]\!]\Big([\![\kappa^0_1]\!]\Big([\![\mu^0_1]\!]([\![\mathrm{XP}]\!])\Big)\Big)\Big([\![\kappa^0_2]\!]\Big([\![\mu^0_2]\!]([\![\mathrm{YP}]\!])\Big)\Big)\Big)$

c. THEOREM. (b) $\vdash [\![\mathrm{XP}]\!] \vee [\![\mathrm{YP}]\!] \wedge \neg([\![\mathrm{XP}]\!] \wedge [\![\mathrm{YP}]\!])$

We turn to the details of this composition and implicature calculation, yielding the exclusive component, in ∫3.2. Before doing so, however, we introduce a procedure in ∫3.1 which will ensure that the generated alternative set is consistent.

3.1 The ♡-procedure

The presence of the altnernative-triggering and exhaustification inducing μ operator, combined with J and κ, will generate a wide set of alternatives, which may yield inconsistencies. We therefore require a system(at)ic procedure that will prevent inconsistent alternative (sub)sets. The procedure we appeal to is that of Innocent Exclusion (♡), which we now (very briefly) motivate using Alonso-Ovalle's (2006) arguments.

Alonso-Ovalle (2006) has convincingly shown, on the basis of evidence from disjunctive counterfactuals (Alonso-Ovalle, 2006: Chap. 2), that a disjunction of, say, two propositions, $p \vee q$, is equivalent to the alternative set of two such propositions, $\{p, q\}$. We invoke again the disjunction data we analysed, using Chierchia's (2013b) system, in ∫1.1 in (43), where argument disjunction is 'lifted' to a propositional level of alternatives.

(43) a. Mary saw *John* or *Bill*

b. *Mary saw John* or *Mary saw Bill*

c. $j \vee b$

It was Sauerland (2004) who argued that the scalar term *or* does not only associate with its scalar competitor *and* to form a Horn Scale ⟨*or, and*⟩, but rather that the alternative set should take two-dimensional form so as to also include, what Chierchia (2006, 2013b) calls, sub-domain (δ) and not strictly scalar alternatives. Since, as Alonso-Ovalle (2006: 65) tersely notes, a conjunction '*x and y*' asymmetrically entails both conjuncts '*x*' and '*y*', where in turn both '*x*' and '*y*' asymmetrically entail their disjunction '*x or y*'. Therefore, "uttering *or* should make salient not only the corresponding sentence with *and*, but also each individual disjunct on its own." (Alonso-Ovalle, 2006: 65)

(44) $\mathfrak{A}\big((43)\big) = $
$$\begin{tikzcd}[column sep=small] & j \vee b \arrow[dl, dash] \arrow[dr, dash] & \\ j & & b \\ & j \wedge b \arrow[ul, dash] \arrow[ur, dash] & \end{tikzcd}$$

A disjunctive sentence with two disjuncts therefore has three, and not only one, competitors (Compt):

(45) $\textsc{Compt}\Big($*Mary saw John* or *(Mary saw) Bill*$\Big) =$ $[j \vee b]$

i. *Mary saw John* $[j]$

ii. *Mary saw Bill* $[b]$

iii. *Mary saw John* and *Mary saw Bill* $[j \wedge b]$

Under the exhaustification-based analysis of the exclusive component, the exclusive reading is obtained by negating all alternative competitors to a proposition. We are therefore led to calculate the exclusive meaning of (45) along the lines given in (46)

(46) Calculating the exclusive meaning of (45):

$$\begin{aligned} \mathfrak{X}(j \vee b) &= [j \vee b] \wedge \neg\textsc{Compt}\big([j \vee b]\big) \\ &= [j \vee b] \wedge \neg[j] \wedge \neg[b] \wedge \neg[j \wedge b] \\ &\vdash \bot \end{aligned}$$

It is clear that the calculation leads to inconsistency under alternative denial since the assertion of disjunction ($j \vee b$) contradicts the denial of its (competitor) disjuncts ($\neg j, \neg b$). To avoid inconsistencies such as this one, we now motivate a procedure which will maintain alternative set consistency.

In other words, we negate ($\mathfrak{N}$) all competitors (alternatives) to the disjunctive assertion $j \vee b$ (47a), which together with the assertion $j \vee b$ leads to an inconsistent set (47b). Note, however, that this latter set, while inconsistent, contains two maximal consistent subsets (47b-i,47b-ii) that contain the disjunctive assertion.

(47) a. $\mathfrak{N} = \{\neg[j], \neg[b], \neg[j \wedge b]\}$

b. $\mathfrak{N} \cup \{[j \vee b]\} = \{[j \vee b], \neg[j], \neg[b], \neg[j \wedge b]\}$

i. $\mathfrak{N}_1 = \{[j \vee b], \neg[j], \neg[j \wedge b]\}$

ii. $\mathfrak{N}_2 = \{[j \vee b], \neg[b], \neg[j \wedge b]\}$

It is the intersection of the maximal consistent subsets of $\mathfrak{N}$ that determines the exclusive component.[19] This procedure was originally proposed by Fox (2007), on the basis of motivations by Sauerland (2004) as sketched above, to account for inconsistency in the generated alternative set. We are therefore led to motivate a means of avoiding inconsistencies; given in (48) is a formal definition the ♡-procedure, which will do just that. For the sake of concision, we give two—mutually inclusive—definitions.

(48) INNOCENT EXCLUSION (♡)

a. For any proposition p and a set of propositions $\mathfrak{A}$, the set of innocently excludable competitors to p in $\mathfrak{A}$ ($\heartsuit(p, \mathfrak{A})$) is $\heartsuit(p, \mathfrak{A}) = \bigcap \{\mathfrak{A}' \subseteq \mathfrak{A} \mid \mathfrak{A}' \text{ is a } \{\textsc{mx}\} \text{ in } \mathfrak{A} \text{ s.t. } \mathfrak{A}'{*}\cup\{p\} \text{ is } \textsc{cons}\}$[20]
(Fox 2007: 26, Alonso-Ovalle 2006: 75)

b. The negation of the proposition p in the set of competitors of a sentence S ($[\![S]\!]_{\mathfrak{A},\cap}$) is innocent if and only if, for each $q \in [\![S]\!]$, every set containing q and as many negations of the propositions in $[\![S]\!]_{\mathfrak{A},\cap}$ as consistency allows contains $\neg q$.
(Alonso-Ovalle, 2008: 123, ex. 22)

Using Fox's (2007) terminology and the terse paraphrase by Alonso-Ovalle (2006: 74–75), (48) states that "the propositions in all the maximal consistent sets containing the proposition expressed by the disjunction and as many negated Sauerland competitors as consistency permits are said to be 'innocently excludable"' (♡). The ♡-procedure is also encoded in Fox's (2007) definition of the exhaustification operator ($\mathfrak{X}$), which he have already defined in (3), but repeat here again below.[21]

(49) $\mathfrak{X}(\mathfrak{A}_{\langle\langle s,t\rangle,t\rangle})(p)(w) \Leftrightarrow p(w) \wedge \forall q[q \in \heartsuit(p, \mathfrak{A}) \rightarrow \neg q(w)]$
(Fox, 2007: 26)

19 See Alonso-Ovalle (2006: 71–75) for details and calculations when more than two disjuncts are involved.

20 Following Fox (2007), $\mathfrak{A}{*} = \{\neg p \mid p \in \mathfrak{A}\}$. We also write {MX} for 'maximal set'

21 For a similar take on redefining $\mathfrak{X}$ in terms of ♡, see also Potts (2012: 2, def. 3).

Note that Fox's (2007) (49) and Chierchia's (2013b) (3) definitions of $\mathfrak{X}$, with or without explicit reference to ♡, are on a par. With ♡ motivated, we now propose an extension of ♡ so as to include in its explanatory scope also Hurford's (1974) constraint (HC), which limits the denotation of disjunction to mutually non-entailed disjuncts, as per (50).

(50) HURFORD'S CONSTRAINT (HC)
Neither of the disjuncts should entail the other, or each other.
  a. a disjunction of the form $X_1 \vee X_2$ is odd if X_1 entails X_2, or vice versa (Katzir and Singh, 2013: 202)
  b. $p \vee q = \begin{cases} \bot & \text{if } p \vdash q \text{ or } q \vdash p \\ \neg\bot & \text{otherwise} \end{cases}$

HC explains why disjunctive sentences, like the following in (51), are infelicitous. It is clear that John's being in Paris entails his being in France (although, not necessarily *vice versa*).

(51) # John is in Paris or in France.

HC-violations are also predicted to occur with quantificational disjuncts, since the universal term *all* classically entails the existential counterpart *some*, everything else being equal. Such data, however, are not infelicitous as (52) shows.

(52) Mary read *some* or *all* of the books. (Chierchia et al., 2009: 2, ex. 3)

To account for such expressions, Chierchia et al. (2009) and, in the similar vein, Katzir and Singh (2013), for instance, posit a silent exhaustifier scoping over one disjunct which forces embedded exhaustification. Take also an example from Potts (2012: 4, ex. 8):

(53) [Mary solved problem A or problem B]
or [Mary solved both problems]
  a. Violates HC: $[a \vee b] \vee (a \wedge b)$
  b. Respects HC: $\mathfrak{X}([a \vee b], \mathfrak{A}) \vee (a \wedge b)$

Such an analysis does not only account for the felicitous disjunction with the seeming entailment pattern but also reassures and rescues the descriptive power of HC as a generalisation.

In recent $\mathfrak{X}$-based analyses (Chierchia et al., 2009; Katzir and Singh, 2013), the ♡ has therefore been implicitly assumed. The reason for our treating HC as a potential part of ♡-procedure, or rather that HC and ♡ are subsets of a wider class of inconsistency-mitigating procedure, will become more relevant in the following subsection (§3.2) where we address a particular form of (symmetric) HC-violation that we will assume is innocently excludable.

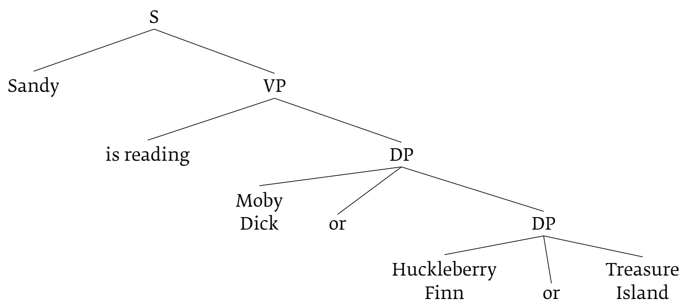
3.2 Composition & calculation

As a methodological preliminary, we assume that the alternative set grows point-wise, in line with standard assumptions stemming from the Hamblinian (Hamblin, 1958, 1973), or indeed Roothian (Rooth 1985, *et seq.*), semantics for alternatives. Structurally, this means that alternatives grow structurally incrementally, i.e., every alternative-sensitive operator, like *only* (or its covert counterpart, $\mathcal{X}$), that activates the alternatives of its sister does so on a no-look-ahead basis.

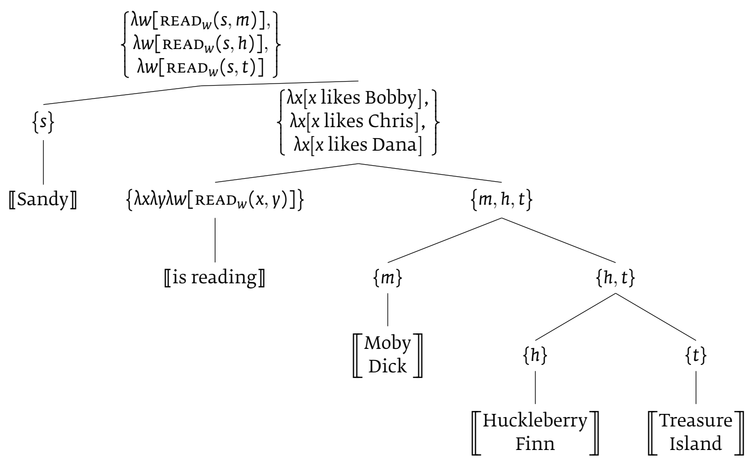
As a sample of the programmatic thrust of such an approach, take a sketch of a a possible disjunction structure (54b) and Hamblinian interpretation taken from Alonso-Ovalle (2006: 80, ex. 63).

(54) "The denotation of the sentence in (54b) is the set containing the proposition that *Sandy is reading Moby Dick* (m), the proposition that *Sandy is reading Huckleberry Finn* (h), and the proposition that *Sandy is reading Treasure Island* (t)." (Alonso-Ovalle, 2006: 80, ex. 63)

a. A simplified structure for disjunction:



b. A denotation for disjunction:

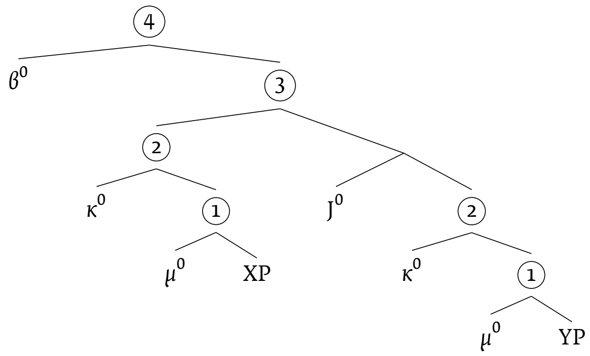


Our alternative tree with involve two alternative-triggering operators, incarnated by the μ and κ superparticles, and one alternative-insensitive Junction head which will pair coordinands and let a c-commanding β operator turn the tuple into a Boolean expression, as per (22) and (23).

The no-look-ahead principle will thus allow for 'embedded' alternatives, where a κ operator will function over a μ-triggered and exhaustified set of alternatives.[22]

We will therefore end up computing and composing the meaning of a complexly-marked disjunction in four steps, as the morpho-syntactic analysis from the previous section suggested. These compositional steps are shown in (55) and paraphrased in (56).

(55) The compositional steps in interpreting $[\![\mathrm{JP}^{+}]\!]$:



(56) Paraphrasing the compositional steps in interpreting $[\![\mathrm{JP}^{+}]\!]$:

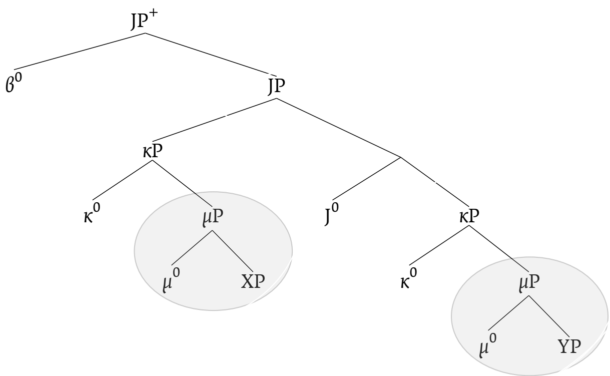
1. $[\![\mu\mathrm{P}]\!]$ as FA of $[\![\mu^0]\!]$ and its argument (coordinand)
2. $[\![\kappa\mathrm{P}]\!]$ as FA of $[\![\kappa^0]\!]$ and $[\![\mu\mathrm{P}]\!]$
3. $[\![\mathrm{JP}]\!]$ as tuple-forming FA of $[\![\mathrm{J}^0]\!]$ and two $[\![\kappa\mathrm{P}]\!]$s (structural coordinands)
4. $[\![\mathrm{JP}^{+}]\!]$ as FA of $[\![\beta^0]\!]$ and $[\![\mathrm{JP}]\!]$

In the paragraphs that follow, we take each of the compositional steps in turn, starting with the first.

STEP 1 The first compositional step concerns the μP.

22 As a matter of methodological principle, stemming from idealised parsimony, we will also assume that there are no semantically vacuous morphemes: therefore a derivation adds compositional meaning. Alternatively, or at least more ideologically loosely, we assume that the inferential system pays close attention to every step of the interpretational (and derivational) procedure, in form of triviality checks, in the sense of Romoli (2015a), and references therein.

(57) Composing μP (a sketch):



Assume a standard additive μ expression, where μ combines with a DP, like *John*, which, once point-wise 'lifted' to propositional level, contains no negative or modal markers (cf. (13)). The presence of μ will activate alternatives of its host and, once active, alternatives need to undergo exhaustification.

$[\![\mu\text{P}]\!]$ has to be recursively exhaustified, since a single layer of exhaustification yields a contradiction in absence of a negative or a modal operator interpolating within the structure, as per (13). A single level of exhaustification yields a contradiction in absence of (very possibly structurally defined) alternatives, as shown in (58a), since the proposition in question is the only available alternative to itself. The speakers are therefore assumed to rerun the Gricean reasoning and add another layer of exhaustification, which, given the result of the first level of exhaustification, now contains the exhaustified proposition as an alternative (58b). Once this alternative is denied, under standard assumptions, antiexhaustivity obtains, as per Mitrović and Sauerland (2014) and Fox (2007).[23]

(58) a. First layer of exhaustification:

$$\begin{aligned} \mathfrak{X}(p)(\{p\}^{\mathfrak{A}}) &= p \wedge \neg p \\ &\vdash \bot \end{aligned}$$

b. Second layer of exhaustification:

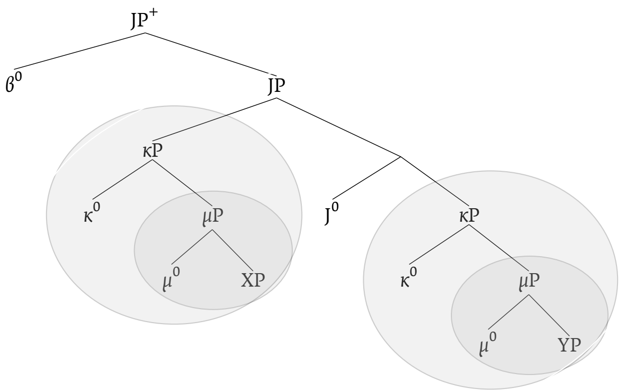
$$\begin{aligned} \mathfrak{X}(p)\Big(\{\mathfrak{X}(p)\}^{\mathfrak{A}}\Big) &= p \wedge \neg \mathfrak{X}(p) \\ &\nvdash \bot \end{aligned}$$

23 See also Gajewski (2008) and Katzir (2007), *inter. al.*, on this matter.

For details and further arguments for iterativity of $\mathfrak{X}$, see Sauerland 2004, Fox 2007 and Mitrović and Sauerland 2014, *inter. al.*.

STEP ②: INTERPRETING κP We now take a structural step higher, where the result of step 1, $[\![\mu P]\!]$, namely (58b), is fed into κ, assumed to be an incarnation of an Inquisitive operator.

(59) Composing κP (a sketch):



κ takes the μP with the denotation $[p \wedge \neg\mathfrak{X}(p)]$ as complement and perform inquisitive closure, i.e. a disjunction of $[\![\mu P]\!]$ and its negation. Via De Morgan equivalnce (DeM), we get the meanings of individual disjuncts, as shown in (62). We also invoke Alonso-Ovalle's (2006) principle of converting disjunction to sets.

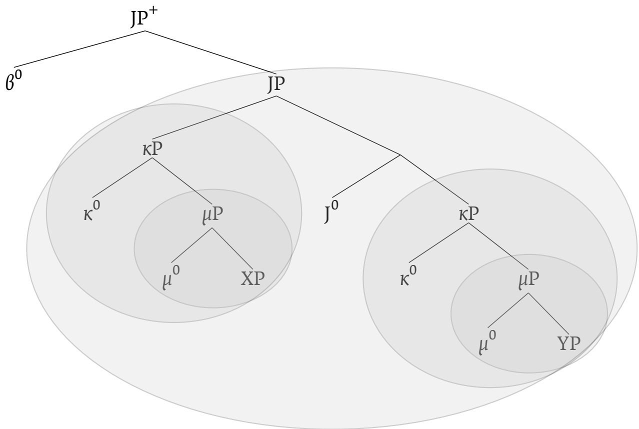
(60) Composing κP:

$$\begin{aligned}
[\![\kappa P]\!] &= [\![\kappa^0]\!]\big([\![\mu P]\!]\big) \\
&= \lambda p[p \vee \neg p]\Big([p \wedge \neg\mathfrak{X}(p)]\Big) \\
&= [p \wedge \neg\mathfrak{X}(p)] \vee \neg[p \wedge \neg\mathfrak{X}(p)] \\
\text{(by DeM)} &= [p \wedge \neg\mathfrak{X}(p)] \vee [\neg p \vee \mathfrak{X}(p)] \\
&= \Big\{[p \wedge \neg\mathfrak{X}(p)], [\neg p \vee \mathfrak{X}(p)]\Big\} \\
&= \Bigg\{\{[p \wedge \neg\mathfrak{X}(p)]\}, \Big\{\{\neg p\}, \{\mathfrak{X}(p)\}\Big\}\Bigg\}
\end{aligned}$$

The result of (62) is true for both of the disjuncts, hence a pair of such sets is paired up by J^0.

STEP ③: INTERPRETING JP We now pair up the two κ-marked coordinands, with an embedded μP each, via the Junction head.

(61) Composing JP (sketch):

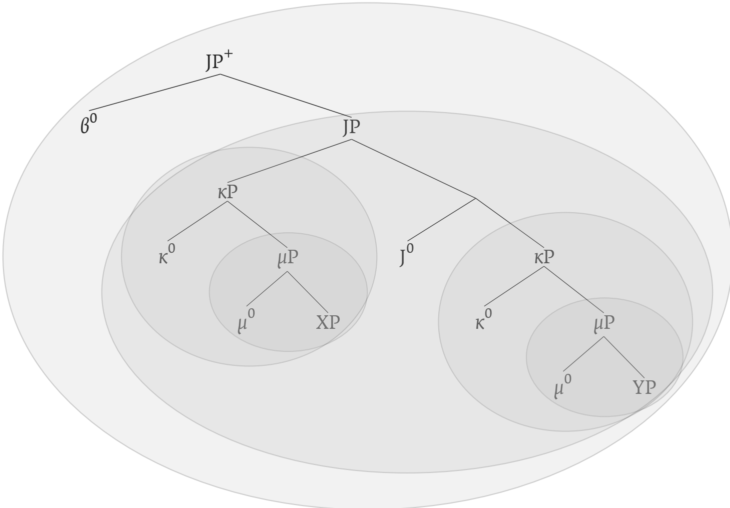


(62) Composing JP:

$$
\begin{array}{rcl}
[\![\text{JP}]\!] & = & [\![\text{J}^0]\!]\Big([\![\kappa\text{P}_1]\!]\Big)\Big([\![\kappa\text{P}_2]\!]\Big) \\
\text{(by Lex. it.)} & = & \lambda y\lambda x\big[x \bullet y\big]\Big([\![\kappa\text{P}_1]\!]\Big)\Big([\![\kappa\text{P}_2]\!]\Big) \\
\text{(by FA)} & = & [\![\kappa\text{P}_1]\!] \bullet [\![\kappa\text{P}_2]\!] \\
 & = & \langle [\![\kappa\text{P}_1]\!], [\![\kappa\text{P}_2]\!] \rangle \\
 & = & \big\langle [[p \wedge \neg\mathfrak{X}(p)] \vee [\neg p \vee \mathfrak{X}(p)]], [[q \wedge \neg\mathfrak{X}(q)] \vee [\neg q \vee \mathfrak{X}(q)]] \big\rangle \\
\text{(by AO)} & = & \Bigg[\Bigg\{\{[p \wedge \neg\mathfrak{X}(p)]\}, \Big\{\{\neg p\}, \{\mathfrak{X}(p)\}\Big\}\Bigg\}\Bigg] \\
\text{(by AO)} & = & \left\langle \left[\left\{ \begin{array}{l} \{[p \wedge \neg\mathfrak{X}(p)]\}, \\ \Big\{\{\neg p\}, \{\mathfrak{X}(p)\}\Big\} \end{array} \right\} \right], \left[\left\{ \begin{array}{l} \{[q \wedge \neg\mathfrak{X}(q)]\}, \\ \Big\{\{\neg q\}, \{\mathfrak{X}(q)\}\Big\} \end{array} \right\} \right] \right\rangle
\end{array}
$$

STEP ④: ENTER β In the last step, we complete the composition by turning the JP-pair into a Boolean expression.

(63) Composing JP$^+$ (sketch):



As already discussed, Minimality will ensure that the uninterpretable feature [uF :] on β^0 is checked by κ^0 bearing [$i\kappa$]. The checked feature [$u\!\!\!-$F : κ] is then interpreted as an instruction to map ⟦JP⟧ via UJ to a disjunction.

(64) Composing JP$^+$:

$$\begin{aligned}
[\![\mathrm{JP}^+]\!] &= [\![\beta^0]\!]\Big([\![\mathrm{JP}]\!]\Big) \\
\text{(by F-check.)} &= \lambda\langle x, y\rangle\,[x \vee y]\Big(\langle[\![\kappa\mathrm{P}_1]\!], [\![\kappa\mathrm{P}_2]\!]\rangle\Big) \\
\text{(by FA)} &= \langle[\![\kappa\mathrm{P}_1]\!], [\![\kappa\mathrm{P}_2]\!]\rangle \\
&= [\![\kappa\mathrm{P}_1]\!] \vee [\![\kappa\mathrm{P}_2]\!] \\
&= \left[\left\{\begin{matrix}\{[p \wedge \neg\mathfrak{X}(p)]\}, \\ \{\{\neg p\}, \{\mathfrak{X}(p)\}\}\end{matrix}\right\}\right] \vee \left[\left\{\begin{matrix}\{[q \wedge \neg\mathfrak{X}(q)]\}, \\ \{\{\neg q\}, \{\mathfrak{X}(q)\}\}\end{matrix}\right\}\right] \\
\text{(by AO)} &= \left\{\left\{\begin{matrix}\{[p \wedge \neg\mathfrak{X}(p)]\}, \\ \{\{\neg p\}, \{\mathfrak{X}(p)\}\}\end{matrix}\right\}, \left\{\begin{matrix}\{[q \wedge \neg\mathfrak{X}(q)]\}, \\ \{\{\neg q\}, \{\mathfrak{X}(q)\}\}\end{matrix}\right\}\right\}
\end{aligned}$$

The generated alternative set contains several subsets (with subsets of their own) which is problematic for the ♡-algorithm. We hence take a brief excursus in order obviate this technical difficulty by positing a set-flattening function.

We aim to derive a set of propositional alternatives from a set of sets of sets (of sets?) of propositional alternatives.[24] To do so, we define a

24 This was inspired by a comment by Daniel Büring, to whom many thanks.

function, BÜ, which will flatten the generated set containing alternative sets (64) and return an elemental set of alternatives.

Let BÜ be a recursive injective function which flattens a set A, i.e. creates a list of elements in A. Formally, BÜ is a recursive morphism from ⊆-reflexive objects[25] to ⊆-irreflexive objects (i.e., to only those objects which are not subsets of themselves).

(65) $\text{BÜ}(x_{x\subseteq x}) = y_{y\not\subseteq y}$

This derives the flattened alternative set, which we label $\bar{\mathfrak{A}}$, in (66):

(66) a. $\text{BÜ} : (64) \mapsto \bar{\mathfrak{A}}$

b. $\bar{\mathfrak{A}} = \{[p \wedge \neg\mathfrak{X}(p)], [q \wedge \neg\mathfrak{X}(q)], [\neg p], [\neg q], [\mathfrak{X}(p)], [\mathfrak{X}(q)]\}$

The alternative set is still inconsistent but in the form on which we now may impose the ♡-function which will negate an optimal amount of alternative subsets until consistency obtains.

(67) $[\![\text{JP}^+]\!] = \left\{ \begin{array}{ll} [p \wedge \neg\mathfrak{X}(p)], & [\neg p \vee \mathfrak{X}(p)], \\ [q \wedge \neg\mathfrak{X}(q)], & [\neg q \vee \mathfrak{X}(q)] \end{array} \right\}$ .... $\vdash \neg$CONS

a. $\left\{[p \wedge \neg\mathfrak{X}(p)], [q \wedge \neg\mathfrak{X}(q)]\right\}$ .... excludable: HC

b. $\left\{[\neg p \vee \mathfrak{X}(p)], [\neg q \vee \mathfrak{X}(q)]\right\}$

i. $\{\{\neg p\}, \{\neg q\}\}$ .... excludable: ∃C

ii. $\{\{\mathfrak{X}(p)\}, \{\mathfrak{X}(q)\}\}$ .... ✓

The LF in (67b-ii) is clearly a candidate—let us see whether this actually obtains. We assume that, since the entire set (67) is inconsistent, one of the two maximal consistent subsets is the resulting denotation. The first consistent set in (67a), however, is excludable for two reasons. For one, (67a) violates HC, as briefly sketched in (68).

(68) SKETCH OF A PROOF: as per our assumptions, let $p, q \in C$. The alternative set $\left\{[p \wedge \neg\mathfrak{X}(p)], [q \wedge \neg\mathfrak{X}(q)]\right\}$ thus comprises of the two disjunct candidates. The first, $[p \wedge \neg\mathfrak{X}(p)]$ entails q since $\neg\mathfrak{X}(p) \vdash q$, and $[q \wedge \neg\mathfrak{X}(q)]$ entails p since $\neg\mathfrak{X}(q) \vdash p$. This violates HC ■

25 We take a standard assumption that all sets are subsets of themselves (see Halmos 1960, *int. al.*):

(1) TH. $\forall S[S \subseteq S]$

$\because$ $\forall x[x \in S \rightarrow x \in S]$

$\Rightarrow$ $S \subseteq S$ ■

Another possible reason for exclusion of (67a) is, perhaps, the strengthening condition we stipulated in fn. 22, which amounts to stipulating, on the grounds of possibly natural principles, that alternative-sensitive morphemes, like μ and κ, enrich (and not simply maintain) meaning structurally. This view finds support in recent work on the general aspects of and interaction of triviality and grammaticality (Gajewski, 2002), or more explicit statements of structural triviality verifications (Romoli, 2015b).[26] A μP with an antiexhaustive meaning, once fed into κ, should not, then, yield a κP with the meaning identical to that of μP alone. Our resulting denotation, however, *contains* the μP meanings of each disjuncts and, may, be excluded for reasons of structural enrichment. Therefore, if the first maximal consistent subset (67b) is not the denotation of JP^+, then it has to be the other.

The other consistent subset in (67b) has a clear flavour of exclusivity: either *only* one disjunct is true ($\mathfrak{X}(p)$), or else that disjunct is not the case ($\neg p$). This, however, still allows for both disjuncts to be false ($\neg p \vee \neg q$) and we end up nothing (i.e., with the wrong meaning, paraphrasable as "neither. . . nor"). We assume an existential presupposition ($\exists$C) blocks this meaning.[27] The second subset of (67b-ii), however, contains a mutually-exclusive doubleton subset (67b-ii), which asymmetrically entails (67b-i). This is the desired result with the exclusive component.

4 CONCLUSION

This paper has essentially tried making sense out of complex morphology for, what seems to be, a rather simple meaning of 'or' or '$\vee$'. I have not only shown that five operators (heads) are present in the morphosyntactic expression of exclusive disjunction, but have also presented a working analysis of deriving the exclusive component as a computational consequence of five-head/operator composition ($1 \times \text{J}^0, 2 \times \kappa^0, 2 \times \mu^0$) and alternative elimination via a $\heartsuit$-like procedure (including HC) that handles inconsistencies in the generated alternative set. If nothing else, this paper presented a sincere attempt to elucidate the compositional gymnastics of logical units below the word level.

26 Note, however, that Romoli (2015a) assumes triviality check to kick in with every (covert) movement (i.e., internal merge) operation. We hypothesise, in a rather similar vein, that triviality scrutiny applies with every external merge, or at least with every externally merged non-terminal node. The details of this view, I concede, remain to be explored and verified for any meta-triviality (pun neither intended nor not intended).

27 I am grateful to Uli Sauerland for pointing out this to me back in 2012. Instead of $\exists$C, we may also appeal to a presuppositional definition of $\mathfrak{X}$, in which the exhaustified proposition is presupposed, as per fn. 1.

References

Adams, D. Q. (2013). *A Dictionary of Tocharian B*. Leiden Series in Indo-European. Amsterdam: Rodopi.

Alonso-Ovalle, L. (2006). *Disjunction in alternative semantics*. PhD thesis, UMass Amherst.

Alonso-Ovalle, L. (2008). Innocent exclusion in an Alternative Semantics. *Natural Language Semantics*, 16:115–128.

Arsenijević, B. (2011). Serbo-Croatian coordinative conjunctions at the syntax-semantics interface. *The Linguistic Review*, 28:175–206.

Autenrieth, G. (1895). *A Homeric Dictionary for Schools and Colleges*. New York: Harper & Brothers.

Beck, J. E., Malamud, S. A., and Osadcha, I. (2012). A semantics for the particle ἄν in and outside conditionals in Classical Greek. *Journal of Greek Linguistics*, 12:51–83.

Bobaljik, J. D. (2012). *Universals in Comparative Morphology: Suppletion, superlatives, and the structure of Words*. Cambridge, MA: MIT Press.

Bošković, Ž. (2001). *On the Nature of the Syntax-Phonology Interface: Cliticization and Related Phenomena*. North-Holland Linguistic Series: Linguistic Variations. Amsterdam: Elsevier.

Bošković, Ž. and Nunes, J. (2007). The copy theory of movement: A view from PF. In Corver, N. and Nunes, J., editors, *The Copy Theory of Movement*, pages 13—74. Amsterdam: John Benjamins.

Bowler, M. (2014). Conjunction and disjunction in a language without 'and'. In Snider, T., D'Antonio, S., and Weigand, M., editors, *Proceedings of SALT 24*, pages 137–155.

Cable, S. (2010). *The Grammar of Q: Q-Particles, Wh-Movement and Pied-Piping*. Oxford: Oxford University Press.

Carling, G. (2009). *Dictionary and Thesaurus of Tocharian A*, volume 1: A–J. Wiesbaden: Harrassowitz.

Chierchia, G. (2006). Broaden Your Views: Implicatures of Domain Widening and the "Logicality" of Language. *Linguistic Inquiry*, 37(4):535–590.

Chierchia, G. (2013a). Free choice nominals and free choice disjunction: The identity thesis. In Fălăuş, A., editor, *Alternatives in Semantics*, pages 50–87. London: Palgrave Macmilan.

Chierchia, G. (2013b). *Logic in Grammar: Polarity, Free Choice and Intervention*. Oxford studies in semantics and pragmatics 2. Oxford: Oxford University Press.

Chierchia, G., Fox, D., and Spector, B. (2009). Hurford's constraint and the theory of scalar implicatures: evidence for embedded implicatures. In Egré, P. and Magri, G., editors, *Presuppositions and Implicatures. Proceedings of the MIT-Paris Workshop*, volume 60. Cambridge, MA: MITWPL.

Ciardelli, I. and Groenendijk, J. (2012). Inquisitive semantics. Ms. NASSLLI lecture notes.

den Dikken, M. (2006). Either-float and the syntax of co-or-dination. *Natural Language and Linguistic Theory*, 24(3):689–749.

Denniston, J. D. (1950). *The Greek Particles*. Oxford: Oxford University Press.

Edgerton, F. (1953). *Buddhist Hybrid Sanskrit: Grammar and Dictionary*, volume 2 vols. New Haven: Yale University Press.

Elliott, W. E. (1981). *Conditional sentences in the New Testament*. PhD thesis, Grace Theological Seminary.

Fox, D. (2007). Free choice and scalar implicatures. In Sauerland, U. and Stateva, P., editors, *Presupposition and Implicature in Compositional Semantics*, pages 71–120. London: Palgrave Macmilan.

Fox, D. and Katzir, R. (2011). On the characterization of alternatives. *Natural Language Semantics*, 19:87–107.

Franks, S. and King, T. H. (2000). *A Handbook of Slavic Clitics*. Oxford studies in comparative syntax. Oxford: Oxford University Press.

Gajewski, J. (2002). On analyticity in natural language. Ms. MIT. Accessible at `http://gajewski.uconn.edu/papers/analytic.pdf`.

Gajewski, J. (2008). On analyticity in natural language. Ms. University of Connecticut.

Hagstrom, P. (1998). *Decomposing questions*. PhD thesis, MIT.

Hale, M. (1996). Deriving Wackernagel's law: Prosodic and syntactic factors determining clitic placement in the language of the Rigveda. In Halpern, A. and Zwicky, A., editors, *Approaching Second: Second position clitics Approaching Second: Second position clitics and related phenomena.*, pages 165–197. Stanford: SCLI Publications.

Halle, M. and Marantz, A. (1994). Some key features of distributed morphology. *MIT Working Papers in Linguistics*, 21:275–288.

Halmos, P. R. (1960). *Naive Set Theory*. Academic Press.

Halpern, A. L. (1995). *On the Placement and Morphology of Clitics*. Stanford, CA: CSLI.

Halpern, A. L. (2001). Clitics. In Spencer, A. and Zwicky, A. M., editors, *Handbook of morphology*, chapter 5, pages 101–122. Stanford, CA: CSLI.

Hamblin, C. L. (1958). Questions. *Australasian Journal of Philosophy*, 36:159–168.

Hamblin, C. L. (1973). Questions in Montague English. *Foundations of Language*, 10(1):41–53.

Hoffner, H. A. and Melchert, H. C. (2008). *A Grammar of the Hittite Language. Part 1: Reference Grammar*. Languages of the Ancient Near East. Winona Lake: Eisenbrauns.

Hurford, J. (1974). Exclusive or inclusive disjunction. *Foundations of Language*, 11:409–411.

Katzir, R. (2007). Structurally-defined alternatives. *Linguistics and Philosophy*, 30:669–690.

Katzir, R. and Singh, R. (2013). Hurford disjunctions: embedded exhaustification and structural economy. *Proceedings of Sinn und Bedeutung 13*, 17:210–216.

Klinedinst, N. and Rothschild, D. (2012). Connectives without truth tables. *Natural Language Semantics*, 20(2):137–175.

Kloekhorst, A. (2008). *Etymological Dictionary of the Hittite Inherited Lexicon*, volume 5 of *Leiden Indo-European Etymological Dictionary Series*. Leiden: E.J. Brill.

Kratzer, A. and Shimoyama, J. (2002). Indeterminate Phrases: the View from Japanese. In Otsu, Y., editor, *The Proceedings of the Third Tokyo Conference on Psycholinguistics*, pages 1–25. Tokyo: Hituzi Syobo.

Lin, S.-Y. J. (2014). An Inquisitive Semantics treatment to Mandarin Chinese Q(uestion)-particles. Ms. NYU. Version as of 8 August.

Marantz, A. (2011). Locality domains for contextual allosemy. Paper presented at the Columbia Lingusitic Society.

Mitrović, M. (2011). *The Syntax of Coordination in Sanskrit*. Master's thesis, University of Cambridge.

Mitrović, M. (2014). *Morphosyntactic atoms of propositional logic: a philo-logical programme*. PhD thesis, University of Cambridge.

Mitrović, M. and Sauerland, U. (2014). Decomposing coordination. In Iyer, J. and Kusmer, L., editors, *Proceedings of NELS 44*, volume 2, pages 39–52.

Nishigauchi, T. (1990). *Quantification in the Theory of Grammar*. Dordrecht: Kluwer.

Potts, C. (2012). Scalar implicature calculation in Chierchia et al. Handout to: Ling 236: Context dependence in language and communication, Spring Term, April 9.

Rizzi, L. (1990). *Relativized Minimality*. Cambridge, MA: MIT Press.

Rizzi, L. (2001). Relativized minimality effects. In *The Handbook of Contemporary Syntactic Theory*, pages 89–110. Oxford: Blackwell.

Roberts, I. (2010). *Agreement and Head Movement: Clitics, Incorporation, and Defective Goals*. Linguistic Inquiry Monographs. Cambridge, MA: MIT Press.

Roberts, I. (2012). Phases, head-movement, and second-position effects. In Gallego, A. J., editor, *Phases: Developing the Framework*, pages 385–440. Walter de Gruyter.

Romoli, J. (2015a). A structural account of conservativity. *Sematntics-Syntax Interface*, 2(1):28–57.

Romoli, J. (2015b). A structural account of conservativity. Ms. University of Ulster. To appear in *Semantics-Syntax Interface.*

Rooth, M. (1985). *Association with Focus*. PhD thesis, University of Massachusetts at Amherst.

Sauerland, U. (2004). Scalar implicatures in complex sentences. *Linguistics and Philosophy*, 27:367–391.

Shimoyama, J. (2006). Indeterminate phrase quantification in Japanese. *Natural Language Semantics*, 14:139–173.

Shimoyama, J. (2007). Indeterminate noun phrase quantification in Japanese. *Natural Language Semantics*, 14(2):139–173.

Singh, R., Wexler, K., Astle, A., Kamawar, D., and Fox, D. (2014). Children interpret disjunction as conjunction: Consequences for theories of implicature and child development. Manuscript, Carleton University. Forthcoming in *Natural Language Semantics*.

Slade, B. M. (2011). *Formal and philological inquiries into the nature of interrogatives, indefinites, disjunction, and focus in Sinhala and other languages*. PhD thesis, University of Illinois at Urbana-Champaign.

Smyth, H. W. (2014). *Greek Grammar*. Benediction Classics, revised edition.

Szabolcsi, A. (2010). *Quantification*. Cambridge: Cambridge University Press.

Szabolcsi, A. (2013). Quantifier particles and compositionality. In Aloni, M., Franke, M., and Roelofsen, F., editors, *Proceedings of the 19th Amsterdam Colloquium*, pages 27–34.

Szabolcsi, A. (2014a). The busy lives of quantifier particles. A series of five workshop lectures. August 11–15. Tübingen: European School for Language, Logic and Information.

Szabolcsi, A. (2014b). What do quantifier particles do? To appear in *Linguistics & Philosophy*. Pre-print version no. 6 as of August 2014. NYU. Accesible at http://ling.auf.net/lingbuzz/001857.

Szabolcsi, A. (2014c). What do quantifier particles do? Ms. version as of 3 March. NYU.

van der Berg, H. (2004). Coordinating constructions in Daghestanian languages. In Haspelmath, M., editor, *Coordinating constructions*, pages 197–226. Amsterdam: John Benjamins.

Winter, Y. (1995). Syncategorematic conjunction and structured meanings. In Simons, M. and Galloway, T., editors, *Proceedings of SALT 5*. Ithaca: Cornell University & Linguistic Society of America.

Winter, Y. (1998). *Flexible Boolean Semantics: coordination, plurality and scope in natural language*. PhD thesis, Utrecht University.

Yatsushiro, K. (2002). The distribution of *mo* and *ka* and its implications. *Proceedings of FAJL 3. MIT Working Papers in Linguistics*, 41:181–198.

Zimmer, S. (1976). *Tocharische Bibliographie 1959-1975 mit Nachträgen für den vorhergehenden Zeitraum.* Heidelberg: C. Winter.