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Two conjunctions are better than one

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Abstract: Across languages, the morpheme expressing conjunction frequently has other uses as well. Several linguists have attempted to unify all uses of conjunction morphemes under one general algebraic scheme. We argue in favor of a more limited unification and propose a universal decomposition of conjunction structures: We propose that there exist both a "nominal" *e*-type and "verbal" or "clausal" *t*-type junctor. Our account is substantiated with evidence from synchronic typology and diachrony. Our analysis hinges on a generalisation, that *e*-conjunctors, but crucially not *t*-conjunctors, may have non-conjunctional quantificational meanings. Historically, we invoke the same principle to explain the change in the conjunction grammar of Indo-European which uniformly abandoned the *e*- and adopted the *t*-level conjunctions across the board.

Keywords: coordination; semantic type; quantification; additive particle; distributivity

1. Introduction

In many languages conjunction morphemes are polyfunctional. Two examples of such polyfunctionality are Japanese *mo* and English *and*. Japanese *mo* also has the the quantificational meanings of 'any' or 'all' (Kuroda 1965; Shimoyama 2001; 2006; Yatsushiro 2009) and the meaning of an additive particle. (Here and in the following, we label morphemes as μ across languages that correspond to the Japanese *mo* according to our analysis.)

(1) a. universal quantification
   i. dare **-mo** wakaru
      who -μ understand
      '**Every**one understands.'
   ii. dono gakusei **-mo** wakaru
      INDET student -μ understand
      '**Every** student understands.'

b. (negative) polarity
   i. dare **-mo** wakarimas-en
      who -μ understand-NEG
      '**No**one (= not **any**one) understands.'
   ii. dono gakusei **-mo** wakarimas-en
      INDET student -μ understand-NEG
      '**No** student (= not **any** student) understands.'

c. conjunction
   Mary (**-mo**) John **-mo** wakaru
   M -μ J -μ understand
   '(**Both**) Mary **and** John understand.'[1]

d. additivity
   Mary **-mo** wakaru
   M -μ understand
   '**Also** Mary understands.'

In English, the conjunction *and* is not homophonous to any morpheme expressing universal quantification: *all, every*, and *each* and the additive particles *too* and *also* are all unrelated to the morpheme *and*. But English *and* can be used to express both clausal coordination (2) in addition to nominal conjunction as in (1c), as well as coordination of several other categories (Partee & Rooth 1983). Japanese *mo* cannot be used to express clausal coordination as shown by (3):[2]

(2) Mary talks and John understands.

(3) *Mary hanase-ru **-mo** John waka-ru **-mo**
Mary talk-NON.PAST -μ John understand-NON.PAST -μ

What does the affinity of conjunction, additivity and quantification on the one hand and that of clausal and nominal conjunction on the other hand tell us about the semantics of conjunction? Algebraic concepts suggest several connections between conjunction and the other notions mentioned. In mathematical logic, the concepts of clausal conjunction and universal quantification are closely related: for finite domains, universal quantifica-

[1] The optional character of the repetitive μ seems typologically consistent. This will also become obvious in section 4. See Mitrović (2014) for some details.

[2] Coordination of tenseless verb phrases with *mo*, as in (i), is possible.

(i) John-ga hon-o yomi-mo si, Bill-ga rekoodo-o kiki-mo si-ta
John-NOM book-ACC read-μ do, Bill-NOM record-ACC listen-μ do-PAST
'John read a book and Bill listened to a record.' (Kuroda 1965, 78)

tion can be reduced to a sequence of conjunctions. Therefore some logicians have proposed to use the symbol $\bigwedge$ for universal quantification such that the equivalence in (4) is mnemonic.

(4) $$\bigwedge_{x \in \{r_1,\ldots,r_n\}} P(x) \Leftrightarrow P(r_1) \wedge \cdots \wedge P(r_n)$$

The link between nominal and verbal conjunction also seems in some cases related to an algebraic intuition. Namely, a distributive predicate P is characterized by the equivalence of $P(r_1 \oplus r_2) = P(r_1) \wedge P(r_2)$. In this case, the mereological join $\oplus$ in the domain of individuals then corresponds to the logical conjunction $\wedge$. Therefore, the nominal conjunction requires that John and Mary kissed someone other than themselves, as the pair of English and SerBo-Croatian examples show.[3]

(5) Both John and Mary kissed (*each other/a frog each).

(6) {Žabu, *Jedan drugog} su i Mujo i Fata poljubili.
frog.ACC one-another.DIST AUX μ Mujo μ Fata kiss.PL
'Both Mujo and Fata kissed {a frog, *each other}.'

For a collective predicate in (7), however, this intuition does not relate the nominal use of *and* to the clausal one, as (7) doesn't entail that John weighs 120 kg. This is confirmed in a language like SerBo-Croatian where the collective predicate blocks the presence of a distributive μ marker *i*.

(7) a. John and Mary weigh 120 kg (together).
b. (*I) Mujo i Fata su skupa težki 120kg.
μ Mujo and.J Fata AUX together heavy 120kg
'(*Both) Mujo and Fata weigh 120kg together.'

In this paper, we explore the contention that nominal conjunction corresponds universally to two distinct morphemes subject to parametrisation of exponence. English *and* is an exponent of one of the morphemes constituting clausal conjunction, while Japanese *mo* is an exponent of nominal conjunction. Assuming that such a semantic duality of conjunction is universally available but subject to cross-linguistic parametrisation and diachrony, in the remainder of this introduction, we discuss two theoretical approaches to the cross-linguistic pattern of quantifier-particle multi-

[3] In SerBo-Croatian, as well as Slavonic more generally, the repetitive *i* is μ, while the non-repetitive clausal *i* is a J morpheme, homophonic with the nominal μ; see Mitrović (2014, ch. 3) for details.

functionality, which we exemplified with Japanese above. In section 2, we then introduce our own proposal involving a complex structure for NP-coordination.

1.1. Previous proposals

There seem to exist in the literature two approaches to explaining theoretically the formative identity of the μ particles featuring in several structures. The first approach takes the multi-functionality of *mo* and *mo*-like particles, which we label μ cross-linguistically, as essentially resulting from accidental homophony. The most articulate proponents of such a view include Hagstrom (1998), Cable (2010) and Bianchi (2015). We explicitly oppose this view, with the intuitionistic argument stemming from a typological observation we raised above: why would languages consistently manifest homophony of coordinate and quantificational markers? We substantiate this objection by introducing a typological argument in greater detail below.

Another, independent argument concerns the invalid predictions that such an analysis, resting on the presupposition of homophony, makes for a language like Japanese (we reiterate this argument from Mitrović & Sauerland 2014). Under a homophony account, there are, at least, two different grammatical formatives which expone as *mo* morphemes: one with a conjoining, and another with a quantificational function. Such an explanandum predicts, *ceteris paribus*, that a morpheme such as *mo* should not be able to simultaneously express coordination and quantification. It is, in fact, the obverse that is empirically the case, as the following Japanese examples in (8) show (taken from Mitrović & Sauerland 2014, 41, ex. (3)).

(8) a. dono gakusei **mo** dono sensei **mo** hanashita
INDET student μ INDET teacher μ talked
'Every student and every teacher talked.'

b. *dono gakusei **mo mo** dono sensei **mo mo** hanashita
INDET student μ μ INDET teacher MO MO talked
'**Every** student **and every** teacher talked.'

The data in (8) provide evidence against postulating the existence of homophonous pairs of coordinate and quantificational μ particles in Japanese, and cross-linguistically more generally. The homophony analysis that Hagstrom (1998) and Cable (2010) most notably defend, predicts that coordination of quantificational expressions (8) should, everything else being

equal, yield particle "reduplication": one particle expressing quantification and another expressing coordination. For further arguments against homophony, see Slade (2011) who provides a detailed historical argument based on a diachronic analyses of Japanese, Sinhala and Malayalam particles.[4] While a pro-homophony account may shift its burden of proof by stipulating a haplology rule that prohibits two phonologically identical morphemes in an adjacent sequence (cf. Poser 1984, 178), we contend that, in the interest of maintaining our approach to cross-linguistic semantics in full generality, it is theoretically more parsimonious and conceptually preferable not to accord such factors too prominent a role; instead, we derive as much as possible from the semantic-syntactic building blocks without the needless (in absence of sufficient motivation) invocation of post-syntactic operations. Or, in other words by Slade (2011, 8), "*Entia non sunt multiplicanda praeter necessitatem*: let us not suppose the existence of homophonous particles unless we uncover compelling evidence for such multiplicity".

The second approach to the μ-particle series regards exponents such as *mo* (=μ morpheme), *every*, and *and* as all deriving from an identical semantic core. A programmatic analysis of this kind is most notably put forth in Szabolcsi (2015). She postulates a silent Meet operation that maps expressions against structures (or contexts) to a conjunctive Boolean value. Szabolcsi (2015) argues that μ-style particles can be assigned a unified semantics across their incarnations. Namely, she assumes the condition in (9) where she explicates $<$ in a version of alternative semantics such that, if X is $P(x)$, Y can be a universally quantified statement $\forall z.P(z)$, or a conjunctive statement $P(x) \wedge P(y)$, which may or may not be accommodated from a single antecedent statement $P(y)$.

(9) Let X be the expression hosting μ, and Y the immediately larger context, μ requires $[\![X]\!] < [\![Y]\!]$. (Szabolcsi 2015, 10, example (20))

We do not pursue Szabolcsi's proposal for three reasons. Firstly, Szabolcsi's analysis is primarily motivated by data from languages such as Hungarian and Japanese, but says little about languages where conjunction isn't polyfunctional in the same way. Specifically, she leaves open the question why English *and* cannot be used to express universal quantification and additivity in the same fashion as Japanese can. A second concern we have about Szabolcsi's analysis is that she assumes that verbal and nominal con-

[4] We also present below a diachronic argument against homophony based on evidence from old Indo-European languages.

junction are the same – i.e., she assumes that the polyfunctionality of *and* as clausal and nominal connective is universal. We find it striking, however, that in many of the well-known languages with universal quantifier uses of conjunction, these morphemes cannot be used for the coordination of full finite clauses. Specially, Japanese *mo* in (3) and the μ-particle of Malayalam *um* in (10) cannot coordinate full, tensed clauses with the morpheme in question (Paul 2015).

(10) *John vann-u-um Bill poː-(y)i-**um** (Malayalam)
John come-PAST-μ Bill leave-PAST-μ

On Szabolcsi's analysis, it would be merely a coincidence that Japanese and Malayalam both are subject to this restriction on μ-conjunctions. Finally, we are uncertain that Szabolcsi's analysis can provide the technical means to differentiate between polar, scalar, and plain universal μ-containing expressions in a way which would allow us to model diachronic relations between the latter three kinds, which have been independently shown to exist (Mitrović 2014). We discuss all three issues in more detail in section 3 as predictions that corroborate our proposal.

2. The structure of conjunction

We propose that DP-coordination involves at least two morphemes (Mitrović 2014; Mitrović & Sauerland 2014):[5] μ and J. We assume that μ is of a semantic type that combines with a single type *e* argument (for short *e*-type), while J is of a type that combines two type *t* arguments (i.e., a *t*-type). In most languages, only one of these two morphemes is pronounced in NP-conjunction. Consequently, there exist two types of conjunctions and languages: those with an overt *e*-type conjunction, for example Japanese *mo*, and those with an overt *t*-type conjunction, for example English *and*. Thus, our proposal, as we spell out bellow, predicts that *e*-type and *t*-type conjunction morphemes should be different, though phonologically not necessarily distinct (cf. footnote 3), morphemes across languages and only *e*-type conjunction morphemes should have quantificational uses.

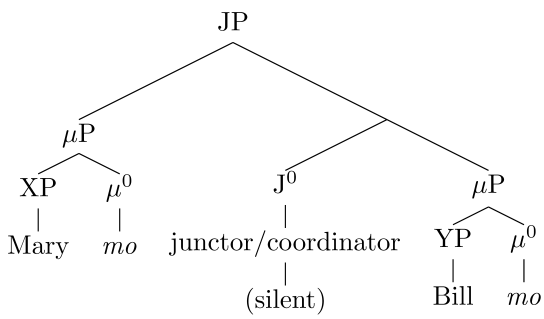
The two types are not motivated on the basis of empirical observation alone but also by theoretical work postulating semantic type-shifting

[5] We exclude at this point comitative structures like *Mary with John* that are marginal in English as DPs, but more widely used with the semantics of DP-coordination in other languages (McNally 1993; Paperno 2012, and others).

operators in the account of coordination (specifically, Winter (1996)) combined with the independent observation that type-shifting operators may be overtly realized in some languages (Chierchia 1998). Essentially our proposal is the result of viewing Winter's type-shifts as pronounceable morphemes, where the choice of exponency of relevant morphemes is subject to parametrisation. We first show how our approach can capture both Japanese *mo* and English *and*. We then show that both data from the historical linguistics of Indo-European and data from language typology corroborate our proposal that there are indeed two conjunctions of different logical types.

The universal syntactic structure for individual coordination we propose is illustrated in (11) for the Japanese phrase *Bill-mo Mary-mo* from (1). Our proposal is similar to that of Munn (1993) and den Dikken (2006) but we extend these syntactic accounts to polysyndetic conjunction so as to capture the non-conjunctive functions of μ:

(11)



For the semantics, we assume as in (12) that the μ head denotes the logical subset operator and propose that the J-head corresponds to set-theoretic intersection, i.e., logical conjunction at the level of sets. We state this as J′ directly at the level of type $\langle e,t\rangle$, but J is the logical conjunction $\wedge$ of two truth values. J′ can be thought of being derived from J via type-lifting of a binary function since $[\![\mathrm{J}']\!](x)(y) = \lambda z\ .\ [\![\mathrm{J}]\!](x(z))(y(z))$.

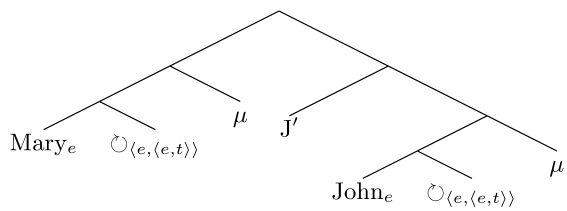
(12) a. $[\![\mu]\!](R^{\langle e,t\rangle})(S^{\langle e,t\rangle}) = R \subseteq S$

b. $[\![\mathrm{J}']\!] = (Q_1^{\langle\langle e,t\rangle,t\rangle})(Q_2^{\langle\langle e,t\rangle,t\rangle}) = Q_1 \cap Q_2$

For clausal conjunction, our proposal predicts that only J should occur combining two *t*-type meanings into one. This predicts that morphemes which unequivocally belong to the μ category should be ungrammatical in clausal coordinations. As demonstrated in (3) and (10) above, this prediction is borne out in Japanese and Malayalam. When two DPs of type

e are coordinated, neither μ nor J′ is directly applicable. We assume that $\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$ marks the typeshift from type e to $\langle e,t\rangle$, the characteristic property of an individual. Then, the structure in (13) correctly predicts conjunction, as it entails that the singleton sets {John} and {Mary} both be subset of the verbal predicate. Note that the concatenation of $\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$ and μ amounts to Montague's type-shift from an individual a to the set of a sets containing that individual, i.e., the generalized quantifier true of properties P with $P(a)$.

(13)



The lexical meanings entail that universally $\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$, μ and J′ need to occur when two DPs of type e are coordinated in the configuration shown below. We assume that the application of J′ with μ is blocked because the expression J′($\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$ a)($\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$ b) results in a contradiction unless a and b are identical. The meaning that results in (13) could combine via a second J′ with a third conjunct as in *Mary and John and Sue*, but only after application of $\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$ and μ.

The interpretation of (13) is a second level property of type $\langle\langle e,t\rangle,t\rangle$ that is true of a predicate P if both P(Mary) and P(John) hold. Our proposal therefore predicts that a collective interpretation, where P(Mary $\oplus$ John) holds, but not P(Mary) or P(John), should be unavailable for (13). This is indeed the case for nominal coordinators in Japanese as illustrated by (14) (Kuno 1973, 114 discusses *ni*) and also Hungarian (Szabolcsi 2015) and SerBo-Croatian (Mitrović 2014).

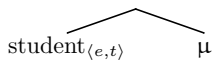
(14) Mary-mo John-mo kekkon-si-ta
Mary-μ John-μ wedding-do-past
'Mary got married and John got married, but not to each other.'

For English, however, NP-coordination by *and* allows collective interpretations as previous literature has extensively discussed (see, e.g., Winter 1996).

For universal quantification, we follow Shimoyama (2006) in assuming that the "indeterminate" *dare*, as exemplified by (1a), is interpreted as a set of type $\langle e,t\rangle$ restricted to humans, i.e., $[\![\text{dare}]\!] = \lambda x\ .\ x$ is human. For

the quantifier *dono gakusei-mo* 'every student', as per (1a), we also follow Shimoyama (2006) and assume that *dono gakusei* is interpreted as a set of type $\langle e, t\rangle$: the set of students. This way, the truth conditions of (15) are correctly predicted using our lexical entry (12a): the students must form a subset of the denotation of the verb.

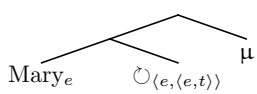
(15)



Finally, consider the additive particle use of *mo* in (16). We propose to derive the additive use from recursive exhaustification and the structure in (15). Note that the presence of *mo* requires the presence of $\circlearrowleft_{\langle e,\langle e,t\rangle\rangle}$ as shown in (17). However, the sentences with and without *mo* are predicted to be semantically equivalent. We therefore suggest deriving the additive inference of (16) as a type of implicature.

(16) Mary **mo** genki desu
Mary μ well is
'Also Mary is well.'

(17)



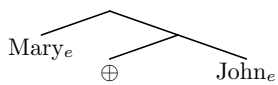
The analysis Mitrović and Sauerland (2014) suggest assumes that the sentences are obligatorily interpreted exhaustively, following Bade (2015) and others. Sentence (16) without *mo*, i.e., *Mary genki desu,* therefore entails that for any individual x other than Mary the predicate *genki* is false. For (16), we then assumed recursive exhaustivization. In this way, a second higher **Exh** of the sentence with *mo* could entail the negation of the exhaustified simpler sentence, i.e., the desired inference that not only Mary is well. Technically, however, this requires a divergence from the assumptions of Fox (2007) in how the alternative sets are determined in recursive exhaustivication. An alternative analysis to that of Mitrović & Sauerland (2014) is to assume that *mo* has *sae* 'only' as a lexical alternative, and therefore (16) has the inference that not only Mary is well. At this point, the latter analysis seems more straightforward to us, but we leave it for future work to adjudicate between the two analyses.

To conclude this section, consider again collective interpretations. In English, NP coordination as in (18) allows collective interpretations in con-

trast to Japanese (2).[6] Winter (1996) argues that the distributive/collective ambiguity of *and,* which he takes to be cross-linguistically the case, motivates an approach where collective interpretation is derived by a type-shift from the distributive one. The lack of ambiguity in Japanese and Hungarian therefore argues against Winter's approach. Instead, we return to the view of Partee & Rooth (1983) that English *and* is ambiguous between the logical connective and the mereological join operator $\oplus$. Since $\oplus$ can directly combine with individuals of type e, the structure in (19) suffices for the collective interpretation of coordination.

(18) Mary and John married (each other).

(19)



Finally, consider the question why J-type coordinators such as English *and* but not μ-type coordinators such as Japanese *mo* might be prone to the ambiguity that English *and* displays. On our approach, this question can be asked more precisely as follows: Is there a possible lexical entry for μ such that a structure for *Mary-mo John-mo* would be assigned the collective interpretation within a natural, compositional system. We suspect that the answer to this will at least require some enrichment of the formal system we have been assuming so far. (20) shows an attempt at a lexical entry that is modelled after the system outline so far and it fails.

(20) $[\![\mu']\!] = \lambda x \in D_e \lambda P \in D_{\langle et \rangle} \,.\, \exists y(y \oplus x = y \wedge P(y))$

(21) $[\![\text{Mary-}\mu'\ \text{John-}\mu']\!] = \lambda P \in D_e \,.\, \exists y(y \oplus \mathbf{m} = y \wedge P(y)) \ \wedge\ \exists y'(y' \oplus \mathbf{j} = y' \wedge P(y'))$

The meaning in (21) is weaker than that of (19) in two ways. For one, because each μ' introduces an existential quantifier, (21) could be true of the predicate *married* when Mary and John got married separately. Secondly, (21) can be true of predicates that hold only of a group containing Mary and John. For example, the Japanese translation of (22) should then be true with *mo* as long as Mary and John are on the soccer team, along with 9 other people.

[6] With *both*, English resembles Japanese, but we think this has a different source, namely that *both* is a distributive quantifier with a restriction that the domain be a doubleton set of individuals.

(22) Mary and John form the soccer team.

These considerations show that the result would not be a true collective interpretation if *mo* could be interpreted as μ′, but an interpretation that is weaker than even the conjunction of the distributive and the collective interpretation. We propose that μ′ is not available as a possible lexical concept because the interpretation it would derive is too weak to be useful.

3. Predictions of the J-μ system

Our proposal predicts the following generalisations on coordinator typology: The J-type coordination has propositional uses, but does not double (**John and Mary and*) and cannot have quantificational or additive uses. The μ-type on the other hand combines DPs, doubles (*John-mo Mary-mo*), and can have quantificational and additive uses (for a discussion of disjunctive uses see Mitrović & Sauerland 2014). The synchronic evidence can be divided into two classes: (1) languages that exhibit direct evidence for the two coordinator positions in nominal coordination, and (2) the typological prediction that languages that have distinct nominal and clausal coordinators should only allow quantificational uses of the nominal coordinators.[7] Thirdly, our proposal also makes a prediction concerning language change: if a language changes from one of the two systems to the other, this should be due to the pronunciation of a part of the J-μ structure not previously pronounced, but used elsewhere in the language – either the propositional coordinator (in the case of μ-to-J change) or a quantificational particle (in the case of J-to-μ change). We have evidence that these predictions are borne out, but can present only a few selected cases in this paper for reasons of space. Specifically, we show synchronic cases where both J and μ can be pronounced, and a diachronic argument that in a μ-to-J change, propositional conjunction is the source of J.

3.1. Languages using two overt coordinators

In this subsection, we consider contemporary languages, which show evidence for the split coordination structure, i.e., two coordinator positions.

[7] With regard to the nature of typological argument, we take typological facts as reflective of the grammatical space of possibility constricted by UG.

SE Macedonian. Southeastern Macedonian (and to some extent, Bulgarian) boasts a rich set of overt coordinate positions. Aside from the standard (English-like) type (23) and a polysyndetic (*both/and*-like) type (24) of conjunctive structure, Southeastern Macedonian also allows a 'union of exponency' of the latter two, as (26) shows[8]:

(23) [Roska] **i** [Ivan]
(μ^0) R J^0 (μ^0) I
'Roska and Ivan'

(24) [**i** Roska] [**i** Ivan]
μ^0 R (J^0) μ^0 I
'both Roska and Ivan'

(25) [Roska] **i** [**i** Ivan]
(μ^0) R J^0 μ^0 I
'Roska and also Ivan'

(26) [**i** Roska] **i** [**i** Ivan]
μ^0 R J^0 μ^0 I
'both Roska and also Ivan'

It is only SE Macedonian among the Indo-European languages that, to the best of our knowledge, allows pronunciation of all three coordinate heads (two μ^0 and a J^0) without an explicit counterexpectational (adversative *but*-like) morpheme. SerBo-Croatian, as demonstrated in (27), also allows three coordinate morphemes per two conjuncts but the J head is adversative, unlike (26).

(27) [**i** Mujo] **a** [**i** Haso]
μ^0 R J^0.but μ^0 I
'not only Mujo *but* also Haso'

Hungarian. Beyond Slavonic (and Indo-European), we also find triadic exponency of conjunction in Hungarian, which our system predicts, i.e., the phonological realisation of the two μ heads and the J head, as per (11). Hungarian allows the polysyndetic type of conjunction with reduplicative conjunctive markers. As given in (28), Hungarian allows the optional real-

[8] This data was provided by Roska and Ivan Stojmenov, and additionally confirmed by Snejana Iovtcheva.

isation of the medial connective *és* (= J^0) co-occurring with polysyndetic additive particles *is* (= μ^0), as Szabolcsi (2015, 181, ex. (45)) reports.[9]

(28) Kati **is** (**és**) Mari **is**
K μ J M μ
'both Kate and Mary'

Avar. Avar, a northeast Caucasian language of Daghestan, also provides similar evidence.[10] Avar boasts three structural possibilities for conjunction. It first allows coordinate constructions of the repetitive type (29), which according to our JP system, involves two overt μ heads, and a J head. Note that Avar thus has three options of realising a nominal conjunction, pretty much alike Hungarian: (i) the repetitive *gi*-morphemes are present (X-*gi* Y-*gi*), (ii) the J *va* morpheme alone is realised (X *va* Y), or (iii) all three morphemes are instantiated:

(29) keto **gi va** ħve **gi**
cat μ J dog μ
'cat and dog'

We independently show that *gi* is of μ category and such features in the predicted subphrasal structure of JP. In absence of J, *gi* may also have a (scalar) additive meaning:[11]

(30) a. Dida [g'yeb **gi**] l'ala
I know μ this
'I [**even**/**also know**] this'

[9] As a reviewer informs us, it is also possible to omit the first is_{μ} if the J element *és* is overt (cf. Szabolcsi 2015, fn. 20):

(i) Kati ∅ és Mari is
K (μ) J M μ
'Kate and Mary'

The omission of the first μ marker of this type is a common cross-linguistic pattern. The only exception known to us is the obligatory exponence of both μ markers in the Dravidian language family (Mitrović 2016). We leave the cross-linguistic nature of choice between the requirement/optionality of realising all three morphemes aside in this paper.

[10] This novel data was provided by Ramazanov (p.c.) and Mukhtarova (p.c.).

[11] The pattern in (30) is also found in Hungarian, as we are reminded:

b. [Dida **gi**] g'yeb l'ala
I μ know this
'[**even I**/**I too**] know this'

It is the possibility of co-occurring realisations of the two types of morphemes that we take as supporting the fine-grained conjunction structure as both μ heads as well as J are realised simultaneously.

3.2. Typological evidence: quantificational uses of conjunction

Since accidental homophony of the two conjunction heads is not ruled out and may in fact be frequent, the prediction of our proposal, concerning the semantic difference between two types of morphemes, is primarily testable in languages where there are two different morphemes for *e*- and *t*-type conjunction. Our starting point for this investigation was therefore the list of languages where verbal and nominal coordination are distinct from Haspelmath (2004; 2007). Since a language may lack quantificational uses of conjunction morphemes altogether, we focussed on 15 languages that are said to not only have a verbal/nominal conjunction difference but according to Gil (2005; 2013) also have quantificational uses of conjunctions.[12] The 15 relevant languages are listed in Table 1. We use the notation "∅" to refer to null conjunction marking, or juxtaposition.

(i) a. Ezt én **is** tudom.
this.ACC I too know.1SG
'I know **this, too**.'
b. Ezt (még) én **is** tudom.
this.ACC even I too know.1SG
'**Even I** know this.'

[12] The classification of Gil is broader as it does not only encompass quantificational uses of conjunction but also includes morphological similarities between additive and quantificational morphemes. For example, Gil groups English with Japanese on the basis of the similarity between quantifier *all* and additive particle *also*.

Table 1: A list of languages with verbal/nominal conjunction difference and the quantificational uses of conjunctions

Language (family)	**nominal conj. (⊕)**	**verbal conj. (∧)**	**quantificational conj. (∀)**	**references**
Japanese (Japonic)	mo	to	mo	Shimoyama (2001); Yatsushiro (2009)
Ainu (Isolate)	ka	no, kor	ka	Refsing (1986, 128, 162, 238–359); Tamura (2000, 155)
Yidiɲ (Northern Pama-Nyungan)	ba	∅	bi, ɖi, ba	Dixon (1977, 142, 147, 293, 388, 412–415, 560)
Koromfe (Niger-Congo, Gur)	mɔ̃, la	la, ∅	mɔ̃, la, dʊrʊ, kãã/kamã	Rennison (1997, 83–89, 92, 238, 311)
Imonda (Papuan border)	∅, mo, i, na	∅, (%mo,) i, a	na	Seiler (1985, 50, 68–70, 194)
Meithei (Tibeto-Burman, Kuki-Chin)	su	adu	su	Chelliah (1997, 133–4, 181, 196, 465); Chelliah (2009, 384)
Zulu Bantu	na	futhi	na	Halpert (2012, 158, ex. 209); König (1991, 64)
Supyire (Niger-Congo, Gur)	ná, màha, mu, o	ŋkáá	màha	Carlson (1994, 686)
Amele (Trans-New Guinea, Madang)	ca	∅, qa	ca/ad	Roberts (1987, 105, 169); Kroeger (2005, 317); Stirling (1993, 195)
Tamil (Dravidian)	um	āṇāl	um	Lehmann (1993, 146, 149, 151); Krishnamurti (2003, 456)
Nivkh (Isolate)	ɣo (COM)	∅, r(ə)	ɣət	Nedjalkov and Otaina (2013, 14, 53, 119, 247, 299, 338); Panfilov (1965, 228); Gruzdeva (1998)
Kanuri (Nilo-Saharan)	yé, sò	∅	yaɣé, sò	Cyffer (2009, 86, ex. 22); Hutchinson (1981, 311, 315); Gil (2005, 230)
Tamil (Dravidian)	um	āṇāl	um	Lehmann (1993, 146, 149, 151); Krishnamurti (2003, 456)
Kannada (Dravidian)	u	mattu	u	Haspelmath (2007, 2); Wälchli (2009, 72); Haspelmath (2004., 99)
Cantonese (Sino-Tibetan)	dou	tung	dou	Szabolcsi et al. (2014, 140); Tang and Lau (2012, 343)
Mandarin (Sino-Tibetan)	dōu	yushi	dōu	Zhang (2010, 15)

3.3. Historical evidence: Indo-European shift from *e*-type to *t*-type conjunction

The core idea we advocate here, stemming from Mitrović & Sauerland (2014), finds additional support in the diachronic behaviour of the Indo-European conjunction system. The Indo-European conjunction system underwent an apparent change from its earliest state, as reflected by Hittite, Ṛgvedic, Homeric, etc., to its modern form, reflected by, for instance, English. All early IE languages had two available configurations at their disposal: one in which the coordinating particle is placed in first and another in which it is placed in the second position with respect to the second conjunct.

Indo-European (IE) languages show a syntax (and semantics) of coordination that is consistent with the particle behaviour in Japanese. Old IE languages show that the grammar of coordination had two core properties. Firstly, there existed two types of constructions for coordination: (a) one in which the coordinator occupies the initial (first) position (1P), with respect to the second conjunct headed by μ^0 (31a), and (b) another construction in which the coordinating μ marker occupies the peninitial (second) position (2P), as the descriptive scheme, employing "&" as a generalised variable over conjunction markers, in (31b) demonstrates.[13]

(31) a. $\Big[_{\&_1\mathrm{P}}\ \overbrace{\&_1^0}^{1\mathrm{P}}\ [_{\mathrm{XP}}\ \overbrace{\mathrm{X}^0\ \ldots}^{\mathrm{CONJUNCT}_2}\ ]\Big]$

b. $\Big[_{\&_2\mathrm{P}}\ \underbrace{\mathrm{X}_i^0}_{1\mathrm{P}}\ \underbrace{\&_2^0}_{2\mathrm{P}}\ [_{\mathrm{XP}}\ \underbrace{t_i\ \ldots}_{\mathrm{CONJUNCT}_2}\ ]\Big]$

Secondly, there existed two types of interpretation for one type of particle, as we witness below. In the following fragment of examples, we sketch the difference in the linear placement of the conjunction morpheme: in examples under (a) we show the peninitial (second-position) morphemes, and in examples (b) we show the initially placed morphemes which essentially reflect the modern Indo-European patters of conjunction, including the English *and*.[14]

[13] Note that the peninitial/2P strings involve minimal, and not maximal, categories in initial positions. For a detailed account of the first/second position alternation, and morpho-syntactic derivation, see Mitrović (2013; 2014), and references therein.

[14] For a wider set of data and further empirical discussion, see Mitrović (2013; 2014).

(32) a. boí Conchuḃur **ocus** maithi
was.3.SG.AOR C.M.NOM.SG and the nobles.PL.NOM
Ulaḋ^{N} i^{N} nEmṁuin
Ulstermen.M.PL.GEN in Emain
'Conchobar and the nobles of the Ulstermen were in Emain.' (Old Irish; *CCC*, 1.1)

b. ba **ċ** ri Temrach
COP and king Tara.GEN
'And he was king of Tara' (Old Irish; *EILw*, 4.179; Thurneysen 2003)

(33) a. ad summam rem pūblicam **atque** ad omnium nostrum [...]
to utmost weal common and to all of us
'to highest welfare and all our [lives]' (Latin; *Or.*, 1.VI.27-28)

b. vīam samūtem **que**
life safety and
'the life and safety' (Latin; *Or.*, 1.VI.28–29)

(34) a. ak ana lukarnastaþin **jah** liuteiþ allaim
neither on candle.DAT.SG and light.IND.3.SG all.DAT.PL
þaim in þamma garda.
it.DAT.PL in that.M.DAT.SG house.M.DAT.SG
'Neither do men light a candle, and put it under a bushel.' (Gothic; *CA*, Mt. 5:15)

b. wopida Iesu qaþ **uh** imma.
called.PRET.3.SG J.ACC said.PRET.3.SG μ^{0}.and him.M.DAT.SG
'(Then Pilate entered into the judgment hall again, and) called Jesus, and said unto him.' (Gothic; *CA*, Jn. 18:33)

(35) a. **uta** mazdå huruϑma haoma raose
and wisdom.M.SG.GEN increase.M.SG.NOM haoma.M.SG.VOC grow.2.SUBJ.MID
gara paiti
mountain.SG.M.LOC toward
'And [thus] may you grow upon that mountain, O Haoma, [bringing] the increase of wisdom, [...].' (Old Avestan; *AvY*, 10.4)

b. yūžəəm aēibiiō ahurā aogō dātā
you.2.SG.NOM them.PL.DAT lord.M.SG.VOC strength.N.SG.ACC give.2.PL.AOR.IMP
aṣ̌ā xṣ̌aϑrəm **cā**
truth.N.SG.INST power.N.SG.ACC and
'O Lord, may you give strength to them through Truth and that power [...].'
(Old Avestan; *AvY*, 29.10)

Diachronically, the two competing configurations reduce to a single winning one, namely the head-initial one shown in examples (b) which all contemporary Indo-European languages retained. We do not concern ourselves

here with the triggers of change[15] but, rather, focus on the fact that the peninitial conjunction morphemes (b) across old Indo-European languages had non-conjunctional functions of the type we observe in Japanese and in a range of other world languages. For instance, we find only the peninitial monomorphemic conjunction markers with quantificational uses in Gothic which combine with a *wh*-word to yield a universally quantified expression:

(36) ⟦everyone⟧
  a. hvaz**-uh**
  b. ***jau** hvaz-

What crucially supports our account is the fact that a *t*-type (initial) conjunction morpheme, like *jau* in Gothic, did not have non-conjunctional (quantificational) functions. This is accounted for on the grounds of our proposal, namely that *jau* and *jau*-like initial conjunction in IE were of J category and, as such, were not equipped with subset semantics which μ category (pen-initial) particles, such as Goth *uh*, Indo-Iranian *ca*/*cā*, or Latin *que*, were.. We therefore take these latter morphemes in old Indo-European, such as *uh* in Gothic, to constitute *e*-type nominal conjunctions.

Aside from the difference in placement between the initial (a) and peninitial (b) morphemes in the examples above, there is another revealing fact regarding the two types of conjunction markers. While peninitial coordinators are monomorphemic, the initial coordinators are bimorphemic and, as such, decomposable synchronically and diachronically into two coordinators, each underlying a morpheme. Greek *kai*, for instance, derives from $^\star kati$, itself being a concatenation of $^\star k^we + {}^\star te$ (Beekes 2010, 614; Boisacq 1916, 390).[16] Conversely, Indo-Iranian (IIr.) *uta* comprises of coordinator $u + ta$ ($<{}^\star h_2(é)u + {}^\star te$); Gothic coordinators *jah* and *jau* result from $^\star yo + {}^\star k^we$ and $^\star yo + {}^\star h_2u$ respectively. We summarise this fact briefly:

(37) a. Ved. *utá*, Gr. *aute*, Lat. *aut* = $^\star h_2u + {}^\star$-*te*
  b. Ved. *u ca* = $^\star h_2u + {}^\star$-k^we
  c. Goth. *jau* = $^\star yó + {}^\star$-h_2u
  d. Hit. *takku*, OIr. *toch* = $^\star tó + {}^\star$-k^we
  e. **initial coordinators in IE** = $\mathrm{J}^0 + \mu^0$

[15] IE languages all seem to have undergone a uniform change in the grammar of coordination. See Mitrović (2013; 2014), and references cited therein, for an account of this change.

[16] The philological notation h_2 refers to the *a*-colouring laryngeal.

The initial coordinators in IE are generally decomposable into – and reconstructable only as – a pair of orthotone and enclitic coordinators. We take these halves to correspond to the two coordinate heads J^0 and μ^0 which we have independently motivated in the previous section using den Dikken's (2006) proposal.[17]

We are now in a position to distinguish the three canonical word order types in IE coordination. In monosyndetic coordinations with enclitic particles, the external (first) coordinand (μP) is silent. In coordinations headed by a linearly initial bimorphemic coordinator, the two coordinate morphemes are distributed between J^0 and the head of its complement, μ^0. This idea is summarised in (38) and (39) with the three types of coordinate construction; Classical Latin (*at*)*que* is taken as an example.

(38) Peninitial (monomorphemic) coordinate configuration

a. *Peninitial monosyndetic configuration*

$$\Big[_{\text{JP}}\ [_{\mu\text{P}}\quad \begin{matrix}\mu^0\\ |\\ que\end{matrix}\quad \text{coord}_1\ ]\ [\quad \begin{matrix}\text{J}^0\\ |\\ \emptyset\end{matrix}\quad [_{\mu\text{P}}\quad \begin{matrix}\mu^0\\ |\\ que\end{matrix}\quad \text{coord}_2\ ]]\Big]$$

b. *Peninitial monosyndetic configuration*

$$\Big[_{\text{JP}}\ [_{\mu\text{P}}\quad \begin{matrix}\mu^0\\ |\\ \emptyset\end{matrix}\quad \text{coord}_1\ ]\ [\quad \begin{matrix}\text{J}^0\\ |\\ \emptyset\end{matrix}\quad [_{\mu\text{P}}\quad \begin{matrix}\mu^0\\ |\\ que\end{matrix}\quad \text{coord}_2\ ]]\Big]$$

(39) Initial (bimorphemic) coordinate configuration

$$\Big[_{\text{JP}}\ [_{\mu\text{P}}\quad \begin{matrix}\mu^0\\ |\\ \emptyset\end{matrix}\quad \text{coord}_1\ ]\ [\quad \begin{matrix}\text{J}^0\\ |\\ at\end{matrix}\quad [_{\mu\text{P}}\quad \begin{matrix}\mu^0\\ |\\ que\end{matrix}\quad \text{coord}_2\ ]]\Big]$$

The analysis of compound coordinators sketched in (38) and (39), where the morphological components of initial particles like Latin *at-que* or Sanskrit *u-tá* are spread between μ^0 and J^0, also lends itself to a diachronic analysis of the development of linear placement of coordinators in synchronic IE, which is uniformly head-initial. The proposed analysis thus also makes an empirical prediction for Indo-European. Our having assigned the lower μ-headed coordination structure a category status, encoding for nominal conjunction of type *e*, we predict the semantic independence of μP. While the higher J^0 is taken to join coordinate arguments, its substructural

[17] For a diachronic analysis and a theory of triggers of such an "agglutinating" change resulting in bimorphemic markers, in the grammar of coordination, see Mitrović (2013; 2014). As a reviewer notes, such changes do not only have structural reflexes but also structural prerequisites. For reasons of structure and space, we are unable to pursue these questions in the present paper.

μP is, *ceteris paribus*, predicted to constitute an independent phrasal category. Given the generalisation on monomorphemic enclitic coordinators, now treated as μ^0s, we predict the b-series (peninitial monomorphemic) morphemes like Latin *que* to feature independently with non-conjunctive meaning, on par with Japanese (1) and our general proposal. This is in fact what we find in all IE branches. The following minimal set of examples shows this.[18]

(40) auent audire quid [quis-**que**] senserit
want hear what wh-μ think
'they wish to hear what **each** man's (**everyone**'s) opinion was' (Cic., *Phil.* 14,19)

(41) a. ⟨prát⟩īdáṃ vīśvam modate yát [kīṃ-**ca**] pṛthivyā́mádhi
this world exults which what-μ world.F.ACC-upon
'This whole world exults **whatever** is upon the earth.' (Vedic Sanskrit; *ṚV*, 5.83.9^c)

b. na yasya [kaś- **ca**] tititarti māyā?
NEG whom.GEN who.M.SG μ able to overcome illusions.PL
'No one [= not **anyone**] can overcome that (= the Supreme Personality of Godhead's) illusory energy.' (Classical Sanskrit; *BP*, 8.5.30)

c. [cintayaṃś- **ca**] na paśyāmi bhavatāṃ prativaikṛtam
thinking.PRES.PART μ NEG see.1.SG you unto-offence.ACC
'**Even** after much thinking, I fail to see the injury I did unto you.'
(Vedic & Classical Sanskrit; *Mbh*, 2.20.1)

(42) a. [þishvad **uh**] [...] gaggis.
where μ go.2.SG.PRES.ACT.IND
'**wherever** you go' (Gothic; *CA*, Mat. 8:19)

b. jah [hvaz **uh**] saei hauseiþ waurda meina
and who.M.SG and *pro*.M.SG hear.3.SG.IND words.ACC.PL mine
'And **every** one that heareth these sayings of mine' (Gothic; *CA*, Mat. 7:26)

(43) a. hi- [cá **-ċ**] -du
in.DAT wh μ place.DAT.SG.F
'in every place' (Old Irish; MF, 024c09)

b. [ce **ċ**] orr
what μ slay.3.M.SUBJ
'**whichever** he may slay' (Old Irish; Anecd. II.63.14.H)

The fact that at least seven branches of Indo-European (Indo-Aryan, Iranian, Italic, Celtic, Greek, Germanic, and Slavonic) show a development

[18] For further discussion and greater empirical coverage, see Mitrović (2014, ch. 3).

from a system of coordination using an e-type to one using a t-type conjunction independently lends support to our account. Our proposal is supported especially by the fact that in no did the same morpheme ever develop from a μ-type to an J-type coordinator, but instead a clausal coordinator was extended to conjunction of type e.

4. Discussion and outlook

In Japanese, *mo* can be used for NP-coordination, universal quantification, and as additive focus particle. By comparison, English *and* can be used as clausal and NP-coordination, but not as quantifier or additive focus particle. Several other languages are similar to Japanese (Malayalam, Sinhala, Hungarian, etc.), but also to English (and German, etc.). It is natural to ask whether the various meanings of *mo/and* can be reduced to one underlying meaning, and whether Japanese *mo* and English *and* can then still have the same meaning. Szabolcsi (2015) recently attempts to reduce the meaning of *and/mo* to one common meaning. But, we argue that Japanese and English really represent two distinct types of languages by looking at typological data and also data from language change in Indo-European. This distinction would get lost in Szabolcsi's proposal. We propose instead a semantics where *mo* denotes subsethood and *and* denotes mereological fusion.

Historical sources

AvY = Avesta: Yasna Haptanghāiti. Based on edition of Geldner (1896)

BP = Bhāgavatapurāṇa. Text edition as per Hellwig (2010–2011).

CA = Codex Argenteus. Text edition as per Project Wulfila.

CCC = Compert Con Culainn. Text edition and translation as per Hamel (1933). Manuscript: Dublin, Royal Irish Academy, D IV 2: f 46rb–47vb.

EILw = Early Irish Law. Text edition as per Hancock et al. (1865–1901).

Mbh = Mahābhārata. Text edition as per Hellwig (2010–2011). *Or* = Cicero: De Oratore. Text edition as per Hendrickson & Hubbell (1939).

ṚV = Ṛgveda saṃhitā. Text edition as per van Nooten & Holland (1994). Translation as per Wilson (2002).

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