A NATURAL HISTORY OF μ

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Contents

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ABSTRACT. This chapter reports an inter-genetic diachronic view of the universal superparticle dubbed μ: the logical particle that can, depending on its structural context, behave like a universal quantifier, distributive conjunction, marker of additivity, negative-polarity or free-choice marker. Three language families are investigated, Indo-European, Japonic, and Sino-Tibetan, in order to outline a natural history of μ, i.e., some universal and tangential principles of semantic change.

1 INTRODUCTION

The μ-meanings are those generally characterised by conjunctive meanings or inferences. One of the general concerns of this paper is the question of dissociating language-particular, and random, diachronic developments in the semantics of μ from the general, and deterministic, diachronic semantic principles that are universal to the μ formative, regardless of genetic affinity. Since this supposes there is a logical primitive μ that is common cross-linguistically, I devote a part of this paper to buttressing this view. The argument is two-fold and is reproduced from Mitrović (2014) Mitrović and Sauerland (2014, 2016). Firstly, if in a single language the construction with a single-meaning μ can bring about the expression of two meanings, then, ceteris paribus, μ is hard-wired to express those two meanings. Japanese is used to show this. Secondly, if cross-linguistic expressions of several particular logical meanings are constructed using a single morpheme, without morpho-phonological resemblance or genetic links (say, modern Dravidian and Gothic), then those semantic properties that are detectable from the logical forms of the expressions are attributable to, and evident of, a common and presumably universal semantic core.

The first hope of this paper is to, therefore, demonstrate that such a core exists. The second desideratum is the detection of some common properties of the semantic change itself that is reflective of the presumably natural principles of language variation and change. The latter is located in the primarily scalar meaning of μ in Old Japanese, for which a morphosemantic decomposition is put forth. I will adopt several conditions on interpretation, which are couched in considerations on economy and efficient computation, and state several parameters in this vein.

Before doing, I devote the rest of this section to characterising in informal terms the kinds of μ-meanings I investigate (∫1.1). I will then couch the μ-type expression of conjunction within a wider typology of conjunction in ∫1.2. In ∫2 I then motivate a common core for μ-meanings and proceed to spelling out those various meanings. ∫3 represents the diachronic section in which I explicate 'two histories' of μ, that is two diachronic facts from Japonic and Indo-European. This section amount to the development of a working set of parametric properties for μ meanings.

1.1 The μ-meanings: a view from Japanese

Modern Japanese boasts a harmonic system of expression of two classes of logical meanings: those characterised by the κ-superparticle *ka* and those characterised by the μ-superparticle *mo*.

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, 2014), 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 (1) and (2), where the left column (1) shows the *mo*-series and the right column (2) shows the *ka*-series.

(1) The μ-series (*mo*)

a. ビル (も) メアリー も
Bill **mo** Mary **mo**
B μ M μ
'(**both**) Bill **and** Mary.'

b. メアリー も
Mary **mo**
M μ
'**also** Mary'

c. 誰 も
dare **mo**
who μ
'**every**one'

d. どの 学生 も
dono gakusei **mo**
INDET student μ
'**every** student'

(2) The κ-series (*ka*)

a. ビル (か) メアリー か
Bill **ka** Mary **ka**
B κ M κ
'(**either**) Bill **or** Mary.'

b. 分かる か？
wakaru **ka**
understand κ
'Do you understand**?**'

c. 誰 か
dare **ka**
who κ
'**some**one'

d. どの 学生 か
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' (1c/2c), delivers a quantificational expression, either with an existential flavour('*some*one', dare-*ka*) or a universal flavour ('*every*one', dare-*mo*).[1] 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)'.[2]

We assume that the two series of superparticle meanings in (1) and (2) do not result from homophony, *contra* Hagstrom (1998) and Cable (2010), as argued by Slade (2011), Szabolcsi (2015), and Mitrović and Sauerland (2014, 2016).

1.2 FROM CONJUNCTION TO μ TYPOLOGICALLY: A PARAMETRIC HIERARCHY

The aim of this subsection to parametrically contextualise the availability and general place of μ within a larger system of cross-linguistic expression of conjunction. Since 67% of world languages express μ meanings, i.e. employ conjunction markers which also express non-conjunctive meanings (Gil, 2005), I address, and programmatically propose, a typological system of parametric hierarchies in the spirit of Biberauer and Roberts (2017).

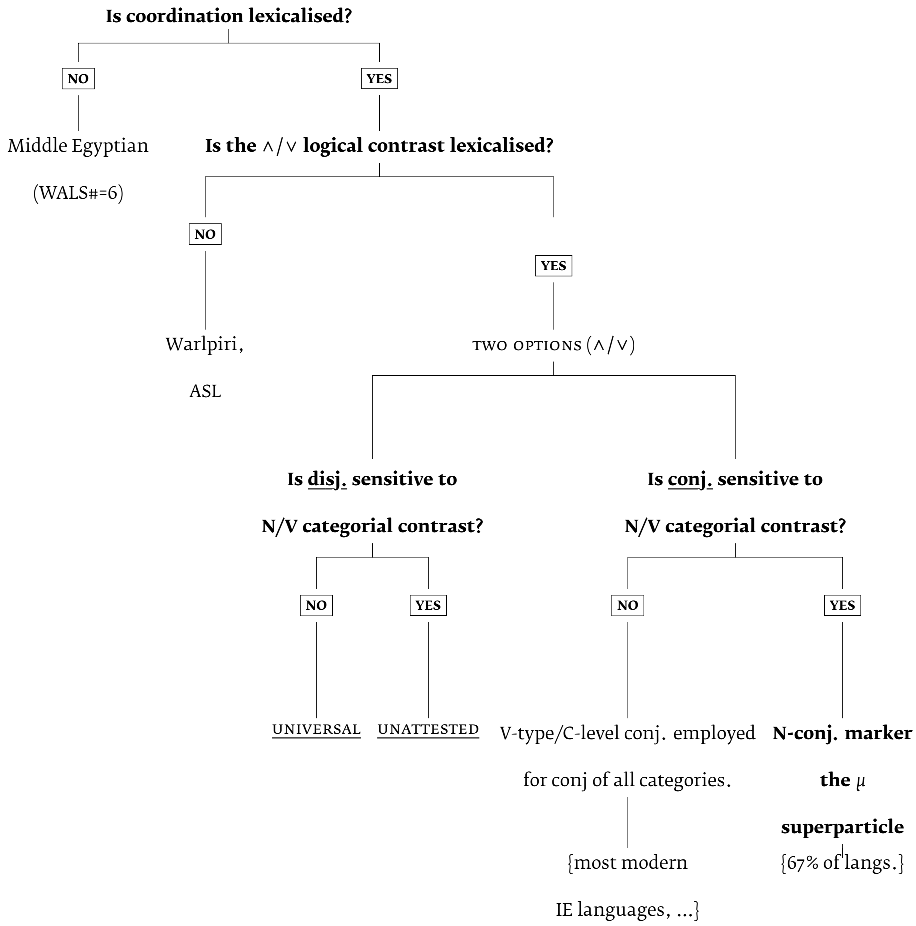
While most languages of the world have some flavour of μ (Gil, 2005), not

1 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 show in the following sections 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.

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

all do. I outline the prerequisite ingredients for a language to lexicalise μ here.

(3) A parametric hierarchy for coordination:



The main question I am concerned with in this section is the semantic switch between conjunction generally and the expressibility of μ meanings. The predictive power of the parametric hierarchy is implicational: a language that does not lexicalise the semantic contrast between conjunction and disjunction is, logically, predicted to be able to lexicalise μ meanings associated with nominal conjunction and quantificational uses.

Another conjectured universal regards the categorial sensitivity of coordination. While conjunction has been shown empirically not to be syncategorematic Zhang (2010); Mitrović and Sauerland (2016), disjunction appears to be different in this regard. I am unaware of a language which could employ a different disjunction morpheme for distinct categories.[3]

2 TOWARD THE COMMON CORE OF μ

The proposed common core of μ meanings, valid and operative synchronically, is related to alternatives and the exhaustification process.

The core motivation for this is the ability for the proposed analysis to account, in a unified way, for additivity and negative polarity. The exhaustification operator, EXH, deliver negative polarity meaning if applying once and additivity if applying twice. I am unaware of any other system that can deliver the two types of meanings by regulating, in a principled way (as I discuss briefly below), the iteration parameter alone. On a general level, this is a desirable economy consideration of the system.

2.1 A TWO-TIERED ALTERNATIVE SYSTEM

I briefly expound here on the formal system and the assumptions I use in the paper.

The account I develop rests on the assumption that pragmatic devices for reasoning are anchored in narrow syntax in the sense that Chierchia (2013) develops in some detail. Such a device is a covert exhaustification operator, EXH, which is able to derive polar-sensitive, free-choice, or additive meanings as well as scalar implicatures (SI). This subsection introduces Chierchia's (2013) system using an example from disjunction.

As a starting exemplar of SIs, we take disjunction which, in English at least, carries an obligatory implicature, as Chierchia (2013: 429) notes: ei-

3 Benjamin Slade (pers. comm.) brings the Kannada facts to my attention (Amritavalli, 2003); the contrast between *-oo* and *illa* seems to be more complex with regards to the non-disjunctive meanings of *illa* and does not seem to be a categorial one. I leave this question, as well those relating specifically to κ-meanings, aside in this paper.

ther 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 (4a). 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 (4b).

(4) 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 (2013), *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 (EXH) in the narrow syntax which attaches to the root of some proposition-level syntactic structure, say IP (for Chierchia 2013) 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 EXH here, is given in (5) 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.

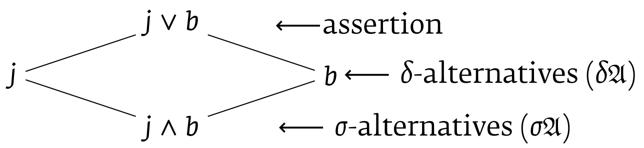
(5) $\textsc{exh}(p) = p \wedge \forall q \in \mathfrak{A}(p)\Big[[p \nvdash q] \rightarrow \neg q\Big]$[4]

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 ∫**??**). Thus an EXH-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 EXH will exhaustify a proposition and deny the sub-domain alternatives, and only those alternatives, to that proposition. The featural specification on EXH are relegated to syntactic rules on Agree, via which the range of exhaustification is determined. The entire alternative set to a disjunctive proposition like (4), thus takes a two-dimensional shape consisting of sub-domain δ- and strictly scalar σ-alternatives, as sketched in (6). The sub-domain (δ) alternatives are

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

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).

(6) $\mathfrak{A}((4)) =$



Note also that the proposed two-tiered system of alternative structure is also analogous to the lattice-theoretic notions of chains and antichains. [5]

(7) i. $D_e = \delta =$ **Antichain**$(\mathfrak{A}) =$ **A**$(\mathfrak{A})$. No two elements are comparable. $\forall x, y \in \delta$, neither $x \leq y$ nor $y \leq y$ hold. The **A**$(\mathfrak{A}(6)) = \{j, b\}$

ii. $D_\sigma = \sigma =$ **Chain**$(\mathfrak{A}) =$ **C**$(\mathfrak{A})$. Any two elements are comparable. $\forall x, y \in \delta$, either $x \leq y$ or $y \leq y$ hold. The **C**$(\mathfrak{A}(6)) = \{j \vee b, j \wedge b\}$

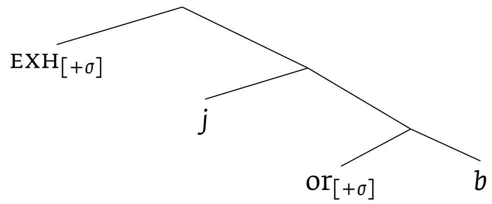
Enriched (exclusive) disjunction may be derived through both means of exhaustification: either globally through EXH attaching to the disjunctive phrase and triggering scalar exhaustification, where the effect of (4b) is derived, as per (8a). Alternatively, exclusive disjunction is also derived locally via EXH-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 (8b). The two exhaustification strategies yielding the exclusive implicatures are calculated by negating different alternative (sub-) sets as per (8a-ii) and (8b-ii).

5 This will become relevant and useful in ∬3.

(8) Two ways of calculating the SI of (4) and deriving the exclusive component:

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

i. Syntactic structure (simplified):

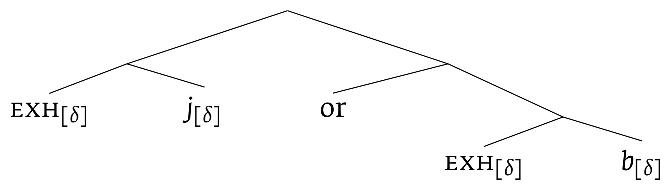


ii. Logical form:

$$\textsc{exh}_{[\sigma\mathfrak{A}]}(j \vee b) = [j \vee b] \wedge \neg[j \wedge b]$$

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

i. Syntactic structure (simplified):



ii. Logical form:

$$\textsc{exh}_{[\delta\mathfrak{A}]}(j \vee b) = \textsc{exh}(j) \vee \textsc{exh}(b) \vdash \neg[j \wedge b]$$

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 '$\vee$', a logical disjunction in itself a scalar-alternative-sensitive operator that is targeted by a silent (probing) EXH.

2.2 SPELLING OUT THE μ-MEANINGS SYNCHRONICALLY

With the basic alternative-based technology in place, and the assumption that the core of μ-meanings is the alternative-triggering signature, I now proceed to spelling out how various meanings arise as an interplay of various kinds of alternatives at play and various modes of exhaustification.

The toy sample of deriving exclusive disjunction was appropriate for the purposes here since I assume that *wh*-phrases denote existential quantification (Xiang, 2016), which is homeomorphic to discrete disjunction.

2.2.1 POLARITY SENSITIVITY

My proposal which assumes iterative exhaustification as the device that delivers FCIs, additives, and universals, is based on an economy consideration. EXH will iterate only when it has to, everything else being equal. Crucially, NPIs, as μ-marked *wh*-indefinites in the scope of negation provide non-trivial contexts in which a single mode of exhaustification is not only successfully meaningful but also economically preferred. This is in line with Chierchia's (2013) Blocking condition (where '>' is an economy preference symbol), given in (9).[6]

(9) BLOCKING: LAST RESORT EXH-RECURSION

$$\text{EXH}_{\delta}[\ \text{NEG} \cdots \text{DP}_{\delta} \cdots] \ > \ \text{EXH}^{2}_{\delta}[\ \text{NEG} \cdots \text{DP}_{\delta} \cdots]$$

Assume now a historical change where the 'last resort' recursive exhaustification (9) become a default 'first response' mode of interpretation. Phase II languages (**??**), such as Gothic or Modern Greek, encode anti-exhaustivity as a 'first response' mode. Such languages are predicted not to be able to encode polarity sensitivity, which requires a single layer of exhaustification. Given the distribution to Downward Entailing contexts, the iterativity as a rescue operation is blocked. In what follows, I advocate another presupposi-

6 The blocking condition is that of Chierchia (2013: 278, 57) but the notion of pre-exhaustivised alternatives is encoded, as an instance of recursive sub-domain exhaustification (EXH^{2}_{δ}), as discussed above.

tional condition which distinguishes NPIs from other meanings.

There is another property that distinguishes NPIs from other meanings. The difference between μ-marked NPIs and other μ-marked indeterminate (*wh*-phrase) expressions can be derived using a semantic and a syntactic parameter. The former is Chierchia's (2013) 'Proper Strengthening' (PS) parameter (10). The latter is a featural requirement on μ for there to be restricted to Downward Entailing contexts (which can be achieved using a Minimalist checking theory). In this paper, I focus on the semantic parameter.

(10) THE PROPER STRENGTHENING PARAMETER (Chierchia, 2013: 274, 48)

$$\text{EXH}^{\text{PS}}_{\mathfrak{A}}(\phi)\begin{cases}\text{EXH}_{\mathfrak{A}}(\phi) & \text{if}\left[\text{EXH}_{\mathfrak{A}}(\phi)\subset\phi\right]\\ \bot & \text{otherwise}\end{cases}$$

Since EXH^{PS} is a presuppositional operator, this allows us to capture the parameter: either EXH is presuppositional, in the sense of PS (10), or it is not. If it is, EXH (recursive or not) is required to yield a meaning which is informationally stronger than the assertion. If it is not, non-stronger meanings pass. This derives the distribution of NPIs.[7]

2.2.2 UNIVERSAL QUANTIFICATION

Another μ-meaning is that of universal quantification, as instantiated in Gothic (structurally in the C-domain) or Hittite (structurally in the nominal domain). What captures the meaning of a universal quantifier is a iterative sub-domain (δ-level) exhaustification. Note that this way of obtaining uni-

7 As well as various kinds of FCIs contrasting in quantificational force), such as the German *irgend*-type versus the Italian *qualunque*-type of FCIs, as Chierchia (2013: 275ff.) discusses in detail.

versal quantification via iterative application of EXH does not violate Chierchia's (2013) naturally defined exhaustification economy:

(11) EXHAUSTIFICATION ECONOMY (Chierchia, 2013: 129, ex. 75)
Avoid unnecessary exhaustification.

a. $*\text{EXH}_A\,[_Y \cdots X_{[+A]} \cdots]$, if the result is itself a member of $[\![Y]\!]^{\mathfrak{A}}$ different from $[\![X]\!]$.

b. $*\text{EXH}_A\,[_Y \cdots X_{[+A]} \cdots]$, if logically equivalent to $[_Y \cdots X_{[-A]} \cdots]$.

The way in which the proposed derivation of universals in Gothic or Hittite proceeds abides by the economy principle in (**??**), despite the over-generation problem of FC-effect that Chierchia (2013: 122, fn. 30) warrants against. Recursive exhaustification over the domain of non-scalar alternatives does not violate (**??**), as shown in (11), taken from Chierchia.

(12)
$$\begin{aligned}\text{EXH}^2_\delta([p \vee q]) &= [p \vee q] \wedge \neg\text{EXH}(p) \wedge \neg\text{EXH}(q)\\ &= [p \vee q] \wedge \neg(p \wedge \neg q) \wedge \neg(q \wedge \neg p)\\ &= [p \vee q] \wedge (p \rightarrow q) \wedge (q \rightarrow p)\\ &= p \wedge q\end{aligned}$$

2.2.3 FREEDOM OF CHOICE

Universal FCIs require wide-scope (more on that below) and, while they derive via iterative sub-domain exhaustification just like distributive universal quantifiers, they have additional characteristic, namely being constrained by Fluctuation (13). I take Fluctuation to be a privative character of (universal) FCIs.

Therefore, FCIs share with universal quantifiers the iterative mode of being derived, to the exclusion of NPIs (cf. 9), which also do not satisfy the PS condition (10). The main property that discriminates between the two types of meanings is, informally, licensing restriction to modalised contexts. In this regard, I propose that the discriminating factor is the Fluctuation Constraint Dayal (2009).[8]

(13) THE FLUCTUATION CONSTRAINT (Dayal, 2009: 241, 5b)

$$\neg\exists X \forall w'[w_a \leq w']\lambda x[P(w')(x) \wedge Q(w')(x)] = X$$

The last meaning I sketch is that of standard additivity, which shares technical character with related meanings but differs in more morphosyntactically detectable aspects.

2.2.4 ADDITIVITY

How are additive meanings technically different from other μ-meanings? I now turn to explicating the commonalities and differences. The main difference can be stated in purely syntactic terms: μ-encoded meanings of universals, FCIs, and NPIs arise when the μ-associate is a *wh*-phrase. Additives arise as an elsewhere option on μ-associating (complementation).

This same distribution can also be captured semantically by cashing in on the existential quantifier meaning of *wh*-phrases, which is what I assume (see Xiang (2016) and those she cites for evidence). A proper noun like 'John' has no hardwired existential meaning: therefore, when μ associates with 'John' it will trigger its alternatives and recursive exhaustification takes place (see Mitrović and Sauerland 2016 for details) to yield an anti-exhaustive, or additive, meaning. Additive expressions of *wh*-phrases are therefore predicted to be impossible μ-meanings.

8 See also the discussion in Chierchia (2013: 310ff.), who provides a modified definition of Fluctuation; his variant does not have bearing on my purposes here

(14) ∗ Znam i ko i kako je napravio zadaću
know.1.SG *μ* who *μ* how AUX.3.SG made homework
'I know both who and how one did the homework.'

The differentiating property of additives is therefore the restriction to non-*wh*-associates, which can be modelled semantically as a possible restriction on type-association (*e*-type versus types higher than *e*), or a restriction on association with existential quantifiers (assuming *wh*-phrases are, indeed, existential quantifiers). I adopt a lighter take here, assuming that the differentiating property is that of 'indeterminacy' (in the sense of Shimoyama 2006: while *wh*-phrases are indeterminate, proper DPs, such as 'John' are not.

Before turning to a diachronic analysis in §3, I discuss in the remainder of this section the commonalities and differences between obligatorily type-lifted *wh*-phrasal *μ*-associates and non-*wh*-associates.

2.2.5 TYPE-LIFTED ASSOCIATES: STRUCTURALLY DISTINGUISHING ADDITIVITY

In Indo-European, all archaic languages operating a *μ* particle show type-lifted associates. In Hittite, as Hoffner and Melchert (2008: 149) note, the universal distributive expressions like '*each*(one), *every*(one)' quantificational expressions correspond to *kuišša* (𒆪𒄿𒀀), comprising of an inflected *wh*-component *kui-* (𒆪𒄿) and the conjunctive (super)particle *-a* (𒀀) / *-ya* (𒅀), corresponding to our *μ* category. The following two examples show *μ*P universals as animate ('who') subjects and inanimate ('what') objects. The relevant *μ*-phrases are bracketed.

(15) 𒉡 𒌉𒈨𒌍𒋗 𒆪𒅖𒊭 𒆪𒉿𒀭𒋫 𒌑𒌅𒉈 𒉺𒄿𒍣
nu [DUMU.MEŠ-ŠU kuišš-**a**] kuwatta utnē paizzi
J sons.his who-*μ* = ∀ somewhere country.LOC went

'**Each** of his sons went somewhere to a country.' (KBo. 3.I.1.17–18)

(16) nu [kuitt-**a**] arhayan kinaizz[i
J what-μ = $\forall$ seperately sifts
'She sifts **everything** seperately.' (KUB XXIV.11.III.18)

Given the proposed character of μ, I now derive the interpolation of the *wh*-element in (15). Following Mitrović and Sauerland (2016), I assume is an *e*-type operator: in (15), in the absence of the *wh*-pronoun *kuišš*- 'who', additivity is predicted to obtain ('also his sons') instead of a universal quantificational term ('each of his sons'). In line with Mitrović and Sauerland (2016), for the expression universal quantification (15), I follow Shimoyama (2006) to assume that the *wh*-pronoun in (15) is indeterminate. As such, it is interpreted as a set of type $\langle e, t\rangle$ restricted to humans, i.e. $[\![$kuišš-$]\!] = \lambda x \, . \, x$ is human. For the quantificational expressions such as 'DUMU.MEŠ-ŠU kuišš-*a*' ('each of his sons'), I analyse the μ-associate 'DUMU.MEŠ-ŠU kuišš-' to be interpreted as a set of type $\langle e, t\rangle$: the set of his sons.

Conversely, 'his sons', lacking the *wh*-pronimal type-lifter, would yield an additive meaning when associating with μ bare.

We maintain the anti-exhaustive semantics for μ particles and account for the universality by specifying that the anti-exhaustive operator (EXH^R or $\neg$EXH) exhaust subdomain alternatives alone, ignoring the scalar alternatives. This computational instruction is easily hardwired into the syntax by specifying the operator with a [δ]-feature. This line of reasoning is also explored by Chierchia (2006) and, most recently, in Chierchia (2013: 311, ex. 18) who works with pre-exhaustified alternatives, which he encodes on the exhaustivity operator by specifying it with a [Exh-$\delta\mathfrak{A}$]-feature, signalling that the alternatives being exhaustified have already been pre-exhaustified.

While this delivers the same anti-exhaustivity result, note that under our analysis, we are not dealing with pre-exhaustified alternatives but simply allow for recursive (re)exhaustification. The iterative modes of running the Gricean reasoning are technically different but essentially the same (Chierchia 2013: 119 notes this too). Since nothing hinges on this, we the notions of pre-exhaustified alternatives and recursively exhaustified alternatives to be on a par and, for all relevant matters, equivalent (as noted in (18b-ii), too).

Take the syntax of (16) as a working example. Without the μ particle -*a*, the object would be a *wh*-DP with indefinite or existential meaning. Since, as Chierchia (2013: 357) eloquently puts it, "indefinites of all colouring receive meanings identical to those of *or* ...as they are just potentially infinite disjunctions," (16) sans the meaning contributed by μ would be something along the lines of (17), where 'sand', 'flour', and 'ash' in (17b) are some possible contextual extensions of *some* things that Hittites may have sifted. We adopt a shorthand for these discrete disjunctions at propositional level in (17c), where 'she sifts sand' is abridged as *a*, etc.

(17) $[\![(16)]\!] \setminus [\![\mu]\!] =$

a. she sifts **some**thing

b. she sifts **sand** ∨ she sifts **flour** ∨ ...

c. $a \vee b \vee \ldots$

The presence of the μ particle thus entails two procedures: (i) the activation of δ-alternatives and (ii) their recursive exhaustification. Still working with the sifting example in Hittite (where we represent only *a* and *b* as working alternatives), we arrive at the following alternative schemata and exhaustification, which delivers the correct computations.

(18) a. ACTIVE δ-ALTERNATIVES:

$a \vee b$ [assertion]

a b [δ-alternatives]

b. EXHAUSTIFICATION:

i. *First level:*

$$\textsc{exh}_{[\delta\mathfrak{A}]}(a \vee b) = \textsc{exh}(a) \wedge \textsc{exh}(b) = \bot$$

ii. *Second level:*

$$\textsc{exh}^{R}_{[\delta\mathfrak{A}]}(a \vee b) = \textsc{exh}_{[\text{Exh-}\delta\mathfrak{A}]}(a \vee b)$$

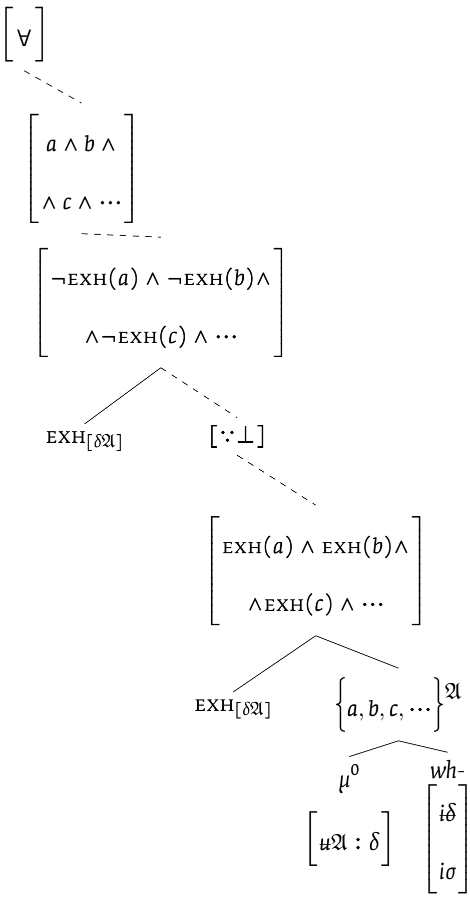
$$= \neg\textsc{exh}(a) \wedge \neg\textsc{exh}(b) = a \wedge b \neq \bot$$

The resulting conjunction is equivalent to universal quantification which is in line with the meaning in (16) we set out to compute. Note that (18b-ii) also shows the iterative requirement of EXH and the way in which we restrict the iterative application of EXH. In the case of (18b-ii), EXH must apply iteratively, that is twice, since a single level of exhaustification leads to a contradiction. The second layer of exhaustification, however, is no longer contradictory ($\textsc{exh}^{R}_{[\delta\mathfrak{A}]}(a \vee b) = \neg\textsc{exh}(a) \wedge \neg\textsc{exh}(b) = a \wedge b \neq \bot$).

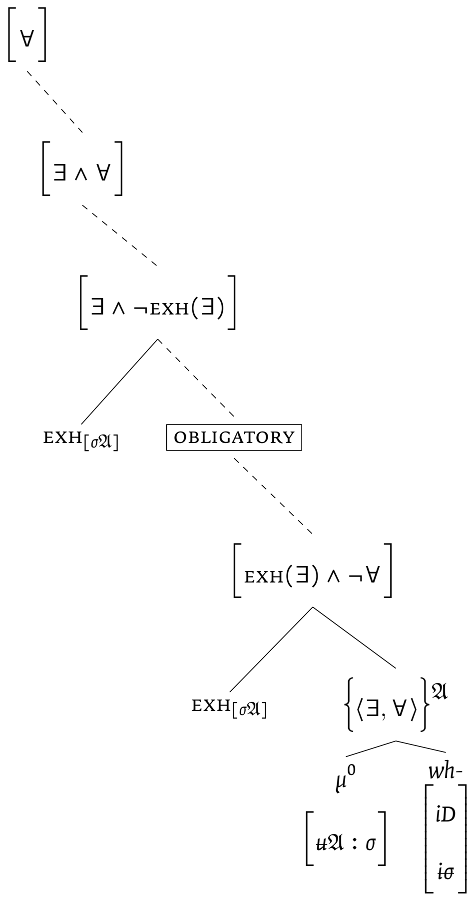
Under the assumption of obligatory iterativity of exhaustification, we can thus derive the universal distributive inference using second-level exhaustification yielding an anti-exhaustive inference. Such recursive exhasusification approaches, generally stemming from Fox (2007), have recently been advocated widely, for instance in Bowler (2014), Mitrović (2014), Mitrović and Sauerland (2014, 2016), Bar-Lev and Margulis (2014), Singh et al. (2016), and most recently in Szabolcsi (2017a,b). We have, however, departed from Fox (2007) and Chierchia (2013) in that we are recursively exhaustifying over a scalar set of alternatives. In sum, the two means of deriving the universal inference, using recursive exhaustification targeting (a) subdomain and/or (b) scalar alternatives, are given in (19)

(19) Recursive exhaustification of ...

a. δ-alternatives:



b. σ-alternatives:



In the next section, I investigate the diachronic processes that gave rise to the synchronic distribution of μ-meanings I have just overviewed.

3 TWO HISTORIES OF μ

There are two diachronic facts underlying the meanings of μ. In Japonic, μ originates as an exclusively scalar particle. In both Japonic and Indo-European, μ-marked NPIs are secondary and develop from universal quantificational or universal free-choice expressions.

I first take each of the two facts in turn in subsections §§3.1–3.2.

3.1 THE JAPONIC PRIMACY OF SCALARITY

The oldest text in Japonic dates back to the 8th century AD and allows us to see how the contemporary superparticle system (2) developed. Unlike the latter, Old Japanese (OJ) superparticle *mo* did not have the role of performing conjunction, nor encoding negative polarity.[9]

What is more, OJ μ shows that the stipulated [σ] feature and the general scalar dimension of meaning is empirically motivated. I will firs introduce the data in Old Japanese before addressing the changes that occurred in the Classical Japanese period in §3.2.1.

In the earliest OJ corpus (*Man'yōshū* MYS, 8th c.), the [*wh*+μ] quantificational expressions were confined to inherently scalar (σ) complements, as first noticed by Whitman (2010).

Not only was the polar construction absent from the μ-system in the OJ corpus, but μ^0 subcategorised for scalar hosts only. That is, the only eligible hosts of *mo* were either numeral nominals or inherently scalar *wh*-terms: *how-many* and *when*. The combination of a numeral *n* and μ, yielded the least likelihood reading along the lines of '*even n*'. In the *wh*-domain, the μ particle created universal quantificational expressions as shown below.

Chierchia's (2013) system gives us the descriptive power to label this μ as carrying [$u\sigma$] since non-scalar complements were disallowed:

(20) 以都母 々々々 於母加 古比 須々
itu-mo itu-mo omo-ga kwopi susu
when-μ **when**-μ mother-GEN yearning by
'I **always, always** think of my mother [i.e. at all times]'

(MYS, 20.4386; trans. by Vovin 2013: 146)

9 The details of the system presented in Mitrović (2014) in fact predict the diachronic behaviour according to which the rise of conjunction or additivity is precluded in absence of the δ-feature on μ.

(21) 佐祢斯 [欲能 伊久陀 母] 阿羅祢婆
sa-ne-si [ywo-no **ikuda** **mo**] ara-**neba**
PRE-sleep-PAST [night-SUB **how many** *μ*] exist-NEG-COND
'As there have been **few** nights in which we slept together ...'

(MYS 5.804a, ll. 46–47)

To buttress the fact that only scalar *wh*-terms were allowed, see Table 1 where counts of *μ* hosts are given.

	# of attestations
SCALAR [*wh*+*μ*]	total 24
itu mo 'when *μ*'	12
iku mo 'how much/many *μ*'	11
NON-SCALAR [*wh*+*μ*]	total 0
ado/na/nado mo 'what/why *μ*'	0
ika mo 'how *μ*'	0
ta mo 'who *μ*'	0

TABLE 1: *Distribution of ±scalar μ-hosts in OJ*

Let me now turn to showing the scalar distribution of the OJ *μ* particle in non-*wh*-constructions.[10] In (22), the clause-final verb constitutes a downward entailing context

(22) 吾 戀 流 千 重 乃 一 重 **母**
(w)a ga kwopuru ti pye no pito pye **mo**
PRO.1 GEN love.ADNOM 1000.NUM layer/part GEN person one *μ*
人 不令知
pito sire-zu
person tell-NEG.AUX
'Without a thousandth part of my great love' (万葉集, Man'yōshū, 13, 3272, ll. 25–27, trans. Taki et al. 2005: 309, #983–4, l. 14)

(23) [[久 爾 能 富 **母**] 美 由]
kuni no po **mo** mi yu
land/area GEN fire/highest *μ* see PASS
'the highest part of the land is visible' (KK., 41 l. 6, trans. by Philippi, cf. NSK. 34)

10 In the examples, # signals a line break in the poems.

Even the highest parts?

(24) [[阿佐 妬 珥 毛] # 伊弟低 由介那]
asa two ni **mo** idete yukana
morning door DAT μ go.out.GRND go.OPT
'Even its morning-door # We would go forth from—' (NSK, 16, ll. 3–4, transl. by Aston 1896)

In (25), the scalar component is visible thhrough the use of the restrictive particle *dani*, which combines with the nominal 'rice'. In association with μ, the scalar additive meaning of 'even' obtains:

(25) 渠梅 多儞 **母** # 多礙底
kome dani **mo** tagete
rice.DEVERBAL RESTR.PTC μ let.eat/drink.GRND
騰裒囉栖
topora-se
pass.through-IMP
'Pass on—having stolen # Even the very rice,' (NSK. 107, ll. 3–4, trans. by Aston 1896)

Example (26) shows a rare conjunction-like expression of μ where the relevant (negative) scale that μ associates with is that of '(not) knowing' on part of the speaker.

(26) 比騰 能 # 於謀提 **母** 始羅孺 # 伊弊 **母** 始羅孺
pito no omote **mo** sira-zu ipye **mo** sira-zu
person GEN front μ know-NEG.AUX house μ know-NEG.AUX
母
mo
μ
'I know not the face, # Nor do I even know the house' (NSK. 111, ll. 4–5, trans. by Aston 1896)

The OJ *mo*, given its restriction to scalar complements, carries an uninterpretable σ-features which sufficiently captures its distribution.[11]

11 While asuming a Minimalist system of syntax, I assume, in line with Roberts (2010), that an

(27) OJ: $\mu[u\sigma]$

Furthermore, this paper argues for the following characterisation of μ-meanings in OJ.

(28) In Old Japanese $[\![\mu]\!](x)$ is defined iff x denotes a a totally ordered set, chain $\mathbf{C}$, morphosyntactically encoded with the $[\sigma]$ feature. $\mu(x)$ denotes the maximal member of that chain, given as an application of the ceiling function of that chain, $\lceil\mathbf{C}\rceil$.

The fact that scalar μ-expressions in OJ under negation resist those negative inferences that obtain in NPIs, they may be analysed as Positive Polarity Items (PPIs). However, as Szabolcsi (2004: 419) notes, "*Some*-type PPIs do not occur within the immediate scope of a clausemate antiadditive operator." As seen in (21), *ywo-no ikuda mo* occurs within the scope of clausemate negation (*ne-*). More crucially, the term in non-negative contexts has a clearly universal meaning which weakens under negation but does not leave the positive scale. Thus, such constructions are best analysed as SIs. In (29), an informal sketch of positive/negative inferences is given based on the example (21).

(29) $[\![\text{[not [all nights]]}]\!] = \begin{cases} \rightsquigarrow \text{some nights} & \text{(scalar reading)} \\ \not\rightsquigarrow \text{no nights} & \text{(polar reading)} \end{cases}$

3.2 THE NON-PRIORITY OF POLARITY SENSITIVITY

Within the range of meanings encoded by the Mu superparticle , the polarity-sensitive encoding has a diachronic aetiology in both IE and JP. Methodolog-

uninterpretable/unvalued feature, upon checking, is not deleted either during the course of the derivation or at the level of Spell Out, as the standard Minimalist theory assumes (Chomsky, 1995). While the exhaustification of the σ-alternatives could obtain without this additional assumption, I do not pursue these details here.

ically, at least, I claim that the identity of diachronic trends is evident of a (conjectured) universal principle:

(30) μ-encoding of polarity sensitivity is not a primary incarnation of μ-meaning. These originate as universals and are diachronically reanalysed as weakened under negation.

Let me first show the rise of polarity sensitivity in Japonic (§3.2.1) before turning to IE (3.2.2).

3.2.1 TWO CHANGES IN CLASSICAL JAPANESE

Two interlocked changes can be detected in the classical period. We take each of them in turn.

The first change concerns the loss of restriction on the type of complements that the Classical Japanese μ may associate with. Unlike in the Old Japanese period, Classical Japanese *mo* can be seen to freely associate with hosts of non-scalar type. One such example is in (31), where *mo* associates with a *tare* 'who' which has as a restriction set the non-scalar subdomain of all individuals.

(31) たれ も 見おぼさん 事
tare mo mi-obos-an koto
who μ see.INF-think.HON-TENT/ATTR matter
'the fact that **everybody** wanted to see' (HM II:226/2; Vovin 2003: 128)

Given the system we propose, the Classical Japanese μ is parametrised as having the [δ] feature both present and, in the case of (31), set to a positive setting. Recall that Chierchia's (2013) systems of morphologically marked PSI requires that at least *one* of the [δ, σ] features be positively set.

Chierchia's (2013) system, in fact, predicts that if both [σ] and [δ] are available features polarity sensitivity should obtain by definition of the system, *ceteris paribus*. As it happens, this is exactly what we find in non-archaic Japonic.

The rise of μ-marked polarity sensitivity is evident from the data in (32) where a *wh*-pronoun *nani* 'what' with a non-scalar domain extension is interpreted under negation.

(32) いま は なにの 心 も なし
ima fa **nani**-no kokoro **mo** **na**-si
now TOP **what**-GEN idea μ NEG-FIN
'I do not have **any thoughts** [but of meeting you] now'

(IM XCVI: 168.9; Vovin 2003: 424)

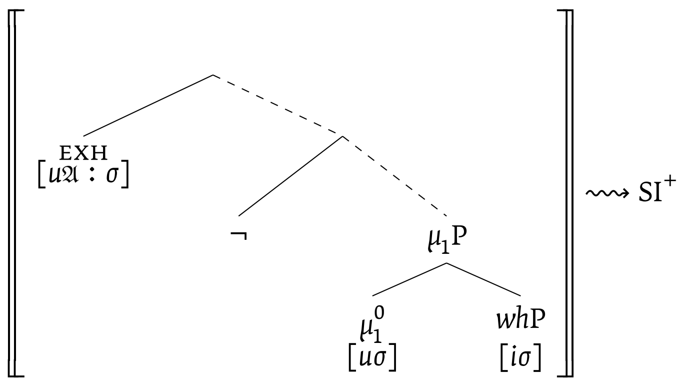
Therefore, the Classical (early middle) Japanese μ-system can be analysed as having lost the licensing restriction to σ-contexts. This can be represented by assuming that, unlike OJ, both [σ] and [δ] features are interpretable on μ, or that neither are (i.e., there is no narrow syntactic restriction posed on the structural context, or complementation).

$$\text{(33)}\quad \text{OJ: } \mu[(u)\sigma] \xrightarrow[\text{cca. 250years}]{t} \text{CJ: } \begin{cases} \mu_1 \begin{bmatrix} (u)\sigma \\ (u)\delta \end{bmatrix} \\ \mu_2 \begin{bmatrix} (u)\text{C} \end{bmatrix} \\ \mu_3 \begin{bmatrix} \varnothing \end{bmatrix} \end{cases}$$

This is motivated by the fact that both scalar and non-scalar complements featured in polarity sensitive and scalar expressions. The novel possibility of non-scalar hosts associating with μ requires us to posit the relevant uninterpretable [$u\delta$] feature on the μ particle, by virtue of which the negative polarity system arises automatically, as per the predictions of Chierchia's (2013) system. Since the union of both the δ and σ alternatives constitute the entire contextual domain, C, the diachronic change can also be stated (μ_2) in terms of the generalisation of the σ-feature in OJ to the C-feature in CJ. A stronger view of the the loss of restriction on associating structural contexts of μ in CJ, and in fact modern Japanese, would be (μ_3) to assume complete loss on the kinds of complements μ was associate with. The features restriction, as discussed, refers to the scalar/non-scalar property of the μ-associate. The μ particle is assumed to be restricted to *e*-type associates (as discussed in Mitrović and Sauerland 2016).

Therefore, the relevant change is that in the type of inference that *wh*-μ expressions carried. In OJ, such expressions are analysed as (positive) SIs, while the Classical Japanese *wh*-μ expressions were, or at least could be, NPIs under negation.[12] In (34a) and (34) I present this view of change in inferential procedure due to featural change, which I analyse as the signature property of the grammaticalisation of μ in Japonic.

(34) a. OJ: $\neg > \forall \vdash \neg\forall$ (SI)

i. 

ii. $\text{EXH}_{[\sigma\mathfrak{A}]}\Big[\neg[\ldots[_{\mu P}\ \exists_{[+\sigma]}\ \ \mu]]\Big]$

b. CJ: $\forall > \neg \vdash \neg\exists$ (NPI)

12 Note that in Chierchia's (2013) system, which is assumed here, both (positive) SIs and NPIs are derived using the same apparatus.

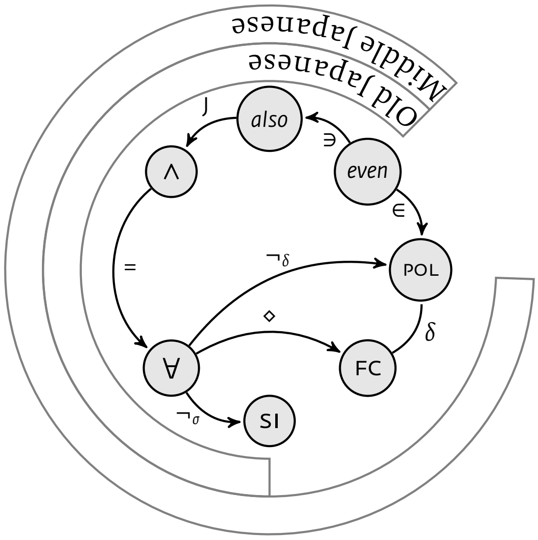
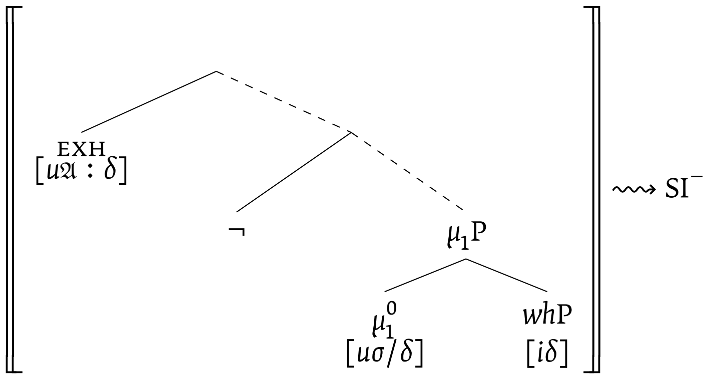


FIGURE 1: *Diachronic-semantic oscillations and development of μ meanings in the history of Japonic, with arrows signalling the (generalised means for) inferential connections between them.*

i. 

ii. $\text{EXH}_{[\delta\mathfrak{A}]}\Big[\neg\big[\ldots[_{\mu P}\;\; \exists_{[+\delta]}\;\; \mu]\big]\Big]$

I address later the technical details of deriving the meanings above. In the next section, I proceed to apply this technical analysis to the IE superparticle system by showing how this application derives the desired natural classes of NPIs and universal (PPI) terms.

Fig. 1 schematises the diachrony of μ in Japonic along with some inferential connections between the meanings that arise in its history.

3.2.2 THE RISE OF POLARITY SENSITIVITY IN INDO-EUROPEAN

The argument for the rise of polarity sensitivity, and the subsequently single-layer of exhaustification over a DE context, is not made as straighforwardly as for Japonic, simply because the IE language family is less homogenous.

The *μ* has existential quantificational force and forms NPIs only in the Satem group of IE languages, such as Slavonic and Indo-Iranian. In the Celtic, Italic, and Anatolian language families, however, *μ* forms universal quantifier expressions (as well as FCIs, which I address elsewhere as they outside the scope of this section). To reiterate some core contrastive data, exemplifying this quantificational split, compare the meaning of a *wh-μ* expression in Sanskrit (35) and Gothic (36), where one is a polarity sensitive expression and another a (polarity 'insensitive') universal expression.

(35)

न	यस्य	कश्	च	तितितार्ति	माया
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.' (*Bhāgavatapurāṇa*, 8.5.30)

(36)

𐌾𐌰𐌷	𐍈𐌰𐌶	𐌿𐌷	𐍃𐌰𐌴𐌹	𐌷𐌰𐌿𐍃𐌴𐌹𐌸	𐍅𐌰𐌿𐍂𐌳𐌰	𐌼𐌴𐌹𐌽𐌰
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 ...'

(CA. Mt. 7:26)

Given the phylogenetic evidence for the Anatolian branch having split off from the Indo-European 'core' the earliest, it is reasonable to assume that Anatolian, therefore, reflects a more retentive character of *μ*. The fact that both Indo-Iranian and Slavonic (among other Satem language families) cannot express universal quantificational expressions using a conjunctive

μ-particle, while the inverse is true for Centum languages such as Hittite, Gothic, and Latin, leads one to conclude that the primary meaning of μ-based *wh*-expressions was universal quantificational, rather than than of a negative polar existential.

This change from universal quantificational expressions to existential polar ones is, in the system I am advocating, modelled as loss of iterative exhaustification and its replacement with a non-iterative exhaustification restricted to DE environments.

In the next section, I turn to formalising some diachronic trends and principles of change that have been detected in the history of Japonic and Indo-European.

3.3 FORMALISING CHANGES

The primary meaning of μ in Japonic, analogous to *even*, has—as shown in previous subsections—descalarised and gave rise non-scalar meanigns, such as universal quantification, NPIs, and additives. In the Chierchia's (2013) system I assume here, there is a way of capturing this diachronic change as a change of mode of exhaustification, from *even*-type to the *only*-type. The other view, and the one I subscribe to and advocate here, is more economical and finds the locus of change in the structural representation of LF, while collapsing one mode of exhaustification into the other. Let me first discuss the first, and most obvious, theory of change.

3.3.1 FIRST APPROACH: THE DIACHRONIC CHANGE IN THE MODE OF EXHAUSTIFICATION

On a more general, and theoretical, level, this section concerns the question whether *even*-type inferences can be derived using the same technology and exhaustification apparatus as polarity-sensititive phenomena. In Chierchia's (2013), *even*-meanings obtain through an application of a an entirely different type of exhaustification operator: *E(ven)*-type EXH, as opposed to the *O(nly)*-type EXH. (Note that '$<_\pi$' is a contextually relevant probability measure.)

(37) Chierchia's (2013) two types of exhaustification operators:

a. $O_{\mathfrak{A}}(p) = p \wedge \forall q \in \mathfrak{A}\big[[p \notin q] \rightarrow \neg q\big]$

b. $E_{\mathfrak{A}}(p) = p \wedge \forall q \in \mathfrak{A}\big[p <_\pi q\big]$

As the primary of aim of this paper is to provide a theory of diachronic semantics which would shed light onto the relation between positive universal, polar-sensitive negative indefinites (NPIs), additives, and *even*-type meanings (OJ), I am led to assume that variation and change in the logical form of these expressions is systematic.

In Chierchia's (2013) system, the diachronic semantics of the Japonic μ, pertaining to the semantic change ($\gg$) from Old to Classical Japanese, has the locus in the *type* of exhaustification brought about by the μ particle, as per (38).

(38) $\big[_{CP}\ E\ \ \cdots [\ \mu\ [\![XP]\!]\ ]\big] \gg \big[_{CP}\ O\ \ \cdots [\ \mu\ [\![XP]\!]\ ]\big]$

It is unclear that, if any, natural principle of change would underlie the shift from E-type to O-type exhaustification that is evident in Japonic. The alternative trigger, *μ* or a PSI like *any* or *irgend-*, does not select the mode of exhaustification in the system as it stands. It is, therefore, unclear for these reasons how a diachronic mechanism, such as the one in (38) could be systematically accounted for in a way which would yield any predictive power.

Even on a more theoretical level, and not just at the level of diachronic finding and deriving diachronic explananda, I turn in 3.3.2 to dissecting *even*, being an overt version of the covert E-exhaustifier, and breaking it down into a recursive O-type exhaustifier coupled with a total-ordering map. This has the potential of economising the inventory of exhaustification procedures as the difference between E- and O-mode of exhaustification may be eliminated.

For these reasons, I now turn to exploring the other approach.

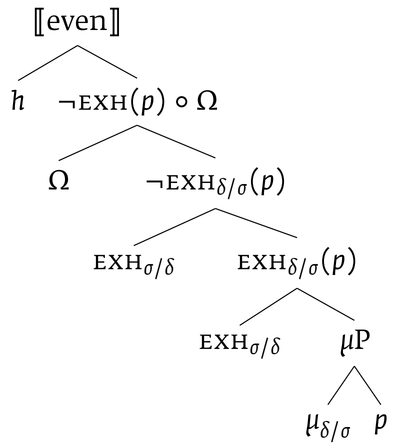
3.3.2 SECOND APPROACH: DISSECTING *even*

If a meaning can be dissected into compositional components that in concert return the relevant meaning, then structural dissection can be relegated to diachronic morpho-syntax.

This section explores one such avenue for the meaning of *even*, to which I relate the primary meaning of *μ* in Japonic, as demonstrated in §3.1. In the following, I use lattice-theoretic apparatus ($\prec$ is a covering relation).

After additive meaning obtains, via a recursive application of EXH (or a single application, assuming EXH is defined in this case over a set of pre-exhaustified alternatives), the partially ordered alternative set is mapped onto a totally ordered set (chain). See Stanley (1984) or Wild (2005), among others, for details, which are not relevant for the basics of the proposed mechanism.

(39)



a. $\text{EXH}_C(p) = p \wedge \forall q \in \heartsuit(\mathfrak{A}_C(p))[\neg q]$, where C ranges over a semi-lattice of σ- and δ-alternatives.

b. $\text{EXH}^R(p) = \text{EXH}(\text{EXH}(p))(p) = p \wedge \neg\text{EXH}(p)$

c. $\Omega = \lfloor \mathbf{C} \rfloor$

d. $r : \mathfrak{A} \mapsto \mathbf{C} \mid \mathbf{C} = \{0, \cdots, n\}$, s.t.,

i. Let r be an order preserving bijection from the lattice $\mathfrak{A}$ onto rank-selected (maximal) chain $\mathbf{C}$ of $\mathfrak{A}$:

$$\triangleright \quad r(x) = \begin{cases} 0 & \text{for all minimal } x\text{, i.e. iff } \neg\exists y[y \prec x] \\ n & \text{for all maximal } x\text{, i.e. iff } \neg\exists x[y \prec x] \end{cases}$$

$$\triangleright \quad r(y) + 1 \Leftrightarrow \exists y[y \prec x]$$

e. floor-function: $\lfloor p \rfloor$, takes an element x of the chain $\mathbf{C}$ and returns the greatest element y, s.t. $y \leq x$. (Negation reverses the function, i.e. its dual (ceiling-function) obtains.)

f. $h : \Omega^{-1}(0)$ defined on a two-element chain $\mathbf{C}_2 = \langle\{0, 1\}, \leq\rangle$

Note that the LF dissection in (39) is not a hardwired lexical entry for OJ μ, but rather the representation of the components that OJ μ brings into play.

The evidence for the proposed dissection of *even* or *even*-like operators, which relies on its additive component being derived from recursive application of the EXH-operator, is also supported by emirical motivation from English

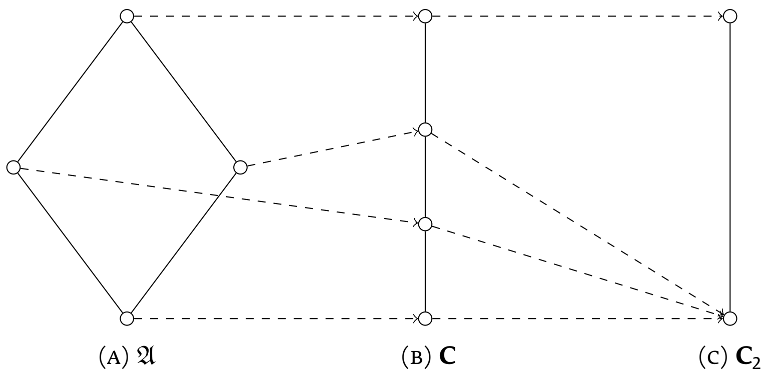


Figure 2: *Maps and partial homomorphisms from completely lattice-structured alternatives to a ranked chain and two-element chain.*

(Francis 2017, and those cited) and Hungarian (Szabolcsi, 2017b). In English, the additivity of *even* is more or less standardly assumed and taken for granted (cf. Rullmann 1997, *int. al.* for an opposing discussion). In fact, obligatory additivity of *even* derives for free by virtue of *even*'s bringing into play likelihood comparanda, or at least one such comparandum which is more likely that the assertion.

In fact, the arguments against the additivity of *even*, which is part of the dissected meaning in (39), may be accounted for by appealing to the syntactic distribution of *even* and its associates. In this direction, Wagner (2015) defends a generalisation pertaining to the category of *even*-associates:

(40) wagner (2015) generalisation:

NP-*even* is additive, VP-*even* is not.

Since this paper is primarily focussed on the NP-combining μ particles (see Mitrović and Sauerland 2016 for background), the additivity of *even* in nominal structural contexts is thus well established.

Szabolcsi (2017b) introduces novel evidence from Hungarian which are on a par with Ser-Bo-Croatian with regards to the fact that two particles must act in tandem to deliver the *even*-meaning of low-rankedness (or related concessive meaning, CNCS) or unlikelihood.

(41) 'Even Mary'

a. Hungarian

i. még Mari is
EVEN ADD

ii. még/akár csak Mari is
EVEN_1 ONLY ADD

b. Ser-Bo-Croatian

čak/makar i Marija
EVEN/$\text{EVEN}_{\text{CNCS}}$ ADD

Thus, in these NP-associating contexts, *even* is encoded by two particles in Hungarian and Ser-Bo-Croatian, in Hungarian up to three particles (41a-ii) are lexicalised. The Ser-Bo-Croatian *i* and Hungarian *is* are independently additive. The *még* and *akár* are, according to Abrusán (2007) even-style particles (which is what Szabolcsi 2017a also assumes), hence labeled EVEN.

Note that the Hungarian *csak* and Ser-Bo-Croatian *čak* are cognate borrowings from Turkish (Skok, 1971: 289). The original borrowed form, *çak*, had (and still has in modern Turkish) the low-likelihood meaning *even*. It is curious that HUngarian borrowed, or developed, the *only*-type meaning. In this connection, the *only*-type particle *sam-* 'only, alone' shows interesting connection in Ser-Bo-Croatian also, bringing the Hungarian and Slavonic meanings of *csak/čak* (only/even, resp.) synchronically closer in their distribution (42). Also note, however, that the particles may also co-occur (43) which is in line with our proposed dissection:

(42) Skok (1971: 289)

a. **čak** do zore
EVEN to dawn.ACC
'**even** till the dawn'

b. do zore **same**
to dawn.ACC only/alone.F
'**even** till the dawn'

(43) **čak** do **same** zore / zore **same**
EVEN to only/alone.F dawn.ACC dawn.ACC only/alone.F

'**even** till the dawn'

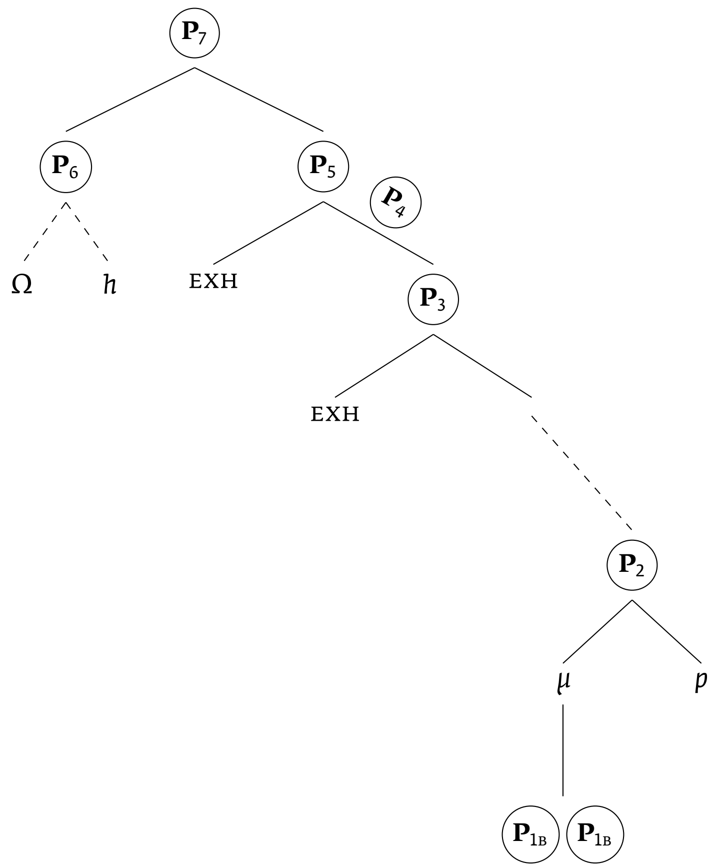
Fruthermore, Ser-Bo-Croatian *makar* is cognate, and (as far as I am able to establish) sychronically rquivalnet to the Slovenian concessive scalar particle *magar(i)* (Crnič, 2011).

Skok (1972: 359) notes that *makar* is "of unknown origin from the domain of syntax," as it's found in Romanian *măcar*, and even modern Greek μακάρι. One analysis that Skok entertains is the coupling of the neo-Persian negative morpheme *ma* and *agar* (from Old Persian **hakaram*, 'once'; cf. Turkish *meğer*). Without reference to the original direction or form of the borrowing, I conjecture that *makar/magar(i)* are cognate with Hungarian particle sequence *még* and *akár*. Historically, the Turkish contact is relevant and likely. This is parallel to *čak/csak* and its potential borrowing from Turkish (cf. *çak* and the discussion above).

3.4 PARAMETRISING THE SEMANTIC INCARNATIONS OF μ

In this final subsection, I attempt to integrate the previous discussion into a coherent explanatory model of diachronic variation and change of μ, deriving from the proposed dissection of *even*-type meaning, which I reproduce below.

(44) Parametric conditions on s scalar-additive template for μ:



The idea behind this approach is based on the assumption that a carefully dissected meaning of Japonic μ provides sufficient means of deriving not only the non-scalar Indo-European character of μ but also the diachronic procedures that yielded the semantic shapes of μ in non-primitive language states.

The first parameter set, $\mathbf{P}_1$, is featural and, on the one hand, distinguishes between strictly scalar and non-scalar association (μ-complementation) as given in (45) for $\mathbf{P}_{1A}$.

(45) $$\mathbf{P}_{1A} : \mu[\pm\sigma] = \begin{cases} + & \text{Old Japanese} \\ - & \text{rest (both scalar and non-scalar.)} \end{cases}$$

On the other hand, parameter $\mathbf{P}_{1B}$ distinguishes between (indeterminate, INDET) *wh*-complements and (determinate) DP complements (46). This differentiates the Old Japanese type of μ-encoded meanings from the rest, in both comparative and historical terms.

(46) $\mathbf{P}_{1B} : \mu[\pm\text{INDET}] = \begin{cases} + & \text{indeterminate quantificational meanings} \\ - & \text{additive meanings} \end{cases}$

The second parameter, $\mathbf{P}_2$, is also related to morpho-syntax and distinguishes between purely *e*-type μ particles in the nominal domain and the μ particles in the clausal domain (47). One such example would be Gothic and Modern Greek, as discussed in Mitrović (2018b). Evidence from Gothic, and even Old Irish, by virtue of lacking an exclusively DP-conjoining character, suggest a fixed position for the μ particle. This position is independently shown to be a clausal Focus head, which supports the view that the IE μ superparticle was reanalysed as an elemenet in the C-system (see Mitrović 2018b for details and an account for this.)

(47) $\mathbf{P}_2 : \mu[\pm\text{D-LEVEL}] = \begin{cases} - & \mu \text{ in the C-system: Gothic, Modern Greek} \\ + & \mu \text{ in the C-system: rest} \end{cases}$

$\mathbf{P}_3$ in (48) regulates Proper Strengthening (10) as a presuppositional condition of μ-expressions. At this level, I am no longer distinguishing between languages but meanings that are allowed if this parameter is (not) set. The meaning that $\mathbf{P}_3$, based on PS, filters is that of (non-) polarity-sensititivy. Therefore, if PS operates, and the relevant $\mathbf{P}_3$ is set positively, '+', then μ will not, or does not, partake in forming NPIs.

(48) $\mathbf{P}_3 = [\pm\text{PS}] = \begin{cases} + & \text{no polarity-sensitive meanings} \\ - & \text{polarity-sensitive meanings allowed} \end{cases}$

$\mathbf{P}_3$ can be seen as an economy condition: if all meanings derived by EXH are presupposed to be informationally stronger than the (input) assertion, then the only means available for strengthening is the reapplication of EXH, which leads me to stating $\mathbf{P}_4$ in (49).

$\mathbf{P}_4$ Is iterativity allowed or obligated?

(49) $\mathbf{P}_4 = [\pm\text{ITER}] = \begin{cases} - & \text{non-strengthened meanings only} \\ + & \text{additivity, free-choice, universal quantification possible} \end{cases}$

Similarly to $\mathbf{P}_3$ in (48), $\mathbf{P}_4$ will allow additive, universal quantificational and free-choice meanings, to the exclusion of NPIs. If additivity can be separated from other purely quantificational μ-expression by the [−INDET] parameter setting, then how does our analysis discriminate between vanilla universal quantifiers and the universal FCIs? In this regards, we follow Dayal (2009) and adopt her fluctuation constraint (13), as discussed earlier.

Therefore, $\mathbf{P}_5$ can be stated in terms of Is fluctuation obligated?

(50) $\mathbf{P}_5 = [\pm\text{FLUC}] = \begin{cases} - & \text{universal quantification} \\ + & \text{free-choice} \end{cases}$

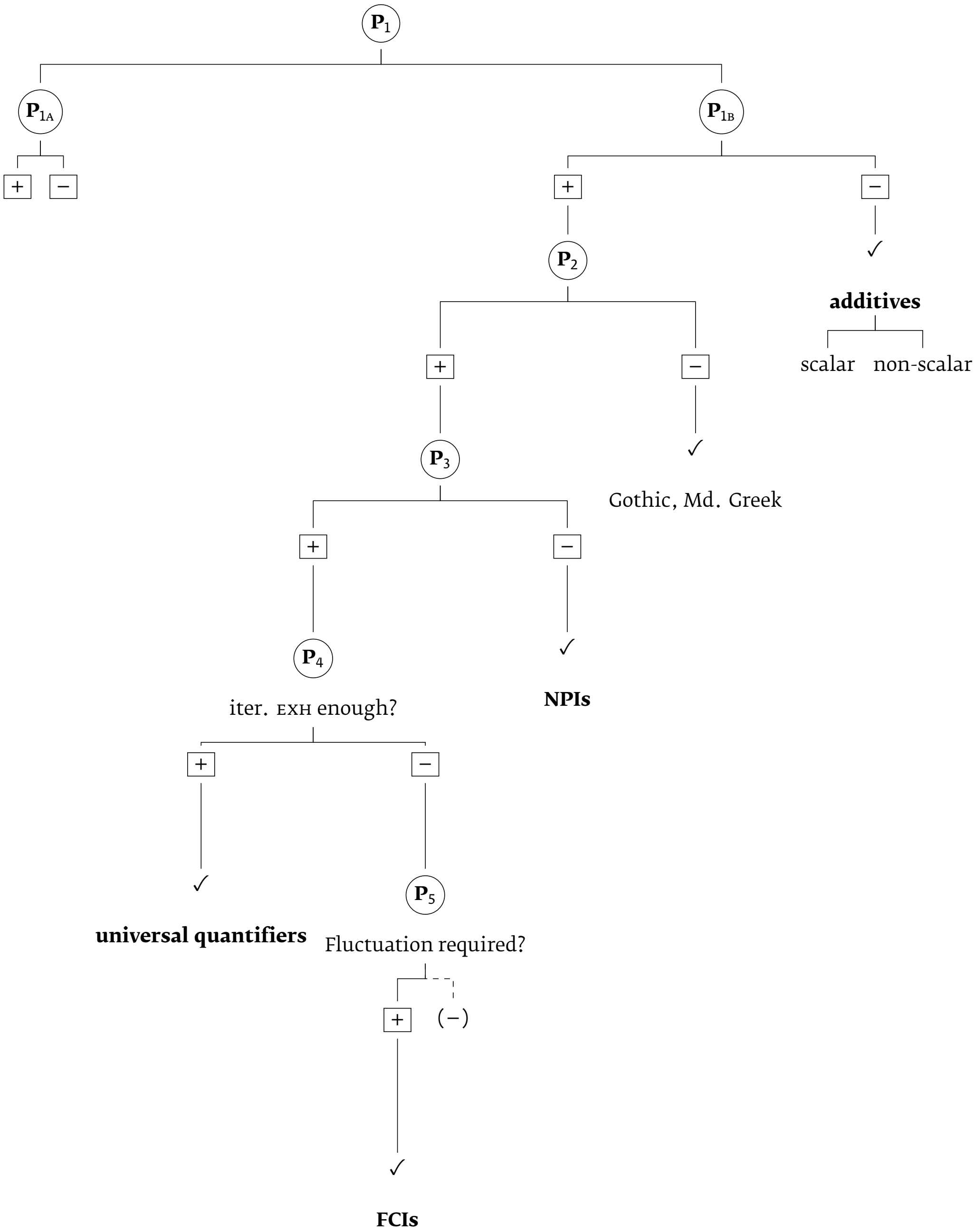
Also note that $\mathbf{P}_2$ and $\mathbf{P}_5$ are connected, although the former is a purely syntactic and the latter a purely semantic parameter. The grammaticalisation of a FC-marker in the C-system guarantees ($\mathbf{P}_2 : -$) Fluctuation and the wide-scope of μP.

The final parameter I state in (44) is $\mathbf{P}_6$ in (51) has to do with the non/scalar output and is related to the first parameter on non/scalar complementation. It can be informally read as 'Is scalar meaning obligated?'

(51) $\mathbf{P}_6 = [\pm\text{SCAL}] = \begin{cases} + & \forall x, y \in \mathfrak{A}(\llbracket \mu\text{P} \rrbracket)[x \prec y \vee y \prec x] \\ - & \text{else, non-scalar meaning} \end{cases}$

Note that the Ω and h functors are motivated empirically on the basis of evidence for *even* associating in questions, as dicsussed in Iatridou and Tatevosov (2016); Mitrović (2016); Francis (2017); Mitrović (2018a).[13] Parameter **P_6** will thus allow for scalar and *even*-type meanings of μ-expressions, which captures not only the character of Old Japanese but also the seeming universality of the scalar ambivalence of additives.

(52) A parametric hierarchy for the meanings of μ:



13 The Ω and *h* differ, basically, only with respect to whether they only rank the alternatives via a map to a chain or whether they homomorphisms onto a two-membered chain of un/-likelihood. See Fig. 2

4 CONCLUSIONS & OUTLOOK

I have attempted to sketch a diachronic theory of μ-meanings: how they are born and how they shift. Two such shifts were demonstrated. In Japonic, the meaning of μ is that of scalar particle: the best means of capturing this distribution is by positing, in Minimalist terms (Chomsky, 1995) an uninterpretable scalar (σ) feature on the Old Japanese μ. Once this restriction to scalar complements is lost in Classical Japanese, non-scalar meanings arise in Japanese. One such meaning is that of neagative polarity or polarity sensitivity more generally. In order to obtain this meaning, I proposed, in line with Chierchia's (2013) system, that the relevant feature allowing access to non-scalar sub-domain (δ) alternatives is innovatively born on the Classical Japanese μ head. This polar meaning is also secondary in Indo-European. I supported this view with independent phylogenetic arguments according to which the two groups, the one in which μ encodes NPIs and another in which μ encodes universal quantifiers, are differently retentive with regard to the original (Proto) Indo-European character of μ.

In the last section, I sketched a view of the causes of diachronic shifts that are detectable in Japonic and Indo-European. These causes can be tangentially gathered under the umbrella of economy conditions (explored in greater detail elsewhere). One such change in adhering to economy was is synchronically by the grammatical use of the EXH operator in 'last resort' derivations/interpretations: if an exhaustified proposition does not make sense, then run exhaustification once more. I stated this as the iterativity parameter $\mathbf{P}_4$. Another example of an economical principle at play was tied to the presuppositional condition that the application of EXH has to strengthen the meaning in which it plays a role. If this condition, stated as parameter $\mathbf{P}_3$, is part of the grammar, then μ-encoded NPIs are predicted to not exist in a given language.

The latter parameter also leads us to an implicational universal which is seemingly trivial: if an expression obtains in non-fluctuational contexts, then it is also admissible in fluctational contexts. I have not paid particular concern to unviersal FCIs in this paper so I leave the details of this universal, and the precise relation of Fluctuation to the overall principles of μ, for future work.

What remains to be worked out, on a more general level, is the connection between the proposed parameters as well as their wider empirical examination. It appears to me that an explanatory relegation of historical phenomena to principles of economy and efficient computation (both derivational and interpretational) are a desirable consequence of a diachronic semantic theory.

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