MORPHOSYNTACTIC ATOMS OF PROPOSITIONAL LOGIC

(युवाभ्याम्)

MORPHOSYNTACTIC ATOMS OF PROPOSITIONAL LOGIC

(a philo-logical programme)

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Preface

- ☆ An earlier version of the analysis developed in §3.5 was presented at the *Formal Approaches to South Asian Linguistics 2*, held at MIT on March 17, 2012 (Mitrović, 2012c) and at *Diachronic Generative Syntax 14* held at Lisbon University on May 7, 2012. (Mitrović, 2012e)
- ☆ An earlier version of the analysis developed in §3.3, forming the basis for chapter 4, was presented at the *South Asian Languages: Theory, Typology, and Diachrony* workshop held at Yale University on September 29, 2012. (Mitrović, 2012d)
- ☆ An earlier version of the analysis developed in parts of chapter 4 was presented at *Harvard Workshop on Indo-European and Historical Linguistics*, held on March 17, 2012 (Mitrović, 2012b), at the *Syntax/Semantics Brown Bag* at NYU (Mitrović, 2012a), and in collaboration with Uli Sauerland at the 44th *North East Linguistic Society* meeting. (Mitrović and Sauerland, 2014)

Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text. It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University of similar institution except as declared in the Preface and specified in the text.

Moreno Mitrović

Jesus College, Cambridge
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Abstract

This thesis presents an investigation into the processes involved in construction and interpretation of two classes of natural language connectives. Languages consistently contain a single set of two morphemes—*mo* and *ka* in Japanese, for instance—which handles universal/existential as well as conjunctive/disjunctive constructions respectively. Aside from the latter coordinate/quantification semantics, *mo* also serves as an additive and *ka* as an interrogative element. The core desideratum of the thesis is to unify not only the semantic but also the syntactic distribution of the contextual incarnations of the two kinds of particles. Syntactic unification is achieved by focusing on a morphologically rich collection of ancient (and modern) Indo-European (IE) languages, which—through their morphology—reveal otherwise silent syntactic material that we fail to find in a language like Japanese. The silent syntax we uncover points to a syntactically, and semantically, *neutral* concept of *junction*, which is structurally (compositionally) the foundation underlying the systems of *con*junction and *dis*junction. By breaking down coordination into separate layers, we capture the syntactic and semantic differences, lying in the amount of layered projections, as well as the core components of the kinds of meanings the pair of particles dictates. Semantically, the phenomenon is unified by adopting the recently grounded 'grammaticised implicature' approach to understanding inferential processes in the scalarity and polarity systems of natural language (Chierchia 2013). With both results achieved, we further investigate diachronically the nature of syntactic-semantic atoms of propositional logic, used to express logical constructions like quantification, coordination and interrogation. By investigating IE and Japonic in parallel, the thesis thus also arrives at the understanding of the diachronic implicational relations in the grammatical systems of quantification, scalarity, polarity and coordination.

Thesis Supervisor: Professor Ian G. Roberts

List of language abbreviations

ṚVSkt	Ṛgvedic Sanskrit
ClSkt	Classical Sanskrit
Av	Avestan
OW	Old Welsh
MW	Middle Welsh
MdW	Modern Welsh
OB	Old Breton
MB	Middle Breton
OC	Old Cornish
OIr	Old Irish
MIr	Middle Irish
ON	Old Norse
Lat	Latin
Gr	Classical Greek
Hom	Homeric
OCS	Old Church Slavonic
PSl	Proto-Slavonic
Sl	Slavonic
Slov	Slovenian
Russ	Russian
Gth	Gothic

Hom	Homeric
Gaul	Gaulish
TA	Tocharian A
TA	Tocharian B
IE	Indo-European
PIE	Proto Indo-European
Ant	Anatolian (family)
Tch	Tocharian (family)
Alb	Albanian (family and language)
PAlb	Proto-Albanian (family and language)
Gmc	Germanic (family)
PGmc	Proto-Germanic (family)
Cel	Celtic (family)
PCel	Proto-Celtic
Itl	Italic (family)
Grk	Greek (family)
Arm	Armenian (family and language)
BSl	Balto-Slavonic (family)
IIr	Indo-Iranian (family)
MdJ	Modern Japanese
CJ	Classical Japanese (Heian period)
OJ	Old Japanese (Nara period)
MdIA	Modern Indo-Aryan

List of technical symbols & abbreviations

LANGUAGE-PARTICULAR TERMS

~~	missing fragment of the text
=	clitic boundary
-	morpheme boundary
ABC	transliterated sumerogram in Hittite
ABC	transliterated akkadogram in Hittite
⁊	amperagus, or tironian *et*, conjunction sign for *ocus* 'and' in Old Irish

INDO-EUROPEAN AND HISTORICAL-LINGUISTIC TERMS

$*$	reconstructed form
$*h_1$	the reconstructed neutral laryngeal
$*h_2$	the reconstructed *a*-colouring laryngeal
$*h_3$	the reconstructed *o*-colouring laryngeal
$\gg$	diachronic development ($a \gg b$ = '*a* developing into *b*')

MORPHOSYNTACTIC TERMS

#	infelicitous expression (semantically/pragmatically), or prosodic pause
*	ungrammatical expression
🌱	syntactic feature (instructions for construction/derivation)
ℹ	semantic feature (instructions for interpretation)
♪	phonological feature (instructions for externalisation/ realisation)

[*u*F]	uninterpretable feature
[*i*F]	interpretable feature
$\alpha_{[+♪]}$	phonological realisation of *α*
$\alpha_{[\pm♪]}$	optional phonological realisation of *α*
$\alpha_{[-♪]}$	no phonological realisation of *α*
⟩	structural height: *x*⟩*y* ‘*x* is structurally higher than *y*’
	syntactic slot for arguments external to the extended projection
REL	relative
EPP	extended projection principle
NOM	nominative case
MASD	masdar
ALLT	allative
PERLT	perlative
SUBJC	subjunctive
2FUT	secondary future
KPRT	*kakari* particle
ADN	adnominal
INTRJ	interjectional particle
RESTR	restrictive particle
CSPRT	case particle
CAUS	causative
PRES8	8th class present stem
SG-ACT	singular active (Toch.)
ALTR.ALL	alternating allative
SUPP.PRES	suppletive base present
HON	honorific particle

REPR	representative
RETR	retrospective
PRT	particle
DV	defective verb
NML	nominaliser
TENT	tentative
ATTR	attributive
SUB	subordinate
EV	evidential
MP	mediopassive
CON	conjunctive gerund
DEB	debitative
ALL	allative
POL	polite
IND	indefinite
INT/Q	interrogative
D	determiner
Λ	label

PHONOLOGICAL AND PROSODIC TERMS

#	generalised phonological pause, morpho-phonological break
↘	falling intonation
↗	rising intonation

LOGICAL AND FORMAL SEMANTIC TERMS

$[\![\cdot]\!]$	denotation, interpretation function
$\langle \cdot \rangle$	tuple, pair
M	model

g assignment function

$\mathtt{e}$ type of individuals (entities)

$\mathtt{i}$ type of temporal intervals

$\mathtt{s}$ type of situations

$\mathtt{d}$ type of degrees

t variable over truth values

w variable over worlds

p variable over propositions (also ϕ, ψ used)

P variable over predicates

x variable (over individuals, unless stated otherwise)

d variable over degrees

C context

$\mathfrak{m}$ measure operator

$\mathfrak{D}_\tau$ domain of some type τ ($\neq$ D [above], nor D [below])

$\mathfrak{A}$ set of alternatives, hence $\mathfrak{A}(p)$ reads 'alternatives to p'; also notated $\{\phi\}^{\mathfrak{A}}$, signifying an alternative set for some propositional term ϕ

$\mathfrak{T}$ scale truncation operator

$\mathfrak{X}$ *only*-type exhaustification operator

$\mathfrak{E}$ *even*-type exhaustification operator

D (feature for) subdomain alternatives

$D\mathfrak{A}$ domain restriction of exhaustification to subdomain (D) alternatives

$\sigma\mathfrak{A}$ domain restriction of exhaustification to scalar (σ) alternatives

σ (feature for) scalar alternatives

$\precsim_C$ maximal structural complexity in C ('at most as complex as in C')

$\mathbb{N}$ set of all natural numbers

$|n|$ cardinality of n

Σ sum

$\heartsuit$ Innocent Exclusion

π probability degree

$<_\pi$ probability measure

$\models$ models (generalised entailment)

P generalised (statistical) probability ($\neq$ P, above)

? inquisitive non-informative closure operator

! informative non-inquisitive closure operator

Π Inquisitive Semantic possibility/-ies

$\vdash$ asserts/entails (generalised assertion/entailment; in other literature, $\subseteq$ is used)

$\nvdash$ does not assert/entail (in other literature, $\nsubseteq$ is used)

$\top$ tautology

$\bot$ contradiction

$\diamond$ modal of possibility ($\diamond\phi$ = 'ϕ may be the case')

$\square$ modal of necessity ($\square\phi$ = 'ϕ must be the case')

$\wedge$ conjunction

$\vee$ disjunction

$\veebar$ exclusive disjunction (a.k.a. 'xor')

$\cap$ intersection

$\cup$ union

$\sqcap$ (Universal) Meet

$\sqcup$ (Universal) Join

sup supremum

inf infimum

$\neg$ negation

$\neg_{[D\mathfrak{A}]}$ negation targeting subdomain alternatives

$\neg_{[\sigma\mathfrak{A}]}$ negation targeting scalar alternatives

$\rightarrow$ consequence relation

$\leftrightarrow$ biconditional relation

$\subset$ proper subset

$\complement$ set-theoretic complementation

$\subseteq$ subset

$\supset$ proper superset

$\supseteq$ superset

$\Leftrightarrow$ (generalised) mutual entailment; used for both semantic and meta-theoretical (esp. parametric) notation

β boolean operator/head

$\multimap\!\circ$ variable over Boolean (and sometimes non-Boolean) connectives

$\circ$ function composition

Ξ^{σ} Horn Scale

$\rightsquigarrow$ implicature; 'implies'

$\not\rightsquigarrow$ lack of implicature; 'does not imply'

ζ set of output context (*qua* postsuppositional) tests

$\underset{\smile}{\psi}$ postsuppositional subformula; $\phi \underbrace{\multimap\!\circ\ \psi}$ reads $\phi \multimap\!\circ\ \psi$, where ψ is post-supposed, i.e. ψ is a postsuppositional test imposed on ϕ

$\varnothing$ empty set

$\in$ in, or 'element of'

$\notin$ not in, or 'not an element of'

$\therefore$ therefore

$\because$ because

∞ infinity

$\propto$ proportional to

$\wp$ powerset

$\blacksquare$ QED

THEORETICAL AND OTHER CONCEPTUAL ABBREVIATIONS

AQ Alternative Question

ToPr	Topical Property
FC(I)	Free Choice (item)
NP(I)	Negative Polarity (item)
PS(I)	Polarity Sensitive (item)
Q	Question
FA	Function Application
FR	Free Relative
FCFR	Free Choice Free Relative
LA	Labelling Algorithm
DeM	De Morgan Law(s)
EP	Extended Projection
EPP	Extended Projection Principle (feature)
PDbP	Phonological derivation by phase
LCA	Linear Correspondence Axiom
2P	second-position
BCC	Borer-Chomsky conjecture
ECP	Empty Category Principle
HC	Hurford's Constraint

GENERAL ABBREVIATIONS AND MISCELLANEOUS TYPOGRAPHIC NOTATIONS

<u>abc</u>	supplied grammatical words in Old Japanese
abc	phonographic text in Old Japanese
abc	logographic text in Old Japanese
s.t.	such that
p.	page
l.	line
ll.	lines
fn.	footnote

ff. and the following (pages, paragraphs etc.)

ex. example

\\ line break

CE Common Era (AD: *anno domini* might creep in)

BCE before Common Era

c. century

cca. *circa*

List of textual abbreviations

INDO-IRANIAN TEXTS

ṚV *Ṛgveda saṃhitā*. Late Bronze age: 1500–1200 BCE. Text edition as per van Nooten and Holland (1994). Translation as per Wilson (2002)

AV *Ayurveda (rasāyana)*. Text edition as per Hellwig (2011).

Mbh *Mahābhārata*. Text edition as per Hellwig (2011).

R *Rāmāyaṇa*. Text edition as per Hellwig (2011).

ŚB *Śathapathabrahmaṇa*. Text edition as per Hellwig (2011).

BP *Bhāgavatapurāṇa*. Text edition as per Hellwig (2011).

ŚU *Śvetāśataropaniśaḍ*. Text edition as per Hellwig (2011).

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

AsH *Arsames, Hamadan*. Text edition as per Kent (1953).

DB *Darius, Behishtan*. Text edition as per Lecoq (1974).

DNb *Darius, Naqsh-i Rustam*. Text edition as per Kent (1953).

DSf *Darius, Susa—The Burgbau Inscription*. Text edition as per Steve (1974a, 1974b, 1975).

ANATOLIAN TEXTS

Ḫatt. *Apology of Ḫattusili* Text edition as per Melchert (2009a).

StBoT *Studien zu den Boğazköy-Texten*. Text edition as per Neu (1980).

2BoTU *Die Boğazköy Texte im Umschrift*. Text edition as per Forrer (1922–1926).

ITALIC TEXTS

Capt *The Captivi of Plautus.* Text edition as per Lindsay (1900).

As *Asinaria of Plautus.* Text edition as per Riley (1912).

Agr *M. Porci Catonis de agri cultura liber.* Text edition as per Goetz (1922).

Att *Cicero: Epistulae ad Atticum*. Text edition as per Jøhndal et al. (2014).

Or *Cicero: De Oratore*. Text edition as per Hendrickson and Hubbell (1939).

Off *Cicero: De officiis*. Text edition as per Jøhndal et al. (2014).

Vul *St Jerome's Vulgate*. Text edition as per Jøhndal et al. (2014).

Gal. *Caesar: Commentarii belli Gallici*. Text edition as per Jøhndal et al. (2014).

Per. Aeth. *Peregrinatio Aetheriae* Text edition as per Jøhndal et al. (2014).

Inst. *Quintilian: Institutio Oratoria.* Translation and Text edition as per Butler (1922).

GREEK TEXTS

Il *Homer: Illiad.* 8th c. BCE. Text edition as per Jackson (2008) and Kahane and Mueller (2014).

Od *Homer Odyssey.* 8th c. BCE. Text edition as per Kahane and Mueller (2014).

Th *Hesiod: Theogeny.* 8th c. BCE. Text edition as per Kahane and Mueller (2014), translation and edition by Hesiod (1990).

WD *Hesiod: Words and days.* 8th c. BCE. Text edition as per Kahane and Mueller (2014), translation and edition by Hesiod (1990).

SH *Hesiod: Shield of Heracles.* 8th c. BCE. Text edition as per Kahane and Mueller (2014), translation by James Huddleston.

Crat *Plato: Cratylus.* cca. 5th c. BCE. Text edition as per Fowler (1921).

Anab *Xenophon: Anabasis.* cca. 5th c. BCE. Text edition as per Brownson (1922)

Cyrop *Xenophon: Cyropaedia.* cca. 4th c. BCE. Text edition as per Xenophon (1910).

Hist *Herodotus: Histories.* 5th c. BCE. Text edition as per Jøhndal et al. (2014).

Alc *The Alcestis of Euripides.* 5th c. BCE. Text edition as per Hayley (1989).

GNT *The New Testamen.* 2nd c. CE.Text edition as per Jøhndal et al. (2014).

Chron *Sphrantzes: Chronicles.* Post-1453 CE. Text edition as per Jøhndal et al. (2014) and Bennett and Olivier (1973).

MYCENAEN TEXTS

PY *The Pylos Tablets.* Text edition as per Bennett and Olivier (1973).

ARCADIAN TEXTS

IG-V2 *Inscriptiones Graecae, V,2. Inscriptiones Arcadiae.* Text edition as per von Gaertringen (1913).

OLD CHURCH SLAVONIC TEXTS

CM *Codex Marianus.* Text edition as per Jagić (1883) and digitisation by Jøhndal et al. (2014).

CZ . *Codex Zographensis.* Text edition as per Jagić (1879).

VC *Vita Constantini.* Text edition as per Tomšič (1960).

OLD AND EARLY MIDDLE SLOVENIAN TEXTS

MF *Monumenta Frisingensia.* Text edition as per Ogrin (2007).

TEDP *Primož Trubar: Ena Dolga Predguvor.* 1557. Text edition as per Seitz and Hladnik (1998).

CELTIC TEXTS: OLD IRISH

EILw *Early Irish Law.* Text edition as per Hancock et al. (1901).

EIL *Early Irish Lyrics.* 8th–12th c. Text edition as per Murphy (1956).

Wb *Würzburg Glosses.* Text edition as per Stokes and Strachan (1901).

MCA *Milan Codex Ambrosianus.* Text edition as per Stokes and Strachan (1901) and digitisation by Griffith (2011).

POMIC *Parsed Old and Middle Irish Corpus.* Corpus compilation and Text edition by Lash (2014), from where the details of the remaining Irish texts listed here have been taken.

Cam *Cambrai Homily.* Late 7th c CE. Text edition as per Thurneysen (1949: 35–6) as presented in Lash (2014). Translation by Stokes and Strachan (1987: 244–247). Manuscript: *Cambrai*, Bibliothèque Municipale, MS. 679 (formerly 619), ff. 37rb–38rb.

Arm *Additamenta from the Book of Armagh.* 700 CE. Text edition as per Bieler (2004: 166–179), as presented in Lash (2014). Manuscript: *Book of Armagh* (TCD 52, fol. 16rb–18vb) .

LC *Lambeth Commentary on the Sermon on the Mount* 725 CE. Text edition and translation as per Bieler and Carney (1972), as presented in Lash (2014). Manuscript: Originally fly-leaves of: MS. London, Lambeth Palace 119 (G.n.12–N.14); now: Fragments 1229, fol. 7–8.

Com *Old Irish Table of Penitential Commutations.* 751–800 CE. Text edition and translation as per Binchy (1962), as presented in Lash (2014). Manuscript: Oxford, Bodleian Library, Rawlinson B 512, ff. 42c–44a;RIA 3 B 23.

Mass *The Treatise on the Mass.* Late 8th c. CE. Text edition and translation as per Stokes and Strachan (1987: 244–247), as presented in Lash (2014). Manuscript: Dublin, Royal Irish Academy, MS D ii 3 (1238) = Stowe Missal, ff. 65v–67r.

Ps *The Treatise on the Psalter.* Early 9th c. CE. Text edition and translation as per Meyer (1984), as presented in Lash (2014). Manuscript: Oxford, Bodleian Library, Rawlinson B 512, ff. 45a–47b.

WMS *The West Munster Synod.* Early 9th c. CE. Text edition as per Meyer (1912) and translation by E. Lash, as presented in Lash (2014). Manuscript: Laud Misc. 610, ff. 102–104.

MT *The Monastery of Tallaght.* 830–840 CE. Text edition and translation as per Gwynn and Purton (1912), as presented in Lash (2014). Manuscript: Dublin, RIA 3 B 23, ff. 33a–47a22.

Hom *The Old Irish Homily.* Mid-9th c. CE. Text edition as per Strachan (1907), as presented in Lash (2014). Manuscript: Dublin, RIA 23 P 2. Yellow Book of Lecan, co. 397sq.

Lais *The Vision of Laisrén.* Late 9th or early 10th c. CE. Text edition and translation as per Meyer (1899), as presented in Lash (2014). Manuscript: Oxford, Bodleian Library, Rawlinson B 512, f.44.

FR *Fingal Rónáin.* Early 10th c. CE. Text edition as per Greene (1975), as presented in Lash (2014). Manuscript: LL fols. 271–3. H 3.18 749–54

FG *The Story of Finn and Gráinne.* late 9th or early 10th c. CE. Text edition as per Meyer (1897), as presented in Lash (2014). Manuscript: Dublin, RIA, Great Book of Lecan, ff. 181 a 2.

LH *The Irish prefaces from the Liber Hymnorum.* End of 11th or beginning of the 12th c. CE. Text edition and translation as per Bernard and Atkinson (1898) and Stokes and Strachan (1987: 298–354), as presented in Lash (2014). Manuscript: TCD E 42.

TDH *The Three Drinking Horns of Cormac úa Cuinn.* Date unknown. Text edition and translation as per Gwynn (1905), as presented in Lash (2014). Manuscript: Dublin, Royal Irish Academy, 23 O 48 (*Liber Flavus Fergusiorum*).

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

CELTIC TEXTS: OLD AND MIDDLE WELSH

PKM *Pedeir Keinc y Mabinogi.* Text edition as per Williams (1930).

MP *De Mensuris et Ponderibus.* Text edition as per Falileyev (2000).

GAULISH INSCRIPTIONS

CI *Chamalières inscription.* Lead tablet. 6 × 4cm. First half of the 1st c. CE. Text edition as per Koch (1982).

L-13 Alise-Sainte-Reine inscription. 1st c. CE. Text edition as per Koch (1982) and those cited therein.

GERMANIC TEXTS: RUNIC INSCRIPTIONS

Pfor-I *Pforzen I.* Silver belt buckle. Bavaria; mid 6th c. CE. Text edition as per Looijenga (2003).

GERMANIC TEXTS: GOTHIC

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

CAm *Codex Ambrosianus.* Text edition as per Project Wulfila.

GERMANIC TEXTS: OLD NORSE

BN *Brennu-Njáls saga.* 1250-1275 AD. Text edition as per Krause and Slocum (2005).

ALBANIAN TEXTS

FP *Formula e pagëzimit.* Dated 6 November, 1462. Text edition as per Lloshi (1999: 291).

MGB *Meshari i Gjon Buzukut.* 1555. Text edition as per Joseph et al. (2011)

KLD *Kanun i Lekë Dukagjinit* 1933. Text edition as per Joseph et al. (2011)

BSk *Barleti's biography of Skanderbeg* 1960. Text edition as per Joseph et al. (2011)

ARMENIAN TEXTS

VT *Vetus Testamentum Armeniace.* Text edition and translation as per Zōhrapean (1805).

HArm *The History of Armenia* by Faustos Buzand. 4th or 5th c. AD Text edition and translation as per Krause and Slocum (2004).

MKHist *History* by Moses Khorenatsi. or 5th c. AD Text edition and translation as per Krause and Slocum (2004).

TOCHARIAN A TEXTS

ṢJ *Ṣaḍdanta-Jātaka.* Text edition as per Sieg and Siegling (1921).

PJ *Puṇyavanta-Jātaka.* Text edition as per Sieg and Siegling (1921) and Lane (1947).

TOCHARIAN B TEXTS

B107 *Die Speisung des Bodhisattva vor der Erleuchtung.* In the the new Berlin numbering system, this text is also known as THT 107. Text edition as per Sieg and Siegling (1921) and Pinault (2008).

OLD JAPANESE TEXTS

MYS *Man'yōshū.* (万葉集) ca. 759 AD. Text edition as per Frellesvig et al. (2014).

SM *Shoku nihongi Senmyō.* (続日本紀宣命) 797 AD. Text edition as per Vovin (2005) and Frellesvig et al. (2014).

BS *Bussokuseki-ka.* (仏足石歌) ca. 753 AD. Text edition as per Frellesvig et al. (2014)..

KK *Kojiki kayō* (古事記歌謡) ca. 712 AD. Text edition as per Frellesvig et al. (2014).

NSK *Nihon shoki kayō* (日本書紀歌謡) ca. 720 AD. Text edition as per Frellesvig et al. (2014).

CLASSICAL (MIDDLE) JAPANESE TEXTS

SN *Sarashina Nikki* (更級日記) ca. 1059. Text edition as per Shirane (2013).

GNM *Genji Monogatari* (源氏物語) ca. first half of the 11th c. AD. Text edition as per Shibuya (1999).

TM *Taketori Monogatari* (竹取物語) ca. 10th c. Text edition as per Shirane (2013). [instead, put NKBT]

H *Hōjōki* (方丈記) ca. 1212. Text edition as per Shirane (2013).

T *Tsurezuregusa* (徒然草) ca. 1331. Text edition as per Shirane (2013).

TN *Tosa Nikki* (土佐日記) ca. 935. Text edition as per Shirane (2013).

IM *Ise monogatari* (伊勢物語) 10th c. Text edition as per Vovin (2003).

HM *Hamamatsu chūnagon monogatari* (浜松中納言物語) 11th c. Text edition as per Vovin (2003).

TSM *Tsutsumi chūnagon monogatari* (堤中納言物語) 11th c. Text edition as per Vovin (2003).

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1

Preliminaries

1.1 Superparticles: the atoms of logic & the 'philo-logical' idea

This thesis investigates the the ways in which natural language incarnates logical constants such as conjunctive and disjunctive connectives or interrogative, additive and quantificational expressions using a single set of two morphemes. Previous research by Szabolcsi (2010, 2014b), Kratzer and Shimoyama (2002) and Slade (2011), among many others, has established that languages like Japanese may use only two morphemes, *mo* and *ka*, to construct universal/existential as well as conjunctive/disjunctive expressions respectively. Throughout this thesis, 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, as we will call them, 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. conjunction and/or disjunction obtains 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*, the combination yields 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]

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 will show in Chapter 5 that the universal distributive semantics of *wh*-μ is diachronically primary in the history of Japonic and develop a diachronic analysis of the the rise of polarity sensitivity.

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

AGAINST HOMOPHONY The pattern underlying examples in (1) and (2) calls for two contrasting hypotheses. The first hypothesis is that the semantic contribution of the two kinds of superparticles is uniform in all four of their respective constructions. If this is true, then there is something deeply interesting lying in the morpho-syntax and semantics of the two superparticles. The other hypothesis, on the other hand, is that the multifunctional meanings behind the different incarnations of the superparticles in (1) and (2) could simply result from homophony, as Hagstrom (1998) suggests, and Cable (2010) even more explicitly defended on the basis of his analysis of Tlingit. The fact that the Japanese superparticle *mo*—under this view just a particle—features in conjunction, universal quantification and focal-additives, is a superficial and accidental matter, the different roles that *mo* performs in (1) stem from the fact that different *mo*'s are at play.

In this thesis, we will strongly oppose this view, i.e., the second hypothesis, and defend the first 'superparticle' idea. One argument in favour of this view is typological: why would languages consistently manifest homophony of coordinate and quantificational markers? (We will introduce the typological argument below.) Another argument concerns the inconsistency of a pro-homophony analysis in a language like Japanese, as presented in Mitrović and Sauerland (2014).

Under a homophony story, there are, at least, two kinds of *mo* particles: a conjoining one and a quantificational one. The same reasoning extends to *ka*, which is, under these assumptions, ambiguous between two homophonous particles: a disjunctive one and an existential one. This predicts that *mo* and *ka* should not be able to express simultaneously coordination and quantification, which is not the case, as the following two pairs of Japanese examples from Mitrović and Sauerland (2014: 41, ex. 3–4).

(3) a. どの 学生 も どの 先生 も 話した
dono gakusei **mo** dono sensei **mo** hanashita
INDET student μ INDET teacher μ talked
'Every student and every teacher talked.'

b. * どの 学生 も も どの 先生 も も 話した
dono gakusei **mo mo** dono sensei **mo mo** hanashita
INDET student μ μ INDET teacher MO MO talked
'**Every** student **and every** teacher talked.'

(4) a. どの 学生 か どの 先生 か が 話した
dono gakusei **ka** dono sensei **ka** ga hanashita
INDET student κ INDET teacher κ NOM talked

‘**Some** student **or some** teacher talked.’

b. * どの 学生 か か どの 先生 か か 話した
dono gakusei **ka ka** dono sensei **ka ka** hanashita
INDET student κ κ INDET teacher κ κ talked

The data in (3) and (4) is clear evidence that there do not exist homophonous pairs of coordinate and quantificational *μ* and κ particles in Japanese. The homophony analysis that Hagstrom (1998) and Cable (2010) most notably defend, predicts that coordination of quantificational expressions (3, 4) should, *ceteris paribus*, yield particle ‘reduplication’: one particle expressing quantification and another expressing coordination. For further arguments against homophony of these two (classes of) particles, see Szabolcsi (2014b) and, especially, Slade (2011) for a detailed historical argument based on his diachronic analyses of Japanese, Sinhala and Malayalam particles.[3] In sum, we contend ourselves with Slade’s (2011) general and methodological argument against homophony: “*Entia non sunt multiplicanda praeter necessitatem*: let us not suppose the existence of homophonous particles unless we uncover compelling evidence for such multiplicity.” (Slade, 2011: 8)

BEYOND JAPANESE Japanese is not alone in exhibiting this syntactic/semantic syncretism, which we will label allosemy below (following Marantz 2011). The formulaic nature of the two types of particles is cross-linguistically well attested, as the minimal collection of languages in Tab. 1.1 shows. This morphosemantic phenomenon is in fact far more common cross-linguistically that it may seem from the European linguistic perspective: Gil (2011) reports that majority of languages (66%/N = 76) that were studied for the *World atlas of language structures* shows formal similarity between quantificational, focal and coordinate constructions. Since the Japanese *mo* and *ka* particles instantiate the three semantic classes (universal/existential quantification, conjunction/ disjunction, and focal-additivity or interrogativity) most clearly, I will henceforth refer to *mo*- and *ka*-type particles cross-linguistically as *μ* and κ respectively.

This topic has largely, if not exclusively, captivated semanticists, who had unifying ideas of making sense of the scattered meaning of *μ* and κ particles. Szabolcsi (2010: 203) was, to the best of my knowledge, the first to

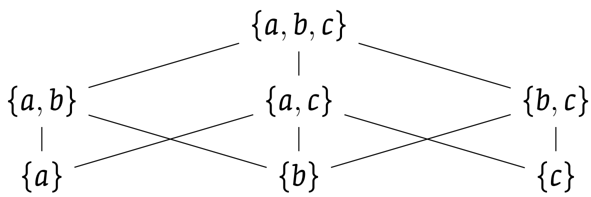
3 Chapter 2 of this thesis presents, in the spirit of Slade’s (2011) work, a historical argument against homophony based on evidence from old Indo-European language.

	UNIVERSAL (μ)			EXISTENTIAL (κ)		
	wh+μ =$\forall x$	XP+μ =XP_{FOC}	XP+μ YP+μ =XP $\wedge$ YP	*wh*+κ =$\exists x$	XP+κ =XP_{INT}	XP+κ YP+κ =XP $\vee$ YP
Japanese	+	+	+	+	+	+
Korean	+		+	+		+
Malayalam	+		+	+	+	+
Hungarian	+	+	+	+		+
Slavonic	+	+	+		+	+

TABLE 1.1.: *Two kinds of semantically scattered particles μ and κ*

propose the core meanings of μ and κ particles, unifying the three pairs of constructions in (1) and (2) under a lattice-theoretic umbrella. We assume that the structure of the domain of discourse is set-theoretic. Drawing from our Japanese data from coordination in (1a) and (2a), featuring Bill and Mary—to which we add, say Jack—we lay out our mini-domain of individuals $\mathfrak{D}_e$ containing a, b, c—respective variables over a set containing Bill, Mary and Jack. The powerset of $\mathfrak{D}_e$, excluding the empty set, thus takes the shape of a complete semi-lattice, which we can represent as in (5).

(5) Structuring the domain:



Now that we have an ordered domain, i.e. a semi-lattice of its structure, we can attribute the μ and κ particles a unifying semantics by invoking the two fundamental properties that lattices have. The two properties can be seen as operations over lattices: Szabolcsi (2010: 203, ex. 36) gives the two particles in question a semantics rooted in the two lattice-theoretic operations:

(6) a. ⟦*ka*⟧ = infimum/least upper bound (join, union, disjunction)

b. ⟦*mo*⟧ = supremum/greatest lower bound (meet, intersection, conjunction)

Along these lines, a *supremum* (**sup**) or Meet ($\sqcap$) operation over our mini-domain of individuals will deliver a conjunction of its atomic (and paired-up) members, as per (7). Inversely, an *infimum* (**inf**) or Join ($\sqcap$) over $\mathfrak{D}_e$ will deliver a disjunction of its elements, as per (8).

(7) $\mathbf{sup}(\mathfrak{D}_e) = \bigsqcap \mathfrak{D}_e \vDash a \wedge b \wedge c \vDash \forall x \in \mathfrak{D}_e[\phi]$

(8) $\mathbf{inf}(\mathfrak{D}_e) = \bigsqcup \mathfrak{D}_e \vDash a \vee b \vee c \vDash \exists x \in \mathfrak{D}_e[\phi]$

Assuming that the elegant semantics in (6) accounts for the distribution of meaning of μ and κ particles, the analysis still sheds no light onto the syntactic status of these particles. In an ideal Euclidian world, the two particles which are equal in meaning type, should be equal in syntactic type (category, structure and/or position).

ALLOSEMY The exemplars in (1) and (2) suggest that what we are dealing with is *allosemy*: 'special meanings' determined by context—a term invented by Marantz (2011). A less formal sketch of allosemic distribution of the superparticle pattern in (1) and (2) is in (9) and (10), respectively. For reasons that will become clear in subsequent chapters, we leave out the fourth (c) series of (1) and (2).

(9) Allosemy of the μ-series

a. [XP μ YP μ] ⇒ ⟦(**both**) XP **and** YP⟧ / [two arguments; XP, YP = any category]

b. [XP μ] ⇒ ⟦**also** XP⟧^{F} / [one argument; XP = any category]

c. [XP μ] ⇒ ⟦**every/any** XP⟧ / [one argument; XP = indefinite, *wh*[+]]

(10) Allosemy of the κ-series

a. [XP κ YP κ] ⇒ ⟦(**either**) XP **or** YP⟧ / [two arguments; XP, YP: any category]

b. [XP κ] ⇒ ⟦XP?⟧ / [one argument; XP = any category]

c. $[\ \text{XP}\ \kappa\ ] \Rightarrow [\![\textbf{some}\ \text{XP}]\!] \Big/ \begin{bmatrix} \text{one argument} \\ \text{XP} = \text{indefinite}, \textit{wh}[+] \end{bmatrix}$

In this thesis, we will show that Marantz's (2011) 'contextual allosemy' is in fact 'syntactic allosemy', i.e. superparticle meanings determined by syntactic structure. With regards to allosemy, taken to be on a par with allomorphy and allophony, Marantz (2011: 6) makes the following claim:

(11) a. It is the structure of the grammar itself that determines the domain of contextual allomorphy: derivation by phase. So the domain of contextual allosemy should also be the phase.

b. The additional constraint on contextual allomorphy of phonological adjacency follows if contextual allomorphy is sensitive to a phonological notion of "combines with"—adjacent items combine with each other (directly) phonologically. If we apply this idea to the semantic domain, we predict that contextual allosemy should be restricted to semantic adjacency, i.e., to elements that combine (directly) semantically.

The first desideratum of this thesis is therefore to unify not only the semantic but also the syntactic distribution of the contextual incarnations of the two kinds of superparticles. From a detailed syntactic structure, the semantics follows compositionally, in line with Marantz (2011). Coordination will be shown to involve more syntactic material than overt realisations suggest. Under my analysis, the silent structure provides enough room for non-coordinate meanings that the pairs in (410) and (411) show. Constructions such as quantification, questions and additive focus form substructures of coordination, as generalised in Fig. 1.1. Empirically, we will draw evidence, predominantly, from a morphologically rich collection of ancient and modern Indo-European (IE) languages, which—through their morphology—reveal otherwise silent syntactic material that we fail to spot in a language like Japanese. The silent syntax will show itself though a cross-linguistic examination, pivoting on syntactically—and semantically—*neutral* concept of *junction*, which we will take to be structurally and interpretationally the foundation of conjunction and disjunction. By breaking down coordination into separate layers, we will capture the syntactic and semantic differences, lying in the amount of layered projections, as well as the core components of the kinds of meanings the two pairs of μ and κ particles dictate.

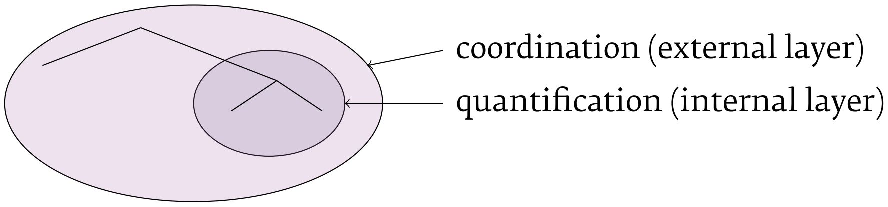


FIGURE 1.1.: *Quantification as a structural partition of coordination.*

Another aim of the dissertation is to account for the empirical hole with respect to constructions of the type in (1c/d). While the formula '*wh*+*μ*' (first column of Tab. 1.1) in Japanese translates into an unrestricted universal construction (corresponding to 'every-' in English), its IE brethren allow '*wh*+*μ*' constructions only in restricted, i.e. downward entailing (DE), contexts (corresponding to NPI 'any-'). To the best of my knowledge, this has not been addressed adequately. The null hypothesis appears to be a simple one: '*wh*+*μ*' in IE is restricted to DE context and in Japanese it is not, most probably for *independent* reasons. I will entertain a diachronic analysis of this apparently typological discrepancy.

Aside from the synchronic aspect of the rich phenomenology of logical expressions, we will also examine the diachronic status of such constructions and interpretations.

For the sake of the current argument, let us assume that functional heads correspond to, and are realised as, single morphemes. Morphemic structure could thus elucidate functional structure. A more general question that we will be pursuing in this regard is whether logical primitives are signalled by morphosyntax. If this were the case, then what about morphological overlaps where a morpheme appears in logically independent words? Do they signal logical overlaps? We will ask such questions, which will lead us to conclude that words like 'and' and 'or' in natural language do not correspond to '$\wedge$' and '$\vee$' in the formal language.

Take the adversative conjunction in Arabic, for instance, *walakin* (ولكن) 'but', which definitely features the (optional) conjunction *wa* (و) 'and' but potentially also the negative marker *la* 'no(t)' (لا). For a less conjectural sketch of the idea, take a Slavonic language like SerBo-Croatian[4], where the con-

4 Throughout the dissertation, I employ the term 'SerBo-Croatian' to refer, in abbreviated form, to Serbian-Bosnian-Croatian.

junction marker *i* is morphologically part of the disjunction marker.[5] Note also that the disjunction morpheme *li* features in the adversative coordinator *ali*.

(12) Some morphemic overlaps in SerBo-Croatian coordination words:

'AND'		i	
'OR'		i	li
'BUT'	a		li

SerBo-Croatian is in no way alone in exhibiting such discrepancies of morphological encoding of logical terms. Methodologically, this dissertation also aims to explore for such 'illlogicalities' across various word-histories in the hope of finding some common logical (syntactic and semantic) ground. A related question concerns the directions which the morpho-logical changes take. We will also explore this question.[6]

Diachronic facts potentially point to something more than a mere historical curiosity and linguistic archaeology. If speakers have access to roots, then while a historically residual and functional morpheme in a contemporary language may not have an active semantic contribution, it must still undergo morphosyntax and, eventually, interpretational composition. Take English alternations in *whether/either/neither* or *never/ever/wh...ever* which, under the decompositional perspective we will be assuming, are not separate and independent lexical entities but non-simplex words built from (some) logical atoms. In the next section, we motivate this decompositional stance further by bringing together some empirical intricacies in words involving complex structure.

1.2 Decomposition

This thesis takes a strongly decompositional approach to logical function words containing superparticles. In the recent development of generative linguistic theory, 'words' have been shown to be rather non-atomic and that their morphological structure is syntactically driven (Chomsky 1957, Baker 1985b, Halle and Marantz 1994, Kayne 2010, 2005, *inter alia*). Rather

5 The first formal treatment of this phenomenon was made by Arsenijević (2011). The first historical and descriptive decomposition of *i-li* can be traced back to Vasmer (1953: 478).

6 For an array of diachronic typologies of change, see Heine and Kuteva (2004) who provide a rich corpus of grammaticalisation typologies.

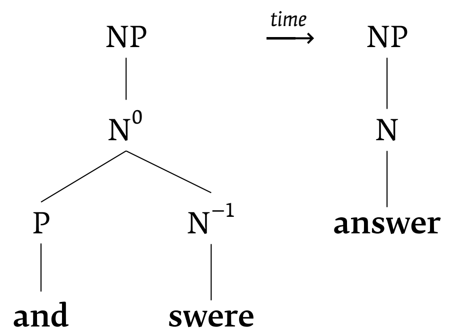
than acting as fillers for syntactic slots, quantifiers, among other words, have quite a bit of syntax behind (or, structurally inside) them.

In this section, we briefly take stock of the mechanism and view of morpho-syntax-semantics from Szabolcsi (2010), the work that inspired the spirit of this thesis. The programmatic thrust of her work is the following:

(13) Compositional analysis cannot stop at the word level. (Szabolcsi, 2010: 189)

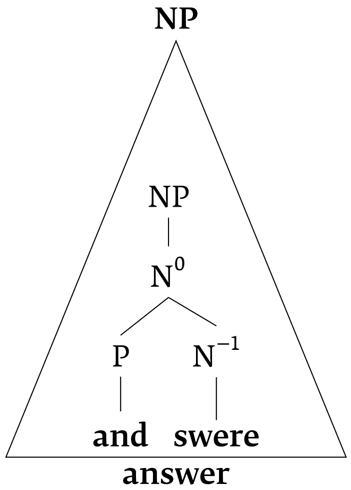
Function words sometimes show a fossilised internal structure, which etymologies make clear. Take the English conjunction *and* which, according to McMichael (2006), has its semantic roots in a preposition meaning 'back' or 'against' (cf. Latin *ante*). The word *answer*, now a noun or a verb, is historically decomposed into and etymologised as *and-swere*, 'to swear or declare back', as McMichael (2006: 48) further notes.

(14)



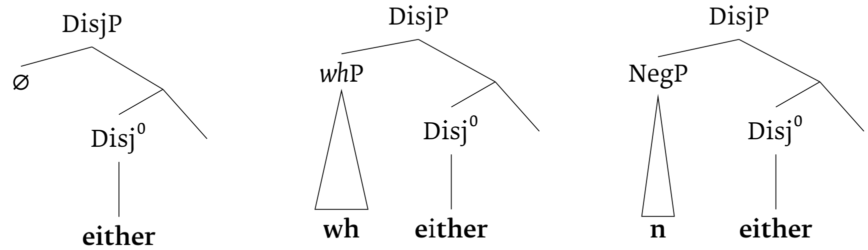
The synchronic/diachronic discrepancy of this type, as (14) exemplifies, where the internal structure and the categorial label of a lexico-syntactic object will be represented as in (15), which also shows the diachronic 'insides'.

(15) A shorthand notation for syntactic-diachronic discrepancy of (14):



While such nouns have rather inactive, or no longer existent, internal syntactic structure, there are still function words in English which can be seen as having rather active syntactic and semantic insides. Higginbotham (1991) provided one of the first analyses of *either/or*, showing that *whether* is the *wh*-counterpart of *either*. The *neither/nor* form falls well within this series. Structures in (16) show a generalised analysis of *whether/neither*.

(16) a. *either*: b. *whether*: c. *neither*:



I take the alternation of disjunctive forms in (16) to be synchronically active in the syntax and semantics.

Another 'active' example we take as a model is the one of German quantifier words by Leu (2009). Rather than functioning as an atomic word, German quantifier *jeder, jede, jedes* 'every.M/F/N' shows a sub-lexical composition: an independently known distributive particle *je-* (cf. *je-weils* 'each time'), the definite article morpheme *d-* (*der, die, das*), and a strong adjectival inflection.

(17) a.

[**je** +	**d** +	**er**] /	[gut +	**er**] /	[**D** +	**er**]
∀	D	AgrA		AgrA	D	AgrA

b.

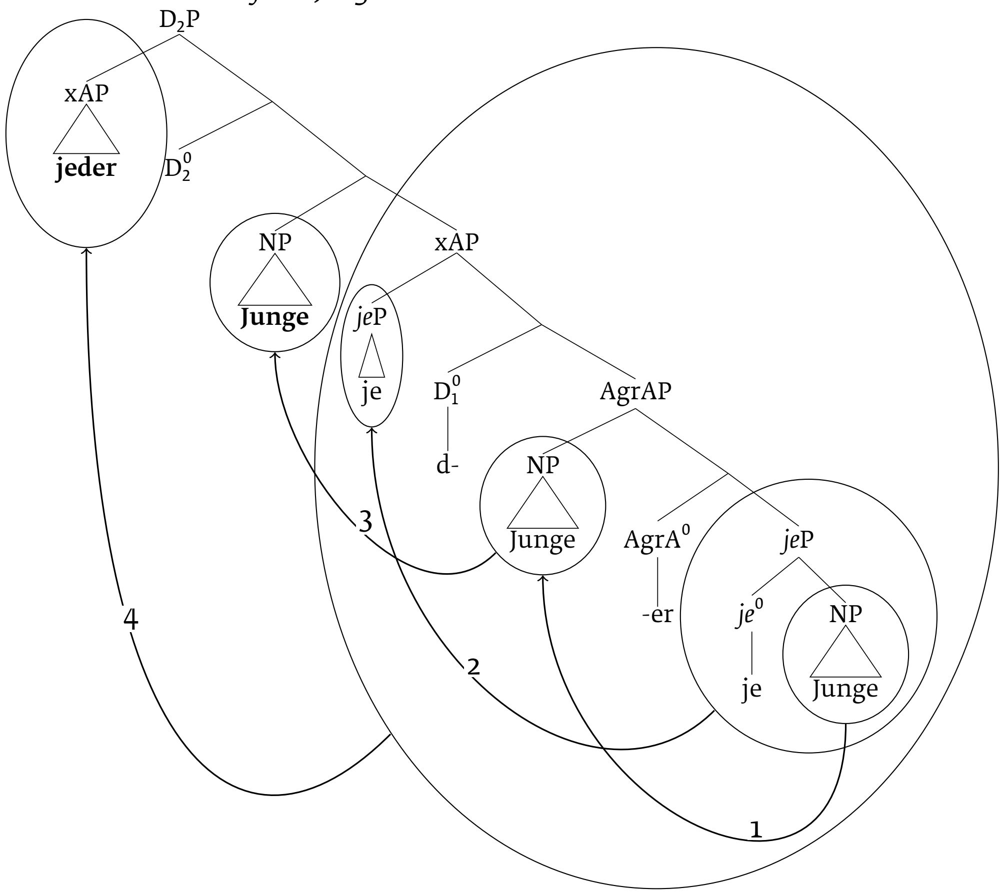
[**je** +	**d** +	**e**] /	[gut +	**e**] /	[**D** +	**ie**]
∀	D	AgrA		AgrA	D	AgrA

c.

[**je** +	**d** +	**es**] /	[gut +	**es**] /	[**D** +	**as**]
∀	D	AgrA		AgrA	D	AgrA

Leu (2009) convincingly shows that German *jeder* contains three overt morphemes, with additional compelling evidence from Swiss German, and derives a simple quantificational phrase like *jeder Junge* 'every boy' not by treating the quantifer word *jede(r)* as a *prima facie* Q(uantifer)^0 *jede(r)* combining with its nominal argument; instead, Leu takes the three morphemes in *jeder* as a 'fused' reflection of several minimal categories as shown in (18). The xAP projection, following Leu, is an adjectival phrase analogous to a relative (small) clause.

(18) The derivation of *jeder Junge*:



Leu's derivation thus proceeds along the following lines. The nominal argument, *Junge*, is first merged as complement to *je*^{0} and is subsequently moved to [Spec, AgrAP] in order to trigger gender and number agreement (indicated by the *-er* exponency). The remnant *je*P then moves to [Spec, xAP], where xAP is taken to be an extended adjectival projection, a structure that is analogous to a reduced relative clause containing an adjectival article (D^0_1) (analysed as a relative complementiser).[7] In the penultimate step, the NP moves further from [Spec, AgrAP] to a position above xAP—this movement step, as Leu (2009: 185) puts it, is analogous to the extraction of the 'head of a relative' from the relative clause. In the last step, the entire xAP fronts to [Spec, D_2P], where the head sequence [$_{xAP}$

7 See Leu (2009) for technical details.

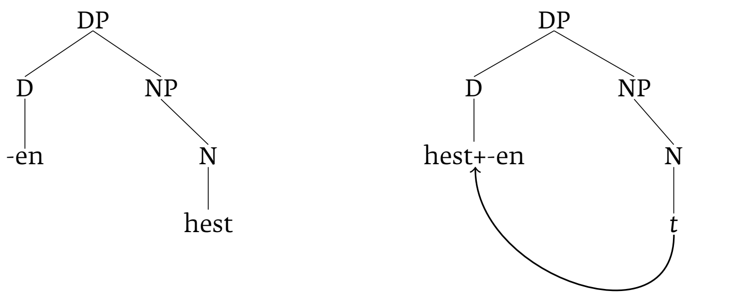
…*je*…*d*…er…] fuses as *jeder* when externalised.

Similarly, Katzir (2011) explores the morphological encoding of syntactic positions in Danish definite NPs as shown in (19), taken from Katzir (2011: 48, ex. 5).

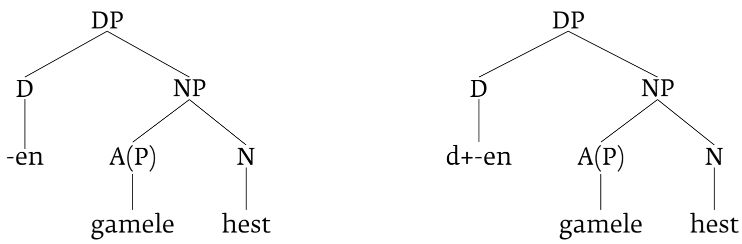
(19) a. **en** stor gammel hest
1 big old horse
'a big old horse'

b. d**en** stor-e gaml-e hest
DEF big old horse
'the big old horse'

(20) a. No adjective, no intervention: N to D raising:

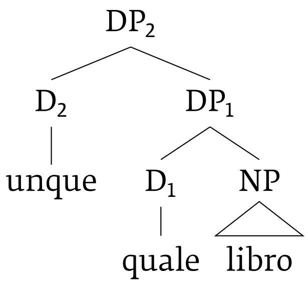


b. Presence of adjective, intervention precipitates: no N to D raising:



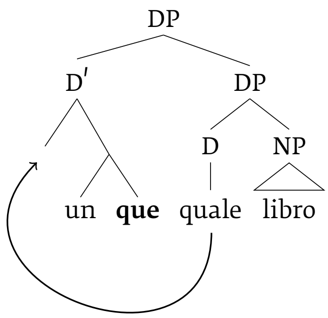
Another exemplar case-study of morphosyntactic structure we will draw from, and introduce here, is the Italian indefinite determiner (phrase) *qualunque*, which Chierchia (2013b: 270–272) takes to be formed out of the *wh*-word *quale* 'which' and the free-choice (FC) morpheme *unque*. Chierchia (2013b: 271; ex. 44b) assumes the following internal structure:

(21)

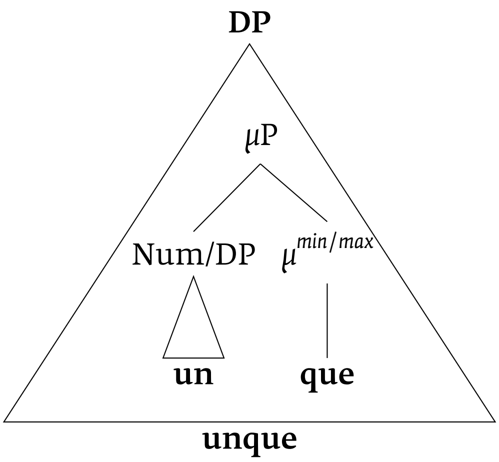


Note that the tree in (21) is a minimally modified structure from Chierchia (2013b: 271), where D_2, labelled D' in Chierchia (2013b: 271, ex. 44b), is a left-peripheral head. Under his view, the D_1 head, *quale*, incorporates into D_2 *unque*, which "originates in the left periphery of the DP and forces DP-internal head-movement of the *wh*-word." This movement obtains the formation of a morphologically complete existential quantifier, a DP, *qualunque*. In this thesis, specifically in chapter 3, we will be concerned with the historical reflexes of PIE $\ast k^w e$, which, via Latin *que*, is visible as the the second root in *unque*, which we further decompose into two left-peripheral heads, maintaining Chierchia's (2013b) analysis. We treat the *unque* morpheme as in fact comprising of two morphemes, or roots, or heads.

(22) Revised morphosyntactic structure of *qualunque*:

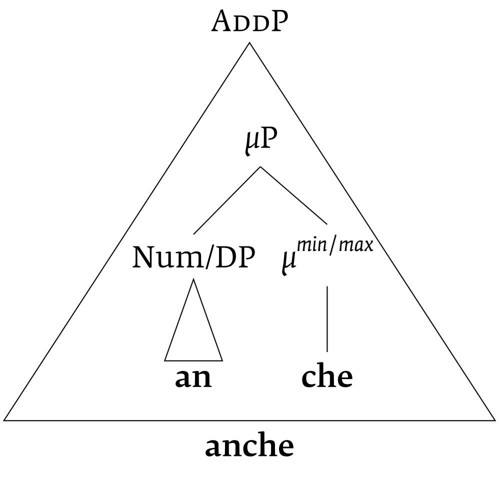


(23) A shorthand notation for syntactic-diachronic discrepancy of (22):



Note also the internal structure of the Italian additive marker *anche*, which we take as being composed out of a fossilised numeral component (*an>un(o)*) and a reflex of PIE $*k^{w}e$, *che* (<Lat. *que*) of a *μ* kind, as we will explore in the main body of the thesis.

(24) A shorthand notation for syntactic-diachronic discrepancy of the Italian Additive marker *anche*:



This diachronic sub-structure in fact derives the synchronic meaning of *anche* in Italian, which under negation (ne_{NEG}-*anche*) means 'not even one': the negative morpheme (*ne*) contributes the negation, the head of a former *μ*P, *che* (<que_{μ}) contributes the scalar additive meaning along the lines of 'also' or (even) 'even' (as we will show for Latin in the next chapter) and the numeral component *un* provides the minimal member of the scale that μ ranges over, yielding the correct interpretation.

This minimal exemplar of function-word-syntax serves as a model of the kind of syntactic and semantic analyses we will be making in this thesis. The next section provides a charted plan on the organisation of the present work.

1.3 The plan

We have already preliminarily set-up the strongly decompositional programmatic thrust of the present work. The thesis strives to be decompositional on two levels, morpho-syntactic and semantic, and is accordingly split into two logical parts. The first part, comprising of three chapters, deals with morpho-syntactic decomposition of coordinate structures, while the second part adds an interpretational component to the structure we will be proposing. The break-down by chapters is as follows.

CHAPTER 2: JUNCTION We theoretically look at the syntax of coordinate construction by first arguing for a binary branching analysis and then upgrading it in light of empirical considerations. The core aim of the chapter is to motivate a syntactically and semantically neutral notion of 'junction', which underlies conjunction and disjunction. With novel data from Tibetan, we try parametrising two types of coordination constructions. We will also make some novel derivational assumptions with respect to incorporation, which we ultimately subsume within our Junction analysis.

CHAPTER 3: THE INDO-EUROPEAN DOUBLE SYSTEM This chapter provides a synchronic and diachronic analysis of coordinate structures in IE. Pivoting on the core insights from the previous chapter, we show that IE once possessed a much more Japanese-looking syntax and semantics for coordination.

CHAPTER 4: THE COMPOSITION OF JP AND ITS INTERIOR The refined syntax for coordination from Chapter 3 is mapped onto semantic composition in this chapter. The three core components (three functional heads) are given a static logical form and the derivation of its various incarnations is provided.

CHAPTER 5: SEMANTIC CHANGE The fifth chapter provides a diachronic take on the compositional semantics of coordination and, specifically, quantification. We initially meditate on the question of the 'quantificational split' in early IE and we compare the (diachrony of the) IE μ-marking quantification with the early Japonic system. We plot a semantic change in the quantificational μ-system using Chierchia's (2013b) system, so as to derive the diachronic rise of the polarity marking in Japonic and IE.

CHAPTER 6: CONCLUSION The last chapter provides the core conclusions of the thesis.

2

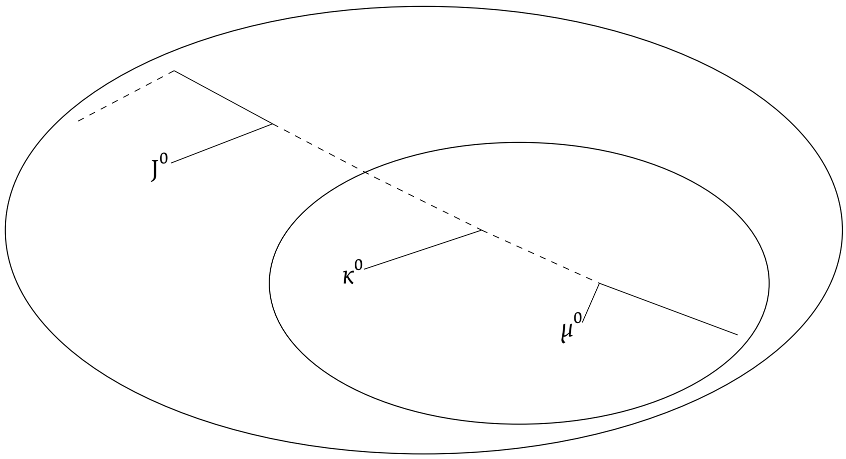
Junction

2.1 Introduction

This chapter aims to, first, argue in favour of a binary branching syntactic structure for coordination in §2.2, rejecting flat analyses, and second, upgrade (so to speak) that very binary structure in §2.3 by invoking additional structure as per the theoretical motivations of den Dikken (2006). §2.3.1 puts some empirical flesh onto den Dikken's (2006) structure. The following section (§2.3.2) fine-tunes the syntactic structure further in light of some novel data concerning composed disjunction. §2.6 summarises the chapter.

IDEA IN A NUTSHELL The analysis we motivate in this chapter—and to which the remainder of the thesis is devoted—is a double-headed and double-layered structure for coordination. We identify a coordinate layer, headed by a J(unction) head (to be developed below), and an inner layer, which encodes non-coordinate meanings ranging over quantification and focus, among others. This is schematised in (25).

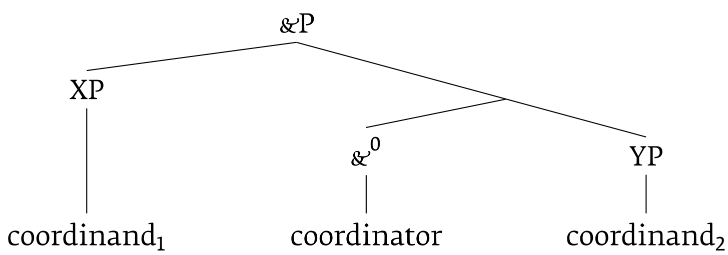
(25) Junctional and sub-Junctional layers:



2.2 Motivating binarity

In perhaps the most recent and simultaneously the most extensive treatment of coordinate syntax, Zhang (2010) has shown that the syntax of coordination involves no special configuration, category, constraint or operation. Based on her work, we will proceed to an assumption that the syntactic structure of coordinate construction is binary as most notably argued for by Kayne (1994: ch. 6), Zhang (2010) and, with minimal variations, Munn (1993). Earliest arguments for a binary-branching model of coordinate syntax go back to Blümel (1914) with subsequent substantiation from Bloomfield (1933), Bach (1964), Chomsky (1965), Dik (1968), Dougherty (1969), Gazdar et al. (1985), Goodall (1987) and Muadz (1991), and many others in the last two decades. Following Kayne (1994), we take coordinators to be heads, merging an internal argument (coordinand) as its complement, and adjoining an external argument (coordinand) in its specifier, as per (26).

(26)



This syntactic model—let's call it the traditional binary model (TBM)—captures, among other things, the (universal) generalisation that there can be no coordinations of heads (27) since the coordinator head $\&^0$ requires complements of maximal category (see Kayne 1994: §6.2 for elaboration). As a brief illustration of this fact, see the Slovenian example in (27), which confirms Kayne's (1994) ban on clitic coordination.

(27)	* Janez	me	in	te	gleda
	J	me.ACC.CL	and	you.ACC.CL	watch.3SG.PRES

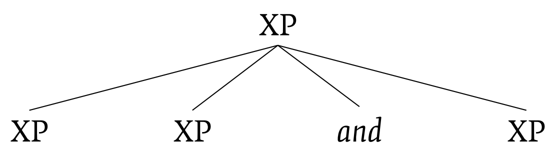
'John is looking at me and you.'

Munn (1993) and Zhang (2010) both presented arguments for the TBM at length. Munn's analysis has a formal twist that, in regards to the general departure from the TBM, has to do with the derivation of the external coordinand, which is base-generated or raised[1] to [SPEC, &P], as I am assuming here (following Kayne 1994 and Zhang 2010).

MUNN (1993) In his influential thesis, Munn (1993) was among the very first to explicitly treat and discuss the phrase structure of coordination. In his Chapter 2, which we now briefly overview and from which we import the main conclusions, he removes the stipulations about phrase structure of coordinated phrases that refer specifically to coordinate structures.

Apart from Gazdar et al. (1985), most studies in syntax of coordination have generally and implicitly assumed a flat syntactic structure, along the lines of (28), taken from Munn (1993: 11, ex. 2.1).The coordinator was taken to syncategorematically adjoin to XP(s).

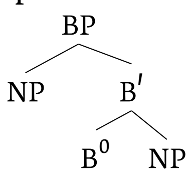
(28)



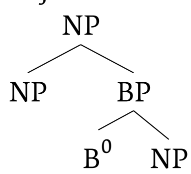
1 Chomsky (2013), for instance, presents arguments from the view of labeling where a coordinate structure of the type [Z *and* W] results from raising of one of the coordinands. Chomsky assumes that the possible base-formed constituency of a coordinate construction, headed by a label-lacking terminal ($\&^0$ in our discussion), is $[_\alpha\ \&^0\ [_\beta\ ZW]]$, capturing the semantic symmetry of coordination. In order to label β (with competing Z and W labels in base-form) and α (unlabellable since $\&^0$ has no label), one of Z, W must raise, say Z, yielding $[_\gamma\ Z\ [_\alpha\ \&^0\ [_\beta\ \langle Z\rangle\ W]]$. (Chomsky, 2013: 46)

The structure in (28) is problematic for several reasons. Firstly, the structure is hardly a phrase since it is not headed and, as such, it violates X-bar theoretic endocentricity. If all lexical items project phrasally, and if a functional work like *and* is a lexical item, which requires not much proving, then not all lexical items project a phrase. This either jeopardises the projection principle or else confines coordinate structures to a position of exceptions and stipulations. Alternatively, if the structure is not flat, then the X-bar theoretic template would extend to coordination, which would re-establish theoretical consistency and conceptual advantage. Munn (1993) arguest against 'flatness' of coordination, proposing a hierarchical and X-bar conformant structure. Taken from Munn (1993: 13, ex. 2.3) and given in (29), are two syntactic structures summarised in Munn (1993): (29a) represents a Spec-Head structure which Munn first defended, which is in line with the phrase structural assumption we made in (26), based on Zhang's (2010) work. The structure in (29b) presents the structure Munn (1993) eventually argues for.

(29) a. Spec-Head BP:



b. Adjoined BP:



The choice between the two structures is, from a modern syntactic theoretical perspective in light of the label-projecting theories of Cecchetto and Donati (2010), Chomsky (2013), and Adger (2013), among many others, vacuous. It is for this reason that we do not revise (26), which will shortly be upgraded in 2.3, retaining the Spec-Head or Adjunction structure.

A strong argument that Munn (1993: 16–37) puts forth in favour of hierarchical arrangement of coordinate structure, among other pieces of evidence, comes from binding asymmetries between the first (external) and the second (internal) coordinand. As shown in (30), taken from Munn (1993: 16, ex. 2.7), the first (external) conjunct can bind into the second (internal) conjunct (30a), but not the other way round (30a).

(30) a. Every man$_i$ and his$_i$ dog went to mow a meadow.
b. * His$_i$ dog and every man$_i$ went to mow a meadow.

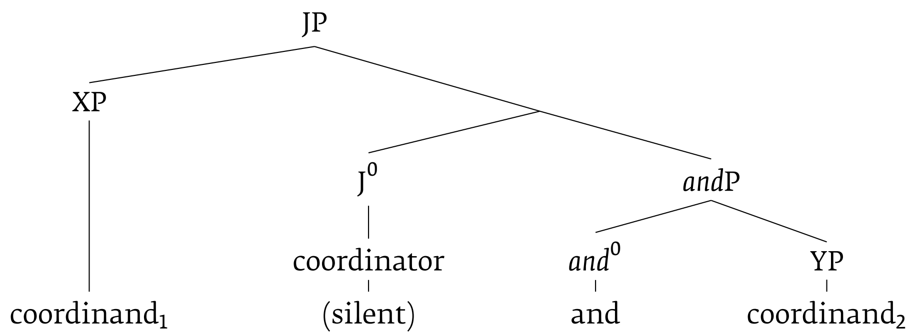
While under an analysis assuming a flat structure (29), the prediction of these asymmetries does not obtain, both the Spec-Head and the Adjunction structures (29) can account for (30) by virtue of asymmetric c-command relation holding between the conjuncts.

The following section is devoted to exploring the idea that a TBM structure in (26) is not quite detailed enough. Consider the idea that coordinator words like *and* in English do not in fact sit in $\&^0$. In the following three subsection, I motivate a revision of (26) along these lines: instead of one coordinator position, three are proposed to accommodate some empirical facts.

2.3 Upgrading structure: den Dikken (2006)

Assuming a binary branching structure for coordination (26), den Dikken (2006) argues that exponents such as *and* and *or* do not in fact occupy the coordinator-head position as indicated in (26) but are rather phrasal subsets of the coordinator projection, with their origins in the internal coordinand. The actual coordinator head, independent of conjunction and/or disjunction which originate within the internal coordinand, is a junction head, J^0, a common structural denominator for conjunction and disjunction.

(31)



The core motivation for den Dikken's postulation of the silent presence of J^0 is to capture the distribution of the floating *either* in English. As Myler (2012) succinctly summarises:

(32) den Dikken's *either* is a phrasal category and can be adjoined to any XP as long as:

a. XP is on the projection line of the element focused in the first disjunct; *and*

b. XP is not of C category; *and*
c. no CP node intervenes between *either* and the focused element in the first disjunct; *and*
d. *either* surfaces to the left of the aforementioned focused element at PF.

This characterisation of *either* predicts its floatation (optional height of adjunction), which is, in den Dikken's words, either too high (33) (his 1) or too low (34) (his 2).

(33) a. John ate *either* rice or beans.
b. John *either* ate rice or beans.
c. *Either* John ate rice or beans.

(34) a. *Either* John ate rice or he ate beans.
b. John *either* ate rice or he ate beans.

The floating *either* may thus move within or, apparently, beyond the first coordinand projection (XP). Note that the subphrasal components to J^0, namely *both-*, *(wh/n)either-*, *and-* and *or*-headed phrases that J^0 glues together are predicted to be structurally independent by virtue of their phrasal status. The fact that the constituent $[_{andP}$ and XP $]$ is disallowed in English (cf. Munn 1993) follows from different lexical specifications. As we will see in the following chapter, this factor need not be at play, making *and*-XP-like sequences possible.[2]

Employing (in his words, the abstract head) J^0, den Dikken's account covers and explains not only the *either...or* coordinate constructions but also the *whether...or* and *both...and*, which are unified under the structural umbrella of JP structure. den Dikken (2006: 58) takes the head introducing the internal (second) coordinand not as the lexicalisation of J^0 but as a phrasal category establishing a feature-checking relationship with abstract J^0 instead.[3] There is no principled reason in his account according to which J^0 would resist or be banned from lexicalisation. For den Dikken, J^0 is an abstract 'junction' category inherently neutral between conjunction and disjunction for which no overt evidence is provided since his account rests

2 We in fact already encountered such sequences in the very fist example (410a). We develop a story behind such construction in detail in chapter three.

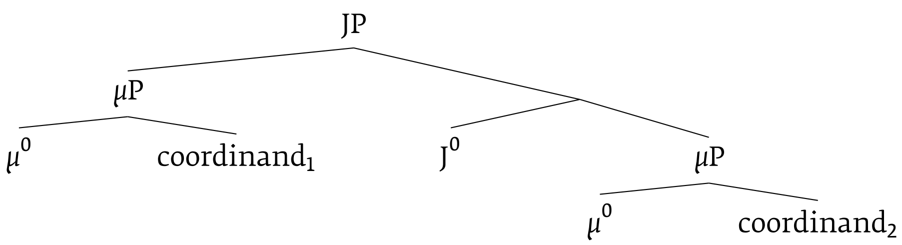
3 In the following chapter, a diachronic analysis of IE coordination is developed, which hinges on the feature-checking power of J^0.

on J^0 not being lexicalised. I take it as a reasonable hypothesis that there may be languages, which overtly realise this junctional component of coordination. The following section provides three sets of empirical evidence for overt realisation of J^0.

2.3.1 The higher field: triadic conjunction

A proof for a fine-grained (double-headed) structure for coordination, like the one in (35) would be straightforward: to find evidence of morpho-phonological exponency of all three heads—J^0 and the two conjunctive μ^0s. We call this triadic (exponency of) conjunction.

(35)



slavonic Macedonian boasts a rich set of overt coordinate positions. Aside from the standard (English-like) type (36) and a polysyndetic (*both/and*-like) type (37) of conjunctive structure, Macedonian also allows a 'union of exponency' of the latter two (39):[4]

(36) [Roska] **i** [Ivan]
R and I
"Roska and Ivan."

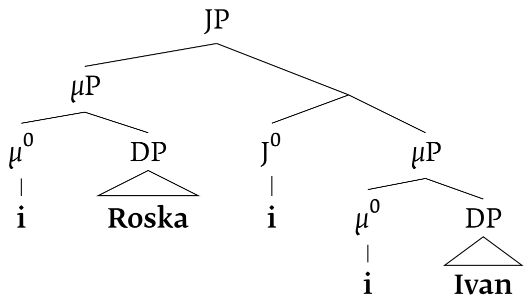
(37) [**i** Roska] [**i** Ivan]
and R J and I
"both Roska and Ivan."

(38) [Roska] **i** [**i** Ivan]
R and and I
"Roska and also Ivan."

4 The following data was initially provided to me by my informants Ivan Stojmenov and Roska Stojmenova. Another informant, Ena Hodzik, confirms and accepts these judgements, hence I am assuming that this grammaticality pattern extends to standard Macedonian.

(39) [**i** Roska] **i** [**i** Ivan]
and R and and I
"Not only Roska, but also Ivan."

(40)



Snejana Iovtcheva (p.c.) also informs me that Bulgarian, or at least the Haskovo Region dialect of Bulgaria, also boasts the triadic realisation of coordination and additive markers. The question given in (41) can be answered with a rich set of homophonic conjunctive and additive markers as (42) shows.

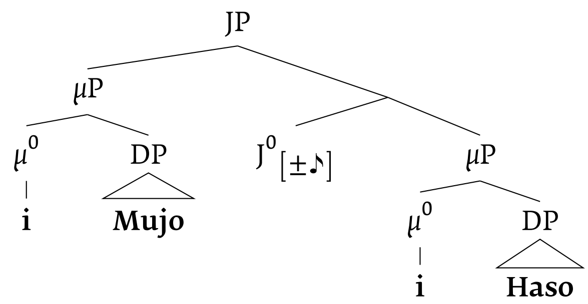
(41) ama **i** Roska li beshe na partito?
but and/also R. Q-li was at party-the
'But was R also at the party?'

(42) i Roska i i Petar i i Dimitar i i Moreno,
also R and also P and also D and also M
vsichki bjaxa na partito!
all were at party-the
'Not only Roska but also Petar and (also) Dmitar and (also) Moreno were all at the party!'

Adversative-flavoured triadic conjunction is also a possibility in SerBo-Croatian (44), which may optionally co-occur within the repetative additive construction (43), just like in Hungarian below.

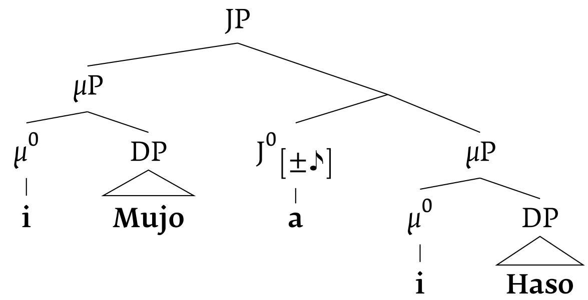
(43) a. **i** Mujo **i** Haso
μ M (J) μ H
'both Mujo and Haso'

b.



(44) a. **i** Mujo **a i** Haso
μ M J μ H
'both Mujo and Haso / Not only Mujo but also Haso'

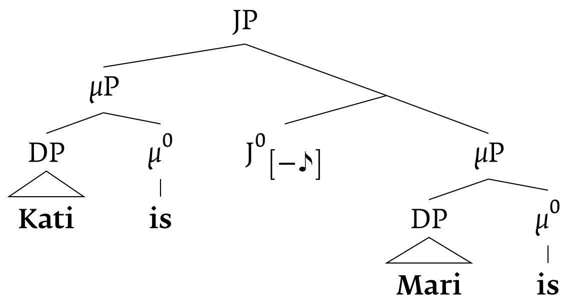
b.



HUNGARIAN Beyong Slavonic (and Indo-European), we also find triadic exponency of conjunction in Hungarian, which allows the polysyndetic type of conjunction with reduplicative conjunctive markers:

(45) a. Kati **is** Mari **is**
K μ (J) M μ
'Both Kate and Mary'

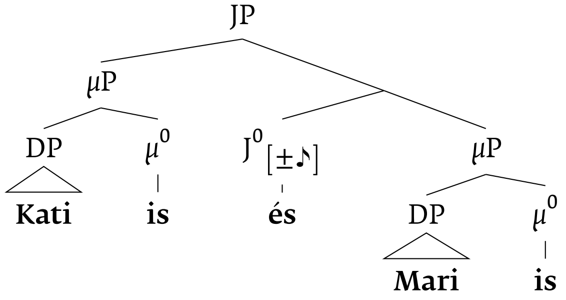
b.



On top of (45), Hungarian allows the optional realisation of the medial connective *és* co-occurring with polysyndetic additive particles *is* (Szabolcsi, 2014c: 17, fn. 21):

(46) a. Kati **is** **és** Mari **is**
K μ J M μ
'Both Kate and Mary'

b.



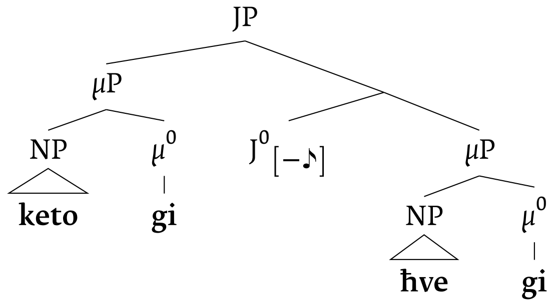
CAUCASIAN Avar, a northeast Caucasian language of Dagestan, also provides such evidence. Avar boasts three structural possibilities for conjunction. It first allows coordinate constructions of the polysyndetic (Latin ...*que* ...*que*, Japanese *mo/mo*) type (48), which, according to our JP system, involves two overt μ heads and a silent $J^0_{[-♪]}$. Take the following data reported in a reference grammar (Alekseev and Ataev, 2007).

(47) Ravzam **gi** Umukusum **gi**
R μ (J) U μ
'Ravzat and Umukusum' (Alekseev and Ataev, 2007: 105)

The following examples, provided by my informants Ramazanov (p.c.) and Mukhtarova (p.c.), are in line with the enclitic character of the *gi* marker as described in the reference grammar (Alekseev and Ataev, 2007), which we take to be overt instantiations of the μ head. The following example and the accompanying analysis in (48) show this.

(48) a. keto **gi** ħve **gi**
cat μ (J) dog μ
'cat and dog'

b.

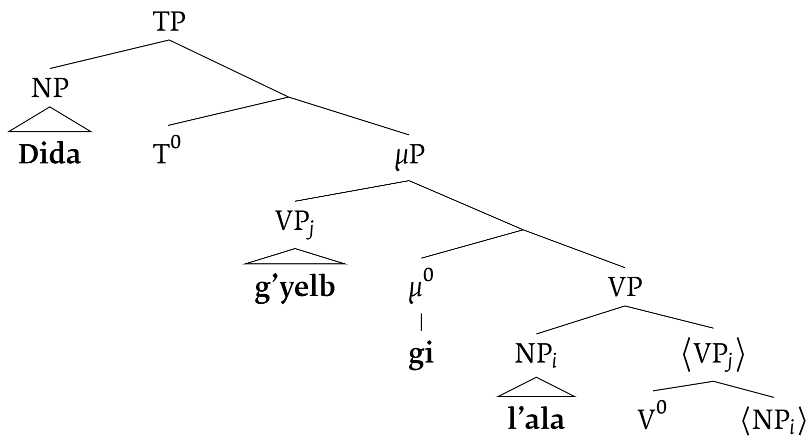


Taking *gi* to be of *μ* category, we predict it to feature independently given the prediction of subphrasal-status of complement to J^0. This in fact obtains and the *gi*-phrase—a *μ*P—exhibits additive (focal) semantics. The following shows the strings and (generalised) structures of such *μ*Ps in Avar.

In (49a), the *mu* marker *gi* follows the verb and intervenes between the verb (*g'yelb*, 'know;) and its object (*l'ala*, 'this'). Its presence triggers antiexhaustive focus on the verb alone. Syntactically, we assume that the object (assumed to be an NP) moves to left-adjoin to the VP, as indicated by *i*-movement in (49b). The remnant VP is then taken to move and left-adjoin to the *μ*P (*j*-movement), which obtains the focus reading with locally generated alternatives to 'know'.

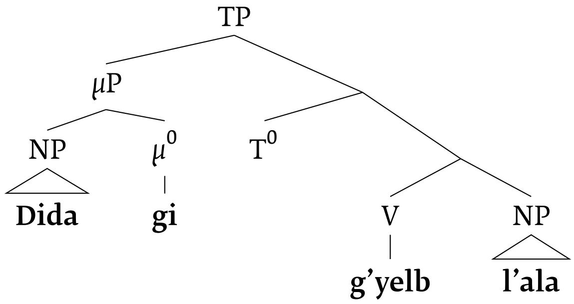
(49) a. Dida [g'yeb **gi**] l'ala
I know *μ* this
'I *even know* this' (as opposed to just remember, for instance)

b.



(50) a. [Dida **gi**] g'yeb l'ala
I *μ* know this
'*Even* I know this' (as opposed to you knowing this, for instance)

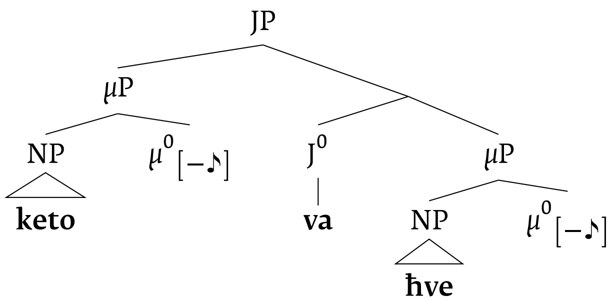
b.



Aside from the polysyndetic type (48), Avar also allows an English-like construction with a conjunction marker placed between the two coordinands, which we take to be a phonological instantiation of J^0:

(51) a. keto **va** ħve
cat (*μ*) J dog (*μ*)
'cat and dog'

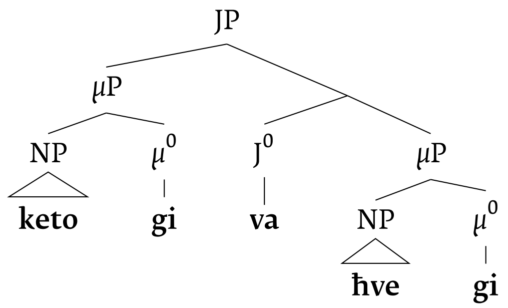
b.



It is the third and last type of construction that Avar allows which is typologically novel and, for our purposes, most intriguing. The last type shows a 'union of phonological realisations' in (48) and (51) and the triadic exponency of conjunction. In this construction type, both *μ* heads as well as J are realised simultaneously.

(52) a. keto **gi va** ħve **gi**
cat *μ* J dog *μ*
'cat and dog'

b.



Among the Dagestanian languages, Dargi also boasts bisyndetic conjunction, as van der Berg (2004) reports. Similarly to Avar, Dargi allows realisation of both the J morpheme as well as the *μ* morpheme, as (53) confirms.

(53) eger di-la k'älˤä.li-za-w ca abdal le-w-ni **wa**
if [me-GEN castle-ILL-M one stupid present-M-MASD(ABS)] and
il-**ra** ħu w-iˀ-ni nu-ni ka⟨b⟩iz=aq-asli
[this-and you(ABS) M-be-MASD(ABS)] me-ERG pose:N=CAUS-COND.1
'If I prove there is one fool in my castle and that is you, . . . '
(van der Berg 2004: 201, ex. 14)

The silence of the leftmost μ^0 can be explained independently on the grounds that C^0 elements, such as *eger* 'if', resist incorporation, which seems to be an empirical generalisation.[5] Although there is no data about it, we would predict the triadic exponency in Dargi as we find in Avar.

I take the syntactic refinement of the coordination structure, proposed in (35), to be well motivated from the empirical perspective. Another empirical perspective, with a strong diachronic flavour, is to follow in Chapter 3. The triadic conjunction data we have drawn from North-Eastern Caucasian (Avar and Dargi), Hungarian and Slavonic is typologically and genetically colourful enough in establishing a clear morphosyntactic pattern which poses serious challenges for alternative syntactic theories of coordination. The evidence is also strikingly uniform with respect to the predictions of exponency that den Dikken's (2006) JP system makes. There is currently no alternative syntactic model of coordination, which could explain this phenomenon of triadic conjunction options without further stipulations since there is simply no syntactic room in the TBM for the third exponent.

5 See Hu and Mitrović (2012), who theorise on this empirical fact and derive its narrow syntactic universality.

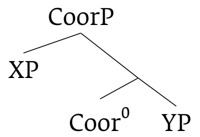
Our fine-grained system, however, can not only handle triadic conjunction without any problem, it even predicts its possibility.

In the following section, we turn to disjunction and further morphological—and consequently structural—complexities associated with it.

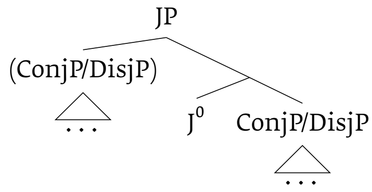
2.3.2 The lower field: *n*-ary disjunction

In this section we explore the lower field, i.e. the internal structure of the 'phrasal subset' of the Junction structure we motivated in §2.3.1. Now that we have established the junctional structure for conjunctive coordination, where three heads feature, we turn to the lower (subjunctional) field and disjunction. By drawing on (both synchronic and diachronic) data from Caucasian, Slavonic and Tocharian, we show that polysyndetic disjunction is structurally complex—even more complex than our JP structure would predict as it stands. Given our JP structure, we have so far shown that the contrast between conjunction and disjunction is not encoded at the J-level, as the TBM would suggest (54a), but rather 'subphrasally', that is, at the *μ*/*κ* levels (54b) since junction syntactically—and semantically, as we explore in Chapter 4—encodes a neutral operation that conjunction and disjunction share.

(54) a. TBM analysis::

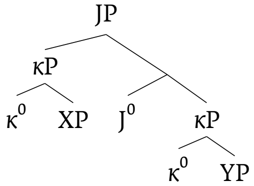


b. JP analysis:

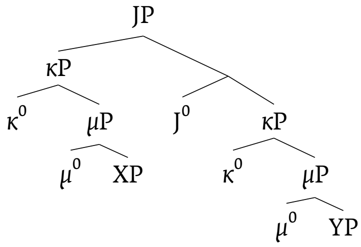


Morphosyntactic evidence suggests, rather, that disjunction is not expressed by non-simplex disjunctive markers, i.e. not by virtue of *κ* heads alone (55a) but by a combination of *κ* and *μ* heads (55b).

(55) a. Simplex disjunction:



b. Non-simplex disjunction:



In this section, we will only argue for the existence of (55b) and not for the non-existence of (55a). As we will see, both options are empirically instantiated. Chapter 4 provides an analysis of both structural options, arguing that while (55a) is the compositional structure for non-enriched (inclusive) disjunction, the structure in (55b) obtains enriched (exclusive disjunction).

The hierarchical arrangements of heads in (55b) is, for purposes of this chapter, stipulative and will be motivated in the following chapters. The motivation that will follow is two-fold: semantic considerations of compositionality will require us to posit the κ particle (operator) commanding the *μ*P. Another motivation comes from the mapping of the two particles onto a fine-grained left periphery of the clause in the sense of Rizzi (1997). This will lead us to structurally and functionally equate μ^0 with Foc^0, and κ^0 with $Force^0$. We will return to this point.

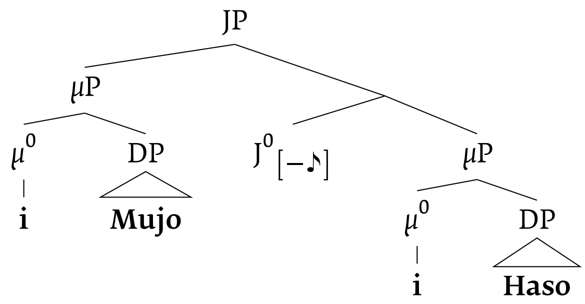
We submit evidence for the structure in (55b) from three groups of languages: Slavonic (extinct and contemporary), Tocharian (extinct), and North-East Caucasian (contemporary).

SLAVONIC We come back to Slavonic in this section, where we show that it expresses (exclusive) disjunction of two arguments using four overt morphemes, i.e. two sets of κ-*μ* pairs.

Polysyndetic conjunction in SerBo-Croatian, among most other Slavonic languages, is expressed using the *μ* particle *i*, as we have already shown in (43)—repeated here as (56). The κ particle *li* independently features in interrogatives, while the combination of the two particles obtains (exclusive) disjunction.

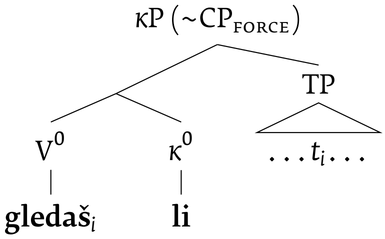
(56) a. **i** Mujo **i** Haso
μ M (J) *μ* H

'both Mujo and Haso'

b. 

The κ particle in SerBo-Croatian has the infamous second-position requirement, which I take to be resolved through head movement, hence the structure in (57b).[6] The incorporation facts surrounding the position of the verb in (57b) need not concern us here too much.[7]

(57) a. Gledaš li?
watch.2.SG.PRES κ
'Are you watching?'

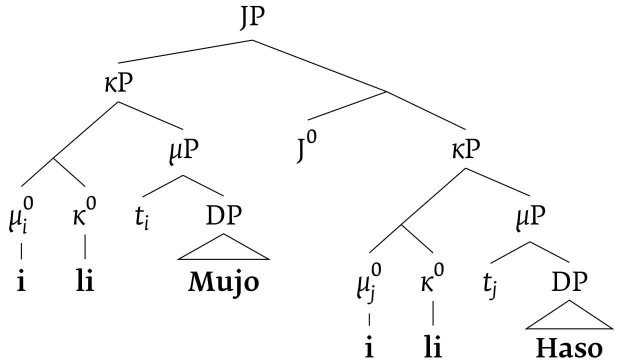
b. 

In exclusive disjunction the *μ* particle *i* head-moves just as the verb does in (57) given the second-position nature of [$_{\kappa^0}$ *li*]. We will work out the details of this analysis in the following chapter.[8]

6 There is a vast literature surrounding the Slavonic interrogative morpheme *li* and its syntactic position. For an overview, see Rivero (1993) and references cited therein, among others.
7 For technical details, see Roberts (2012).
8 Note that *li* is standardly assumed to be a C-element. In the analysis we started to develop here, and which we will continue to develop in Chapter 4, *li* is located VP- or even DP-internally, cf. e.g., 58. To rectify this seeming theoretical disparity, we will assume a type of semantics according to which DP disjunction (to be treated as junction of two polar interrogatives) will denote the same set as the corresponding CP disjunction. Hence all instances of DP-internal (or at least subclausal) structures featuring *li* in this dissertation may be treated as elliptical disjunction of clauses. For very similar assumptions, see Alonso-Ovalle (2006: 80, fn. 17).

(58) a. **i li** Mujo **i li** Haso
μ κ M (J) μ κ H
'both Mujo and Haso'

b.



Consider also Macedonian, which overtly expresses the two κ markers (*le*) along with a disjunctive flavoured J (*ili*).[9]

(59) Roska **le ili** Ivan **le**
R κ J.DISJ I **le**
"Either Roska or Ivan (but not both)."

It may appear inconsistent that we decompose the SerBo-Croatian *ili* as containing two heads, morpho-syntactically spread between the J and the inner κ heads, yet do not decompose the Macedonian structure in (59). That is, we are assuming that SerBo-Croatian *ili* is composed of two heads, while SE Macedonian *ili* is composed of one. We motivate this assumption empirically, based on distributional evidence. Recall that SerBo-Croatian *li* is an interrogative marker. In Macedonian, the *li* marker does not, while the *le* marker does, serve an interrogative purpose:

(60) a. Ivan e tuka
I is here
'Ivan is here.'

b. Ivan **le** e tuka?
I κ =Q is here
'Is Ivan here?'

c. * Ivan **li** e tuka?
I κ =Q is here
'Is Ivan here?'

9 All the data is from Roska Stojmenova & Ivan Stojmenov, p.c.

Although the Macedonian *le* and *li* markers above are similar in their phonological form, I maintained that they are not the same lexical item. A comparable situation is found in Hungarian, where the *is* and *és* forms in an example like (46a), repeated here as (61a), are phonologically similar but semantically clearly different devices as (61b) and (61c) show.

(61) a. Kati **is** **és** Mari **is**
K μ J M μ
'Both Kate and Mary'

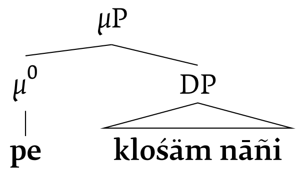
b. Kati **is**
K μ
'Kate too/also.' (Szabolcsi et al. 2013: ex. 24f)

c. * Kati **és**
K μ
'Kate too/also.' (Bárány, p.c.)

While the *μ* markers *és* and *is* in Hungarian as well as the κ markers *li* and *le* in SE Macedonian very likely have common diachronic origins, they operate on different syntactic and semantic levels in contemporary varieties.

TOCHARIAN Another language showing complex disjunctive markers is Tocharian, the most recent extinct Indo-European language to be discovered, the written remnants of which were found in modern China. Among other conjunctive particles, Tocharian boasts an additive particle *pe* 'also', which we take to be a superparticle of *μ* category. As predicted, *pe* independently, i.e. not embedded within a JP structure, obtains an additive reading, as shown in the string of data and generalised analysis in (62).

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

b. 

When forming a part of a coordinate structure, *pe* takes on a conjunctive function. Data in (63) shows conjunction with an overt *pe* expressed in the last nominal conjunct.

(63) moknac nispal mā
for.an.old.man.M.SG.ALLT property.SG.NOM NEG
tāṣäl, mā śu ypeyā
to.be.laid.up.M.SG.NOM (J) NEG over land.SG.PERLT
mskantāsac, J mā
for.those.who.are.PRES.3.PRPL.ACT.M.PL.ALLT (J) NEG
empeles omske□sac, mā **pe** tampewātsesac
terrible.M.PL.OBL evil.M.PL.ALLT (J) NEG **and** powerful.M.PL.ALLT

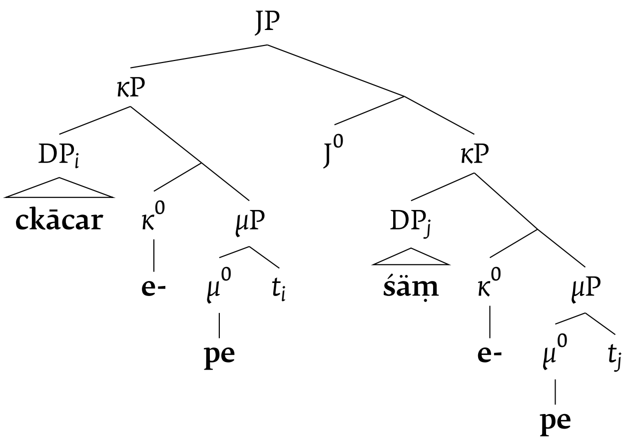
'For an old (man) property (is) not to be laid up, not for those who are over the land (?), not for the terrible, the evil, and not for the powerful.' (TA, Puṇyavanta-Jātaka, 26[a,b])

Disjunction, surprisingly, features the same μ superparticle. The disjunction morpheme is internally composed of a morpheme *e-* (to be addressed) and the μ particle *pe*, as (64a) shows. (64b) gives the structure for the string—the κ and μ projections are taken to be head-final, which is consistent with the general head-final properties of Tocharian, such as object-verb order and postpositional secondary cases.[10]

(64) a. ckācar **e**-**pe** śäṃ **e**-**pe**
sister κ-μ wife κ-μ

'either sister or wife' (TA, Puṇyavanta-Jātaka, T III š 72.6[a,b])

b.



We return to Tocharian in §3.4.7.

10 See Ashton (2011) for details.

NORTH-EAST CAUCASIAN The third empirical stock of evidence for composed disjunctive markers comes from Dargi (North-East Caucasian). Take first a disjunction of two negative clauses:

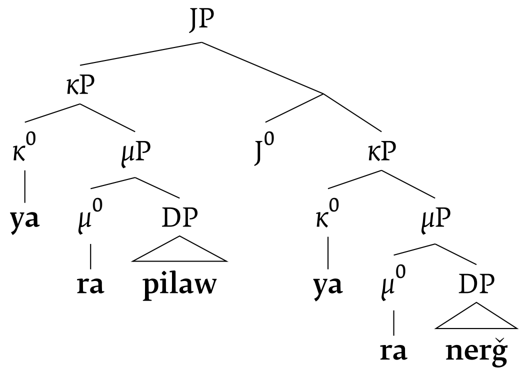
(65) nu-ni umx̂u sune-la mer.li-či-b b-arg-i-ra, amma **ya**
me-ERG key(ABS) self-GEN place-SUP-N N-find-AOR-1 but κ
pulaw, **ya** ˤärˤä ħe-d-arg-i-ra
pilaf(ABS) κ hen(ABS) NEG-PL-find-AOR-1
'I found the key at its place, but neither the pilaf nor the chicken was there.' (van der Berg 2004: 203)

Recall that conjunction obtains polysyndetically using an enclitic *ra* *μ* particle:

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

Exclusive disjunction, on the other hand, features both *μ* and κ particles, as evidence in (67) shows, along with the coordinate structure of the object in (b).

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

b.


The same compositional pattern is found in Avar, which expresses exclusive disjunction using a composed morpheme expression, containing a κ particle *ya*, the same one as in Dargi, and the *gi* particle, whose *μ* status has been independently motivated.

(68) **ya gi** Sasha **ya gi** Vanya
κ *μ* S κ *μ* V
'either Sasha or vanya.'

2.4 Towards a typology of coordination kinds

In this section, we explore the typology, or limits of possibilities, of coordination types, showing that at least three types of coordination constructions exist, at least insofar as the optional realisation of coordination markers is concerned.[11]

(69) a. English type (optional drop of all but last conjunction marker)
b. Tibetan type (optional drop of all but first conjunction marker)
c. Dravidian-Hungarian type (no optional drop of conjunction markers)[12]

By 'drop', we will mean the phonological silence and maintain syntactic presence. Additionally, we will need to distinguish between two types of coordinate markers:

1. μ^0-type markers: one marker per conjunct
2. J^0-type markers: one marker per two conjuncts / per pair

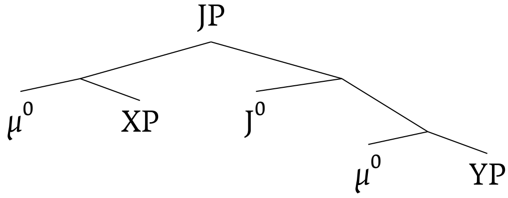
Let us first briefly remark on the syntax and phonology of polysyndetic coordination, i.e. the type of *n*-ary coordination (generally for $n > 2$) involving multiple realisations of the coordination marker. Take the following example from SerBo-Croatian:

(70) Fata poznaje **i** Muju **i** Hasu **i** Smaju
F knows **and** M **and** H **and** S
'Fata knows **not only** Mujo **but also** Haso **and** (**also**) Smajo'

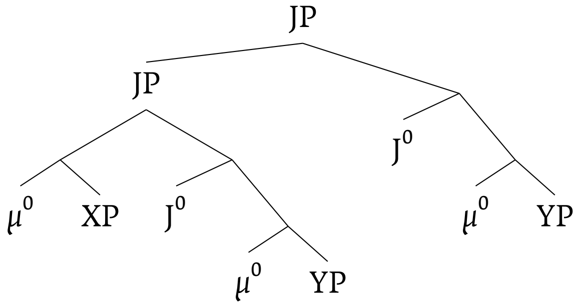
11 In this section, we focus on conjunction alone but tentatively assume that the generalisation on typology extend to disjunction and disjunctive markers.
12 For a discussion of this class of languages, see Mitrović (2014).

Since we have motivated a double-headed coordination structure, we take (70) to feature two silent Junction heads, yielding three coordinand slots, each of which is additionally headed by a μ^0, realising as *i* 'and' in the case of SerBo-Croatian. For polysyndetic cases, we will motivate a left-branch recursion, along the lines of the two structures in (71).

(71) a. COORDINATION OF TWO COORDINANDS:



b. COORDINATION OF THREE COORDINANDS:



The formal principle of polysyndetic coordination that Zwart (2005) proposes only states that the number of overt coordinators (r) is equal to the number of coordinands (d), where the latter count only ranges over J^0 heads in our system, ignoring sub-junctional heads like μ^0. In (72), we list some cardinality properties of the proposed system of leftward recursion, taken from Mitrović (2011: 35, ex. 2.48).

(72) Formal correspondence of syntactically and phonologically realised μ^0 and J^0 coordinators (r) and coordinands (d) in polysyndetic constructions

a. the number of phonologically realised μ^0 heads:
$r_{\mu^0} = d$

b. the number of phonologically realised J^0 heads:
$r_{J^0} = d - 1$

c. the number of all syntactically present (con)junction markers ($J^0 + \mu^0$, covert+overt):
$r_{J^0+\mu^0} = 2d - 1$

Comparing the number of over coordination markers in a language like SerBo-Croatian in (70) with a language like English, we notice that English employs one less coordinator for an *n*-ary sequence of coordinands. We take this observation and the correspondences listed in (72) to be preliminary diagnostics for the coordination structure. Since SerBo-Croatian (70) falls in the (72a) category above, we classify SerBo-Croatian as a *μ*-marking language; conversely, since English falls in the (72b) category above, we classify English as a J-marking language.

We now turn to scrutinising a theoretically implicit generalisation regarding linearisation of coordinate structures. Kayne (1994: 57) states the following pair as asymmetrical and signalling that the coordinator must occur before the last coordinated DP (his 1 and 2)

(73) ✓ I saw John, Bill and Sam

(74) * I saw John and Bill, Sam

While the above symmetry holds for English, there is at least one language, Tibetan[13], which confirms the non-universality of such an asymmetry. The following examples are from Classical Tibetan, taken from Beyer (1992: 241). While the first example (75) shows a pattern similar to English, the second one (76) is unlike English in that it is in stark contrast to Kayne's asymmetry above.

(75) ས་དང་ ཆུ་དང་ མེ་དང་ རླུང་
sa-**dañ** tšhu-**dañ** me-**dañ** rlun
earth-**and** water-**and** fire-**and** air
'earth and water and fire and air'

(76) ས་དང་ ཆུ་ མེ་ རླུང་
sa-**dañ** tšhu me rlun
earth-**and** water fire air
'earth, water, fire, and air'

The following two strings, then, are natural linguistic possibilities:

(77) ✓ I saw John, Bill and Sam [English]

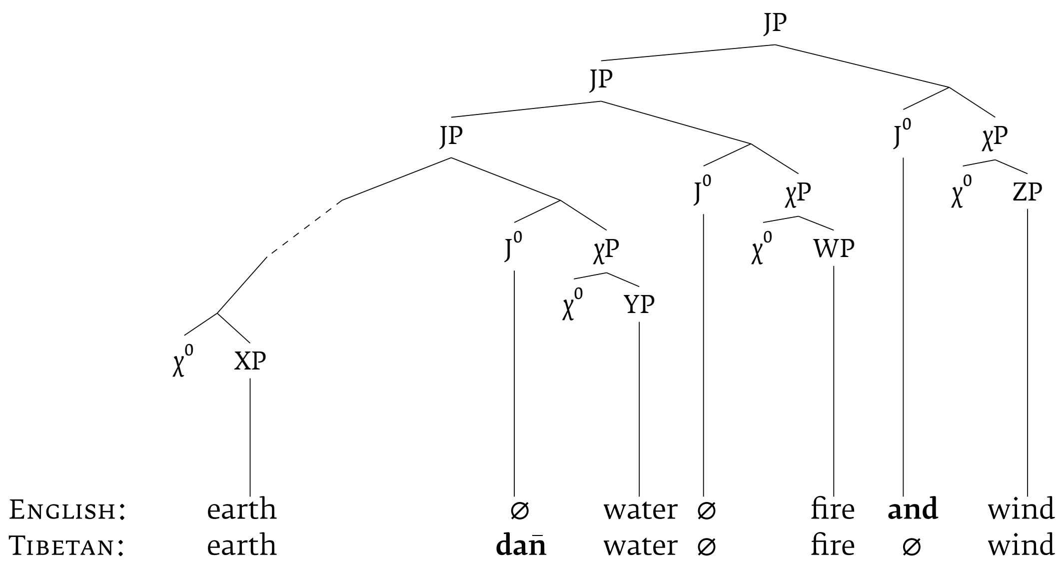
(78) ✓ I saw John and Bill, Sam [Tibetan]

13 I'm grateful to Joseph Perry (p.c.) who drew my attention to this fact, which has, to the best of my knowledge, not received formal treatment.

The desideratum is to derive both possibilities from a single syntactic structure, that is, assuming on conceptual grounds that all natural language coordination structures are uniform and that the differences in the patterns of realisation may be accounted for by appealing to different mechanisms (e.g., at the level of phonology).

The polysyndetic syntax we are assuming is the left-branching one developed in Mitrović (2011), as shown in (79), where χ^0 is a variable over connectives such as μ^0, κ^0 or den Dikken's (2006) subjunctional *and* in English.

(79) An *n*-ary coordination tree for polysyndetic exponence:



We further account for the exponence asymmetry shown in (79) by appealing to the notion of Chain Reduction (CR) (Nunes, 2004) and the distance calculated at two separate modular procedures of the post-syntactic derivation. (We explicate the notion of chain below.) With respect to the structure of the Spell Out, we adopt Arregi and Nevins's (2012) theory. This theory also allows for parametrisation, which will capture the two exponence types as postsyntactic parametric possibilities, stemming from a single structure underlying the two types. We assume that this 'parameter' is calculated post-syntactically, at the sensory-motor interface.

(80) LINEARITY-SENSITIVE EXPONENCE PARAMETERS FOR *n*-ARY COORDINATION:

a. English: From left to right, reduce coordinate chain and assign phonological index to the **structurally** closest terminal (from left to right).
b. Tibetan: From left to right, reduce coordinate chain and assign phonological index to the **linearly** closest terminal (from left to right).

In contrast, a μ-marking polysyndetic language like SerBo-Croatian, involves an extra conjunction exponent. Compare the number of conjunction markers in (70), repeated below in (81), with the number of markers in English (82)

(81) Fata poznaje [**i** Muju **i** Hasu **i** Smaju]
F knows **and** M **and** H **and** S
'Fata knows (**both**) Mujo **and** Haso **and** Smajo' [$r = d$]

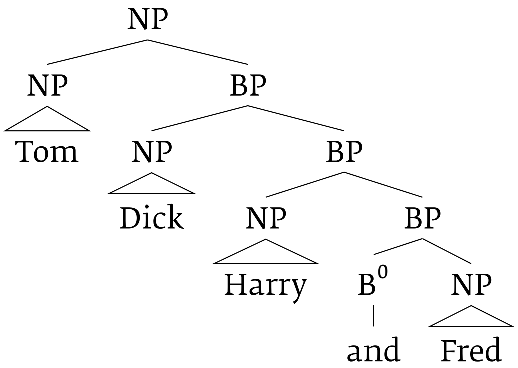
(82) John knows [Bill **and** John **and** Mary]. [$r = d - 1$]

The polysyndetic data is problematic for all approaches which assume a single coordination head (such as Chomsky 2013, for instance). For coordination of three coordinands, a μ-marking language like SerBo-Croatian realises three conjunction markers, while a J-marking language like English realises two, in line with (72). A μ-marking language is thus analysed just as Tibetan or English, *modulo* the shift of phonological realisation from J^0 to χ^0 in (79).[14]

Munn's (1993) analysis of polysyndeticity, or iterated conjunction as he calls it, assumes a multiple adjunction to his Boolean Phrase (BP). Take a conjunction string like *Tom, Dick, Harry and Fred* analysed in (83) *à la* Munn (1993: 24, ex. 2.18).

14 I am not aware of any Tibetan-styled μ-marking language, which would realise the linearly closest μ-marker. This is a possibility our system allows, *ceteris paribus*.

(83) Polysyndetic (iterated) conjunction as multiple adjunction to the Munn's (1993) BP:



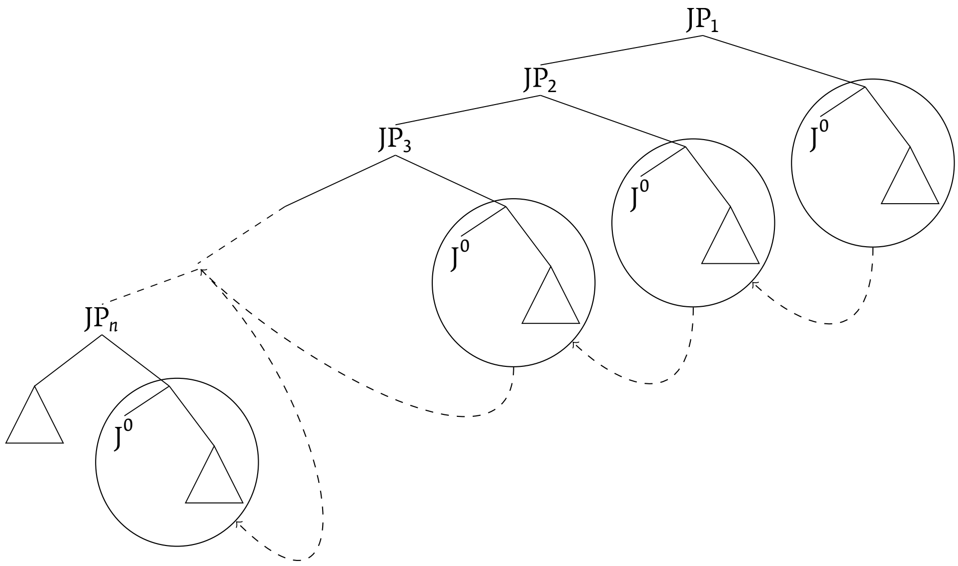
It is not clear how Munn (1993) would structurally treat polysyndetic conjunction with overt exponents. To maintain endocentricity, I suppose he would have to resort to multiple BPs and not just a single one with multiple adjunction slots. Once this is stipulated, the structure has one other difference, namely right-branching recursion, while we have maintained a left-branching recursion.

This brings us to another matter implicitly unresolved in (80), where we have introduced a notion of coordinate chain. Conceptually, we would like to capture the core empirical observation that coordination is unbounded and reconcile this universal with using a theoretical tool which would allow recursive copying of the coordinate structure. We therefore stipulate a coordination chain generalisation:

(84) JP CHAIN GENERALISATION
A JP may freely copy and adjoin a copy of itself to itself.

The informal stipulation above translates into a generalised structure in (85).

(85) A copy-theory of polysyndetic derivation:



The triangular structures are used to specify the coordinand positions.

2.5 An unfolding theory of head complexes

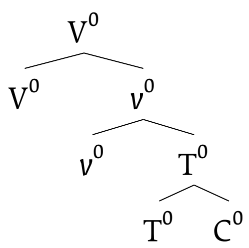
This section is devoted to modelling a derivation, which integrates the three positions headed by J^0, κ^0 and μ^0, as discussed and motivated so far. We do this by adopting Shimada's (2007) novel model of head movement. In the first half of this section, we review the core derivational mechanics that Shimada (2007) puts forth for the derivation ('unfolding') of the clausal spine. This half will basically summarise Shimada's programme in detail. As we do so, we also identify some outstanding problems with the model and upgrade it accordingly as we go along. In the second half, we apply his derivational theory to account for the subjunctional heads we have identified in the last sections of this chapter.

Shimada's model solves two problems that head movement poses for a minimalist programme and which have remained unsolved. One of these problems concerns binding and Percus's (2000) generalisation, which we leave aside. Instead we start with a focus on the architectural problem of head-movement.

HEAD MOVEMENT AND ITS PROBLEMS The core characteristic of head movement is problematic. Head movement, or incorporation, is understood as displacement of (i) the minimal category (head/X^0) to (ii) a non-root position via adjunction. There are two undesired effects of such mechanics in light of the minimalist programme: (a) first, the movement is non-extensional since it does not target the root node, as Chomsky (2001: 37–38) observed, and (b) movement results in lack of a c-commanding relation between the moved element and its trace. Both of these problems seem to be the same, as Ian Roberts (p.c.) reminds me. Roberts (2010: 50–65) develops a Minimalist model of head movement where the Extension Condition, which head movement violates, "need not be formulated as an independent condition in Chomsky (2008), but that instead its effects derive from Edge Features (EF)." (Roberts, 2010: 213) We will return to Roberts's (2010) model at the end of the section as we integrate it with Shimada (2007).

To solve this problem, Shimada (2007) proposes a derivational theory where the functional heads of, say, a clausal spine start their derivational lives by primarily assembling into a head complex (86) and in the course of derivation these heads move out and unfold (hence the title of the section).

(86)



We will look at this model in detail below; let us first review some previous takes on head movement, which will contextualise Shimada's (2007) proposal.

Head movement has been part of generative theory since the very beginning, with the first proposed incarnation in Chomsky (1957) in relation to Affix Hopping, and in continued discussion thereafter. As Roberts (2010: 6) notes, it was only in the Government & Binging era that the idea received theoretical solidity and a series of theoretical postulates were proposed, which in turn provided a clear and theoretically stable characterisation of head movement in the eighties, due mainly to the work on the topic by Koopman (1983), Travis (1984) and Baker (1985a, 1988).

One of the most influential analyses involving head movement is Pollock's (1989) parametric take on the difference between French and English verb placement.

(87) *adverb ⟩ verb*

a. John often kisses Mary

b. * Jean souvent embrasse Marie
J often kisses M
'John often kisses Mary'

(88) *verb ⟩ adverb*

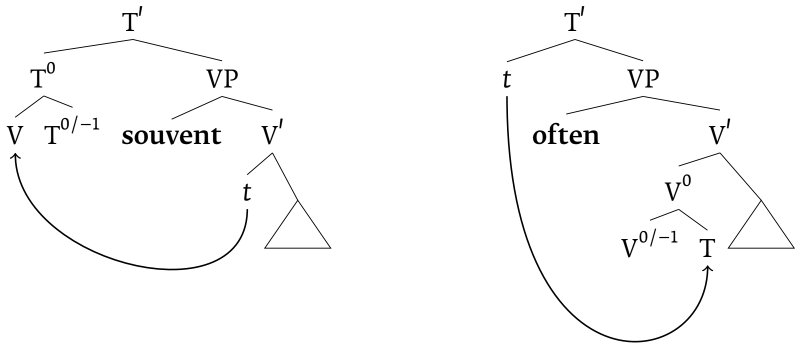
a. * John kisses often Mary

b. Jean embrasse souvent Marie
J often kisses M
'John often kisses Mary'

Assuming, on independent grounds, that adverbs attach to the VP, Pollock (1989) proposed to account for the contrast above by a positing V^0-movement parameter: the lexical verb *embrasse* is said to raise to T^0 in French (89a), while the tensed verb *kiss* gets its inflection via a T^0 lowering onto V^0 (89b)

(89) The raising/lowering analysis of verb placement in French/English (Shimada, 2007: 3,4):

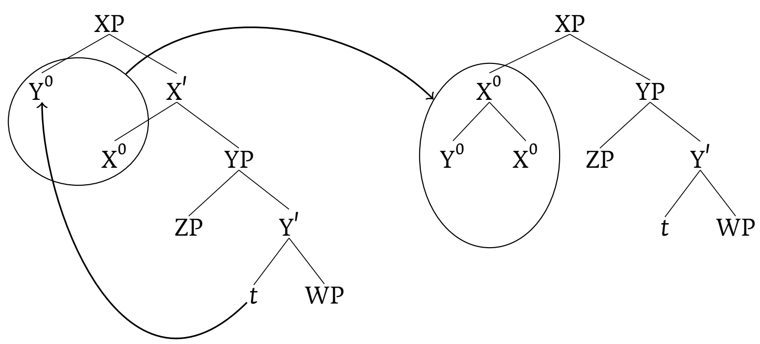
a. Raising: b. Lowering:



From the minimalist perspective, both instances of movement are problematic. Neither of the moved heads c-command their trace position. However, in the raising scenario, the head m-commands its trace, while m-command does not obtain in the lowering instance but we leave other kinds of command aside. In terms of adjunction, the raising analysis accords with the Kaynean rule of that adjunction should always be to the left, which the lowering analysis violates. Both structures also violate the Extension Condition of Chomsky (1993, 1995) since neither of the cases of movement increment the structure by adding a sister at the root to an existing tree.

One attempt, but in no way a solution, as we review below, to resolve the Extension Problem of head movement is Matushansky's (2006) two-step analysis. In a minimalist spirit, Matushansky assumes that, in the first (syntactic) step, the uninterpretable features on a head (itself defined as a syntactically indivisible bundle of formal features) trigger movement of the head to the root of the tree, mechanically akin to phrasal movement. In the second (morphological) step, an operation called *m(orphological)-merger*, itself distinct from movement, applies to two heads which (i) are adjacent but (ii) do not form a constituent (iii) and nothing intervenes between them. Derivationally, her theory in two steps can be summarised in (90).

(90) a. *Step 1:* b. *Step 2:*



The extraction of the three properties of *m-merger* above are my own since Matushansky (2006) does not formally define the concept. While Matushansky's m-merger model *prima facie* resolves the Extension Problem by positing an extensional first step via movement of a minimal category to the root of the tree, this movement fundamentally requires access to non-root nodes of the tree in the second (morphological) step. As Shimada (2007: 5) notes, the two trees, each representing a step in Matushansky's model, may be represented in bare phrase structural terms below. Adopting Shimada's notation, ⟨Y,X⟩ : {Y,X} represents a syntactic object created by adjoining Y to X.

(91) a. X : {Y,X : {X, YP}} via (90a)
b. X : { ⟨Y,X⟩ : {Y,X}, YP} via (90b)

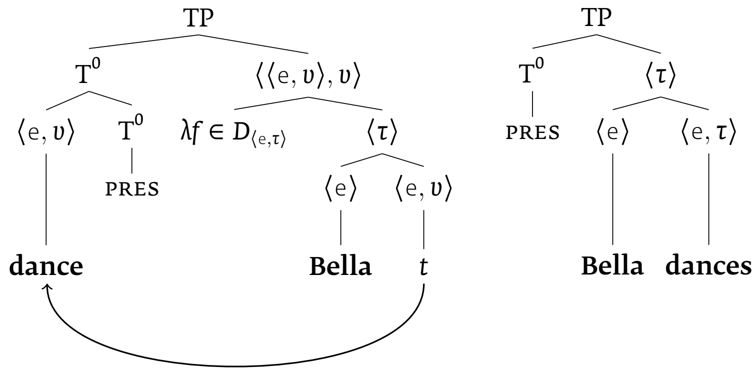
The reconfiguration and transformation of a first-step structure $[_{XP}\ Y^0\ [_{X'}\ X^0\ YP\ ]]$ into the second-step constituency $[_{XP}\ [\ Y^0\ X^0\ ]\ YP\ ]$ via m-merger, Y^0 is required to 'look into' inside its sister, break it down and itself be merged with the head of its sister. As Elaine Schmidt (p.c.) observes, there is nothing stopping us from m-merging anything (with anything) once m-merger is divorced from syntactic constraints and, *ceteris paribus*, allowed to apply across the board. The uninterpretability condition that needs to be met by the two minimal categorial m-merger candidates potentially allows the constinuency-breaking m-merger of all adjacent terminals in a given structure, which over-generates the phenomenon of head movement as it stands.

As Shimada (2007: 5) observes, not only are the constituency reconfiguring morpho-syntactic operations that Matushansky (2006) proposes all illicit by the minimalist assumptions of derivational mechanics, but the requirement of access to non-root nodes feeds the Extension Problems, which persists despite the reformulated, and mechanically troubled, take on the problem.

While head movement is assumed not have semantic effects (Matushansky, 2006: 71), Matushansky's derivational model seems to predict two distinct compositional possibilities, depending *when* in the derivation m-merger is supposed to take place. If m-merger is post-syntactic, i.e. if it follows transfer (or spell-out), then the phrase XP headed by the triggering head X^0 carrying [*u*F], would end up in a sisterhood relation with the moved head Y^0; as a result, the functional application would apply at the root of the tree. On the other hand, if m-merger is narrow syntactic, in that it precedes the transfer, the two heads X^0 and Y^0 would be in a sisterhood configuration, yielding functional application within the X-head-complex. Matushansky (2006), however, maintains that m-merger applies as soon as it can, which we understand as meaning our latter (narrow syntactic) 'timing' option, making the m-merged head-complex an input structure to semantics.

Similarly, Shimada (2007: 6) notes that while head movement has no semantic effects (however, cf. Roberts 2010: 17–23), it does result in a semantic composition different to a structure without head movement. Let's return to V-to-T raising/lowering analysis (89) and semantic consequences of interpreting Tense. Take a (generalised) compositional analysis of raising/lowering below, taken from Shimada (2007: ex. 10) where a checking theory is assumed for the so-called lowering.[15]

(92) a. Raising: b. No raising:



Given that the French and English meanings behind verbs are independent of their high/low position, we need to ensure that both kinds of verb placements receive the same interpretation. In the case without raising, we interpret the structure generally as follows. Since the argument (*Bella*) is an entity of type e, the unergative verb like *dance* that takes the argument (of type e), has to be of type $\langle e, \tau \rangle$, for some semantic type τ, returning a value of that type τ. In case of raising, we assume that the verb *dance* retains its type as it incorporates, leaving a trace behind of the same type.

Matushansky (2006: 102–104) addresses the issue of compositionality and the fact that verb movement often lacks LF effects. She finds the reason for verbal minimal categories undergoing movement in their being predicates—as such, they semantically undergo predicate abstractions (Heim and Kratzer, 1998: 96–97). This operation allows us to interpret the verb in its original copy (trace) position. Matushansky thus concludes that “whether we assume that predicates must reconstruct . . . or allow them to be interpreted in their final position, the outcome is the same: predicate movement is not reflected at LF.” (Matushansky, 2006: 103)

This, however, predicts, *prima facie*, that a verb V_n with the same meaning

15 Following Shimada (2007), I insist on the typographically appealing, but technically incorrect, representation of ‘unary types’ as unary tuples. Hence, I may represent an item of type e as type ⟨e⟩.

in two different languages will compose differently (as we briefly explore below): in a verb-raising language, V_n will of a heavier type than V_n in a language that does not require verb raising. Therefore, whether the semantic outcome is the same or not does not preclude the same means of arriving at such an outcome. The fact remains that head movement, if indeed narrow syntactic as we will want to maintain, following Roberts (2010) and Shimada (2007), has compositional effects, regardless of whether or not these effects are reflected in the interpretation.

The compositionality of a raising analysis in (92a) thus leads us to posit that the T^0 carrying PRES is, as Shimada (2007: 6) observes, either of type e or type $\langle\langle e, \upsilon\rangle, \rho\rangle$, for some semantic type ρ. The first option, that PRES is of type e is excludable on conceptual grounds since Tense does not have a set of entities as its extension (just like verbs for that matter). The second option involving a type-heavy meaning of T^0 is technically tenable but conceptually doubtful since we would then *have* to posit two different type-kinds of T heads across languages: in one type of languages, to which English belongs, which does not admit V-to-T raising, the semantics of T^0 is of type ρ, for some semantic type ρ, while in the other type of languages, to which, say, French belongs and which admits V-to-T raising, the semantics of T^0 is of type $\langle\pi, \rho\rangle$ for some type π of the Verb. Assuming clitics result from head movement (Roberts, 2010), then the 'type-heaviness parameter' extends beyond Tense:

(93) INCORPORATION-INTERPRETATION COROLLARY:
In languages, in which head movement (incorporation) *does not* take place, the semantic type of the incorporation goal is $\langle\rho\rangle$, for some semantic type ρ and the semantic type of the probe of incorporation is of type $\langle\pi\rangle$, for some semantic type π. In languages, in which head movement (incorporation) *does* take place, the semantic type of the incorporation goal is $\langle\rho\rangle$, for some semantic type ρ and the semantic type of the probe of incorporation is $\langle\rho, \pi\rangle$, for some semantic type π.

So either the availability, and requirement, of type-lifting is encoded in the availability, and requirement, of incorporation, for which there is no readily available theoretical or empirical motivation, or the head-complex constituency resulting from m-merger (or any other means in different theoretical approaches) is in fact, at most, a post-syntactic process not feeding such interpretation. As Shimada (2007: 7) notes, if the first-step structure preceding m-merger were the input to semantics, the problems would not arise and the corollary I stated above would not hold since "as long as the trace left behind by *dance* is of the same type as the denotation of *dance*, the whole structure is interpreted as if there were no movement." Crucially, this would not require the type-fixing of the incorporation probe. This is the line taken by Shimada (2007), to whose proposal we now turn.

Shimada (2007) starts motivating his model on the basis of the following data, discussed by Kusumoto (2005), which exhibit temporal ambiguity since (94a) cannot be explained by a single temporal index.

(94) Tom said that Karen was dancing.
  a. Tom said, "Karen **is** dancing."
  b. Tom said, "Karen **was** dancing." (Shimada, 2007: 12)

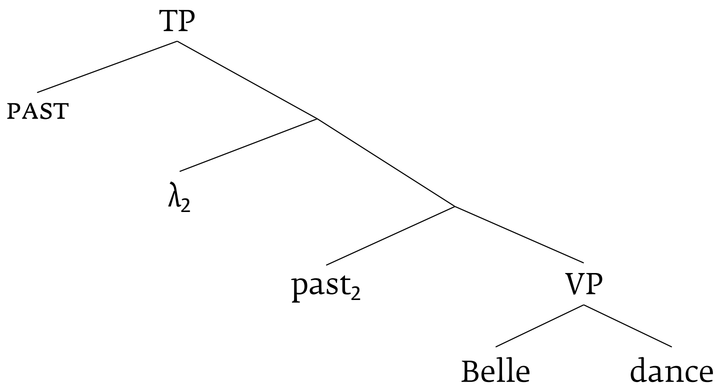
Also, take the following sentence, which is temporally ambiguous between two readings: in one, Hillary married a man at time *t* who had already become the president of the US before *t*; in another reading, Hillary married a man at time *t* who became the president of the US after time *t*.[16] As Shimada observes, for the latter reading, the relative clause would refer to the utterance time and this cannot be explained in a single temporal index system.

(95) Hillary married a man who became the president of the US.
(Shimada, 2007: 12)

This leads Kusumoto (2005) to propose a model, in which predicates have an argument slot for a time as well as a slot for a world. The past tense is then interpreted as a time variable, hence the time argument slot. This semantics and the two argument slots need to be represented compositionally, therefore also syntactically. Kusumoto takes the origin of the past tense morpheme to reside just above VP, possibly as the T head. Crucially, to obtain the double temporal index assignment, which would derive the reading in (94a), two past tense operators are required. The compositional structure therefore looks like (96), taken from Shimada (2007: 13, ex. 5). The lambda needs to be inserted above $past_2$, just as this was required in 92a, in order to interpret the structure in the system of Heim and Kratzer (1998).

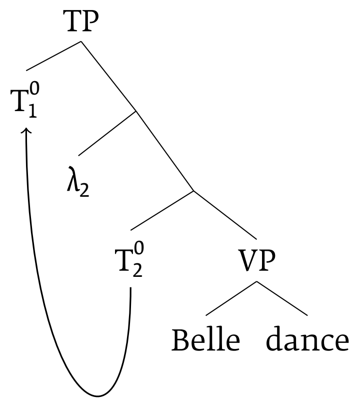
16 For a detailed analysis, see Enç (1981).

(96)



While the semantics that Kusumoto (2005) proposes predicts the readings correctly, she assumes that the PAST morpheme is in fact phonetically null. Further, the structure in (96) is stipulatory, as Shimada (2007: 13) notes and further asks, "how come it is outside the VP and [is] yet able to get affixed onto *dance*?" Assuming PAST is a quantifier over temporal intervals (elements of type `i`), Shimada interprets past_2 as a variable of type `i`.[17] Given that in the system of Heim and Kratzer (1998) variable binding is achieved via movement, Shimada assumes that past_2 is a trace of movement of PAST (itself T^0), which removes the stipulatory component in Kusumoto's (2005) system.

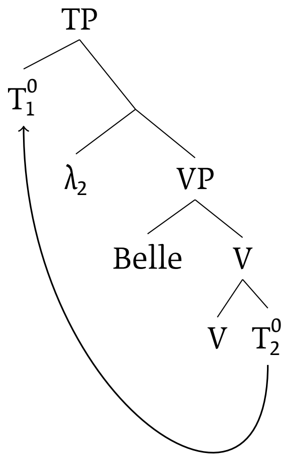
(97) Shimada's (2007: 13) (interim) rendition of Kusumoto's (2005) system:



17 Shimada develops a rather complex semantics for time (and space), which I do not overview here. See Shimada (2007: ch. 3) for details and Partee (1973) for an interesting binding approach to treating Times as individuals and Tenses as pronouns.

In light of pronominal analysis of Tense in Partee (1973), we might treat the T^0_1-T^0_2 relation as one of pronominal coreference or binding, as Ian Roberts (p.c.) notes, or as an instance of movement, as Shimada (2007) notes. Shimada therefore wonders how we might motivate such movement. There is neither a type-mismatch arising in the structure nor does the movement result in any semantic effect since the landing site is just above the extraction site. Shimada rejects, or rather upgrades, the structure by positing that T^0_2 in fact originates as the sister of V^0

(98) Shimada's (2007: 14) rendition of Kusumoto's (2005) system:



The derivational model in (98) brings us back to the problems posed by Matushansky's (2006) system. Firstly, the reconfiguration problem is solved since the V-T adjacency[18] is obtained for free as the inflectional morpheme, *qua* exponence of T^0, may be seen as resulting from pronunciation of the tail of the T-chain (99). It is additionally clear why the PAST operator (morpheme) is phonetically null in Kusumoto's (2005) system: her PAST and $past_2$ elements are two copies of the same head, T^0, which is pronounced lower down in a V-adjacent position and silent in other positions, possibly for reasons of Chain Reduction:

18 There arises an issue of labelling and labellability of such adjacency—we address this below.

(99) CHAIN REDUCTION: (Nunes 2004 from Chocano 2009: 82, fn. 26-i)
Delete the mininal number of constituents of a nontrivial chain CH that suffices for CH to be mapped into linear order in accordance with Kayne's (1994) Linear Correspondence Axiom.

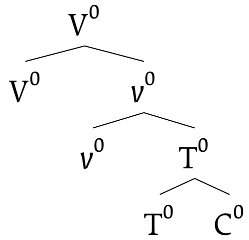
While Chain Reduction is generally assumed to choose to preserve the highest copy and delete the lower ones, there is no definitive reason to opt for the realisation of the highest copy for reasons explored by Bošković and Nunes (2007), who provide a detailed review and account.

Once we consider the idea that T^0 originates below, or as a sister to, V^0 and locate the locus of parametric variation between V-to-T raising / T-to-V lowering in the head-adjacency, we are lead to drastically reformulate the traditional generative derivational mechanics. The idea naturally lends itself to an extension to other categories within the clausal spine. Once we add the C^0, positing its original existence as sister to T^0, we could derive, in the same vein, the V-to-C movement. It is further equally logical to extend this head-complex structure from the clausal spine to the nominal. The ultimate aim of this section is to extend it, along the lines of the same logical reasoning, to the con-/dis-junctional structure. Before doing so, we expound Shimada's (2007) model in greater detail so as to equip ourselves with the basic tools of his proposal.

Shimada (2007) thus proposes that a primary step in a derivation is the derivation of a head complex by merge. Assuming incorporation takes place after this first step, we run into the structural (access to non-root node) and interpretational (arbitrary type-weight) problems we reviewed before in light of Matushansky (2006). As Shimada (2007: 14) writes, "the only logical possibility that gets around this, then, is to assume that heads are merged before they undergo head movement."

To sketch this idea, Shimada (2007) takes a simple sentence with C^0, T^0, v^0 and V^0 in its spine, and illustrates the derivational steps in his model. First, a complex head (86), repeated below as (100), is formed.

(100)



The internal argument, object, gets merged and V^0 projects, after which the complement complex of V^0, immediately headed by v^0, excorporates to the root so as to form a v^1. In the same vein, the head-complex complement to v^0 excorporates to the root-level so as to form T^1. An external argument, subject, may be merged here in [Spec, TP]. In the last step, C^0 excorporates along the same lines so as to extend the structure and form C^1 and ultimately C^{MAX}.

We briefly remark on a problem arising with Shimada's (2007) model that concerns the labellability of the Shimadean head complex. While Shimada (2007) does not address the problem, the label [V] of the head complex in (100) seems arbitrary, as Ian Roberts (p.c.) reminds me. The set of heads such as the one in (100) can be seen as an inverted Extended Projection (EP). We therefore assume that the features at play in an EP are those listed in (101).

(101)

cat.				weight (*n*)
C^0	[+**C**]	[+**T**]	[+**V**]	3
T^0	[−C]	[+**T**]	[+**V**]	2
v^0	[−C]	[−T]	[+**V**]	1
V^0	[−C]	[−T]	[+V]	0

(based on Roberts 2012: 421, ex. 10)

We assume that a Labelling Algorithm (LA) applies to syntactic structures, *qua* sets, to determine a label for each constituent to satisfy the Legibility Condition at interface. Chomsky (2013) articulates a LA, which, in very broad terms, states two labellability scenarios (conditions). If two syntactic objects α and β are merged, the resulting set is $\{\alpha, \beta\}$. In the first scenario, if one of the two objects is a head, say α, and the other a maximal category (β), then the LA will select the head of the set, i.e. α, as the label and the procedure of transfer (to interfaces) continues. In this case, α and β are asymmetric insofar as one of them is a head (minimal/non-maximal category), while the other is a non-head, or a phrase (maximal/non-minimal category). In the second scenario, α and β are symmetric in that they are both either maximal or minimal categories. The LA will be unable to determine the label using the same procedure but has to resort to finding an intersecting feature common to both α and β. This was formally sketched in Mitrović and Fiorini (2012) using an elementary logic and λ-calculus.[19]

19 The *PI* stands for 'projection index', which refers to whether a synatctic object is a maximal

(102) The Labelling Algorithm: (Mitrović and Fiorini, 2012)

$$\left[\lambda\alpha\lambda\beta \left[\begin{array}{c} \left[PI_\alpha < PI_\beta\right] \Rightarrow \exists \mathbf{L}.\lambda f\left[f \in \mathbf{F}_\alpha \wedge \mathbf{L} = \alpha\right] \\ \vee \\ \left[PI_\alpha = PI_\beta\right] \Rightarrow \exists \mathbf{L}.\lambda f\left[\mathbf{L} = f \mid \iota f\left[f \in \left[\mathbf{F}_\alpha \bigcap \mathbf{F}_\beta\right]\right]\right] \end{array} \right] \right]$$

Roberts (2010) develops labellability conditions for minimal and maximal categories, given in (103), which is in line with Chomsky (2013).

(103) *min/max* LABELLABILITY (Roberts, 2010: 54, ex. 20)

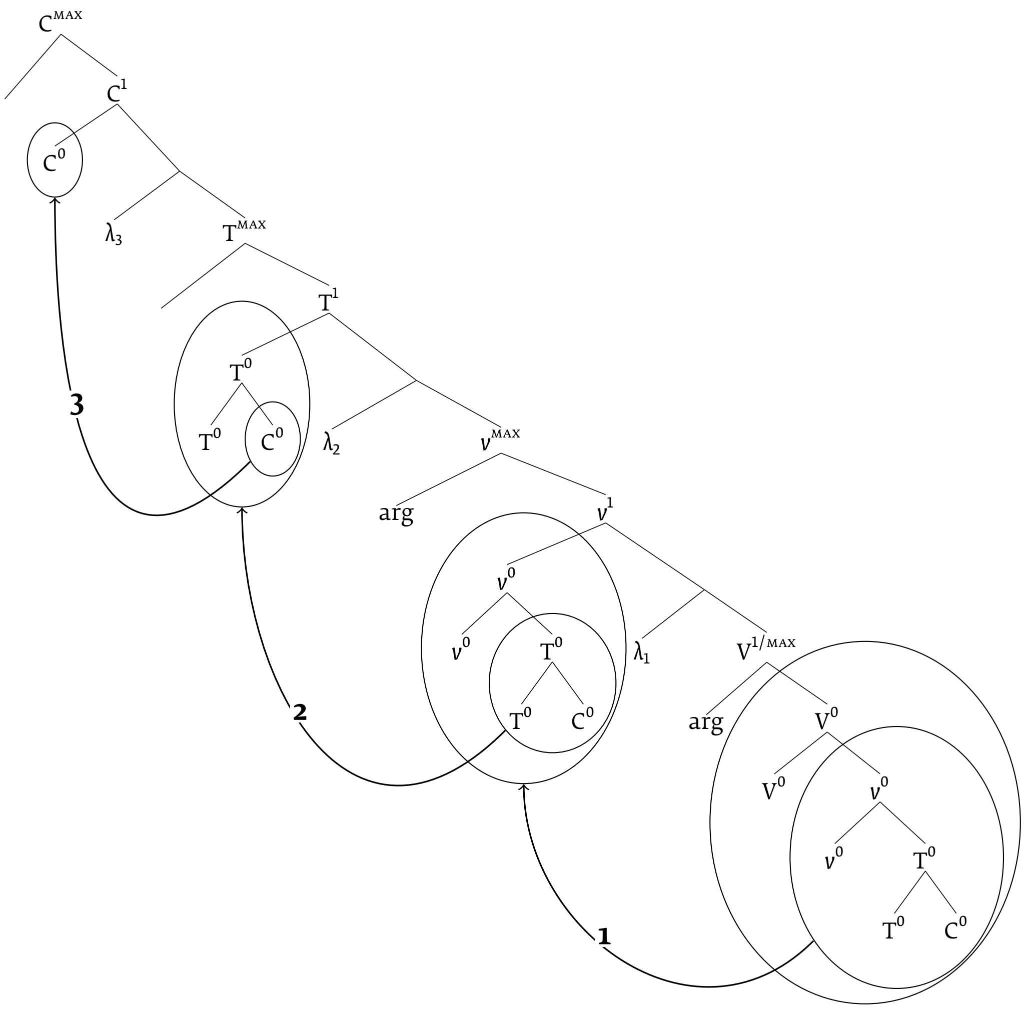
a. The label L of category α is MINIMAL iff α dominates no category β whose label is distinct from α's.
b. The label L of category β is MAXIMAL iff there is no immediately dominating category α whose label is non-distinct from β's.

Given our assumptions on EPs (101) and LA (103), the labellability problem of (100) is solved: the LA determines the label of the head complex in (100) as [V] since [V] represents the intersection of all the heads, *qua* feature bundles, in the complex. Additionally, while V^1 in (100) indeed dominates category [X], which is distinct from [V] and whose label is therefore distinct from [V]'s, as per (103a), such dominated category [X] in fact contains [V], which makes it labellable by the LA as formulated in Chomsky (2013).

We represent his steps with labelled movement arrows in (104) that can be accompanied by the description above. Recall the requirement for the presence of λ operators for reasons required by interpretation. Since semantics cannot add to structure, at non-root positions, during interpretation, the λ-slots have to be left room, or be represented, in the syntax.

or a minimal category (where $PI_{min} < PI_{max}$); **F** is a set of formal features (f) and **L** the label.

(104) Shimada's (2007) head-complex unfolding mechanics:



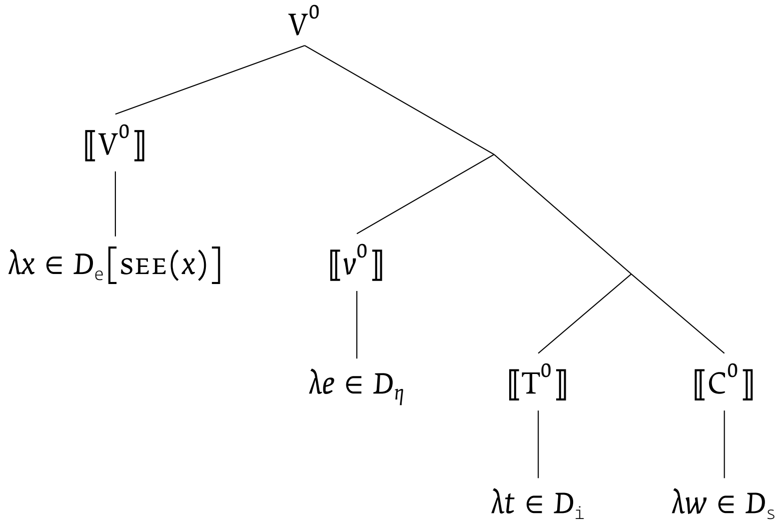
Going back to Kusumoto's (2005) idea, which Shimada (2007) picks up on, that predicates come syntactically pre-installed with a time slot of type `i` as well as a world slot of type `s`, then the lexical entry for a verb like *dance* is heavier than it first appears:

(105) $[\![\text{dance}]\!]^g = \lambda x \in D_e \Big[\lambda t \in D_i \big[\lambda w \in D_s [x \text{ danced at } t \text{ in } w] \big] \Big]$

This view of predicates being hardwired with semantic slots for times and worlds, essentially located in T^0 and C^0 respectively, maps elegantly onto

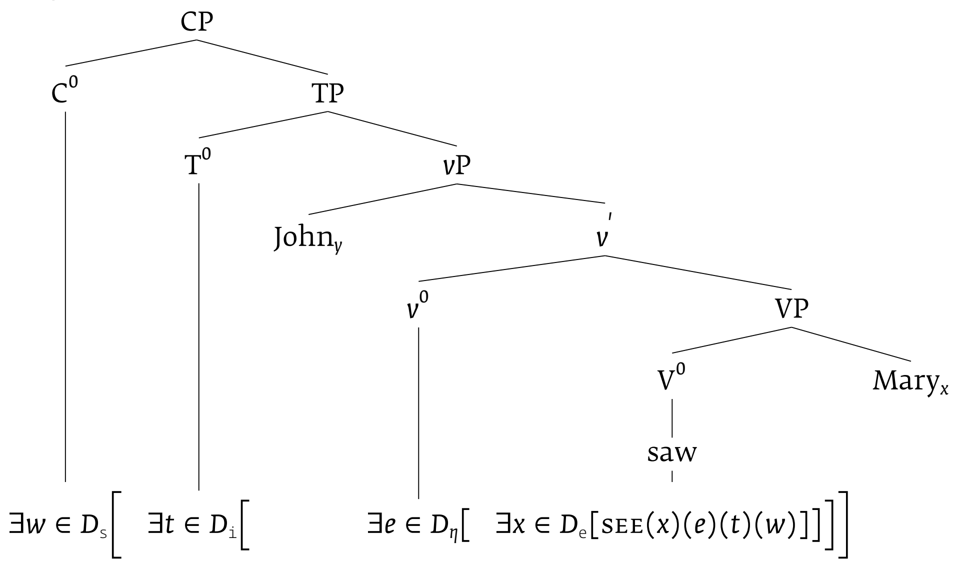
Shimada's (2007) model. Take a verbal head-complex that is assumed to be at the base of derivation in (104), $\left[\ \mathrm{V}^0\ [\ v^0\ [\ \mathrm{T}^0\ \mathrm{C}^0\ ]]\right]$, which represents semantically a complex of the necessary interpretational slots for a predicate like *see* once it enters the derivation. For now, we ignore the semantic import of v^0 for succinctness: below, we simply assume that v^0 introduces an event argument slot of type η.

(106)



After successive excorporation, not only the derivation but also the interpretation obtains, in line with Kusumoto (2005), assuming all λs are ∃-closed.

(107) Resulting derivation and interpretation of a sentence like *John saw Mary.*



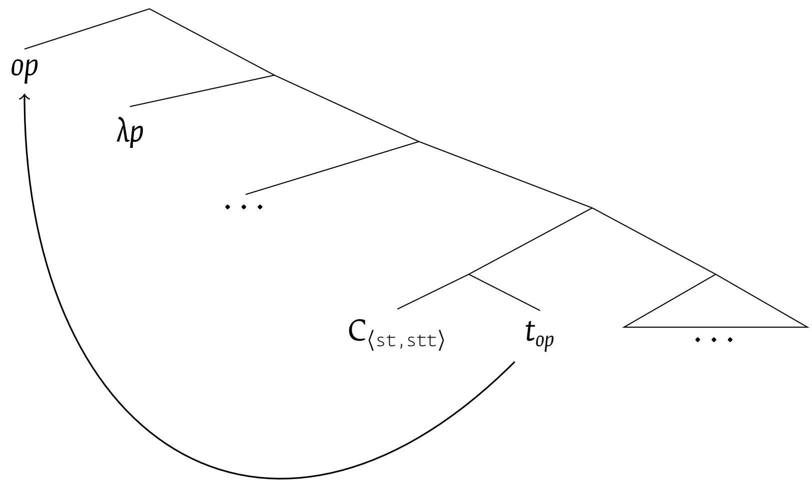
Shimada's (2007) excorporation trigger is semantic. Assuming the functional categories in the clausal spine, i.e. C^0, T^0 and v^0, are in fact quantifiers over worlds, time-space pairs and events, respectively, he motivates the excorporation to the root on the grounds of type mismatch. He further defines "the complement as a node from within which its head-to-be is moved by head movement", which collapses "the arbitrary distinction between specifier and complement" since he treats all externally merged nodes as specifiers, making the merge site of objects in [Spec, V^0].

The idea of banishing arguments into specifiers does not affect the LCA in any way since Kayne himself proposed that objects are not universally merged as complements. It therefore holds that, on a general level, Shimada's (2007) base word order, with respect to head-argument configurations, is structurally equivalent to the derived head-final word order of Kayne (1994).

This still makes English look like Japanese, which Shimada (2007) explicates by extending the reasoning we applied to the Kusumoto's (2005) null-PAST morpheme. The basic idea is that phonetic value of a lexical item may be move onto another head within the head-complex.

There is another independent motivation for the excorporation analysis that Shimada proposes. Consider the standard analysis of covert question-formation (Nicolae 2013; Sauerland 1998; von Stechow 1996, among many others), where the LF of an interrogative CP essentially requires excorporation of a a question-level operator from within an independently motivated C^0_{+Q}-complex.

(108) *op*-excorporation and the preliminary sketch of the semantics of questions:



FEATURE SYSTEM We take a slight step back in order to explicate a feature system. It can be argued on grounds of conceptual necessity that a syntactic minimal category (a head), is a feature set (Chomsky, 1995). Further, not all features are equally relevant at all stages of the linguistic computation, comprising a (narrow syntactic) derivational module, the externalisation and the interpretational wings, as sketched in Fig. 2.1. Thus a formal syntactic feature, which we label ⚘, can be seen to contain information for the derivation of a structure, while a semantic feature, labelled ℹ, presents the intepretational module with instructions for interpretation (these can be seen as lexical entries/LFs of the terminals). Finally the phonetic/phonological features, labelled ♪, instruct the motor-sensory module of the grammar whether to—and/or how to—pronounce the head (e.g. prosodic contour).

While Fanselow (2001), among many others, presents an excellent conceptual overview of the feature system, it suffices for our purposes to as-

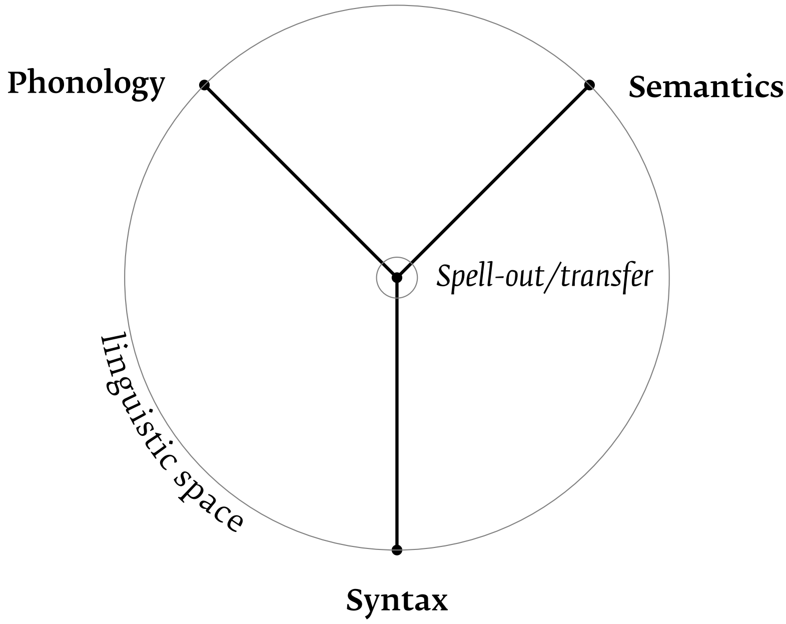


FIGURE 2.1.: *The Y-model: a minimalist architecture of grammar*

sume the two-fold skeletal definition of heads and feature subsets in (109), which amount to defining a head as in (110).

(109) a. heads are feature sets, and
b. there are three subset kinds of the feature set:
i. formal features (🌱)
ii. semantic features (ℹ)
iii. phonetic/phonological features (♪)

(110) $X^0 = \langle$ {🌱}, {ℹ}, {♪} $\rangle$

We follow Matushansky's (2006) definition of a head, which we state in (111).

(111) SYNTACTIC HEAD: (Matushansky, 2006: 70, ex. 1)
A head is a syntactically indivisible bundle of formal features.

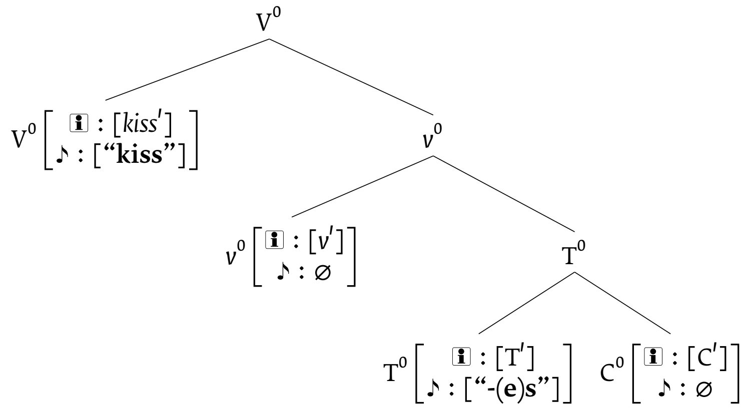
Assuming the methodological principles put forth by Chomsky (1995) in form of the Minimalist Program, Matushansky (2006) derives the definition of a syntactic head in (111) by noting that the atomicity of derived heads should follow from the properties of the grammar, independently motivated by Chomsky (1995). This definition, however, does not preclude the indivisibility of non-formal, i.e. the semantic and phonetic, features. Take a feature bundle of T^0 in English:

(112) T^0 [🌲 : [EPP] ; ℹ : [PRES] ; ♪ : [“**-s**”]]

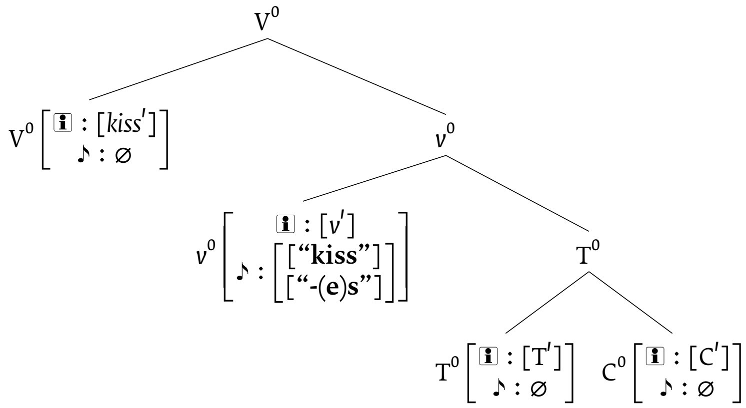
Let us now return to the old problem of English vs. French lowering/raising analysis we reviewed earlier. Employing our 3D feature system and Shimada’s (2007) idea of phonological/semantic feature movement, we can represent the English verb system as shown in (113), based on Shimada’s (2007) ex. 12 (p. 17), where we ignore the syntactic features for convenience and clarity. We are also sketching the semantics very coarsely at this stage, but see Shimada (2007: chs. 2&3) for details.

(113) The verbal head-complex for English ‘John often kisses Mary’:

a. pre-♪-movement:



b. post-♪-movement:

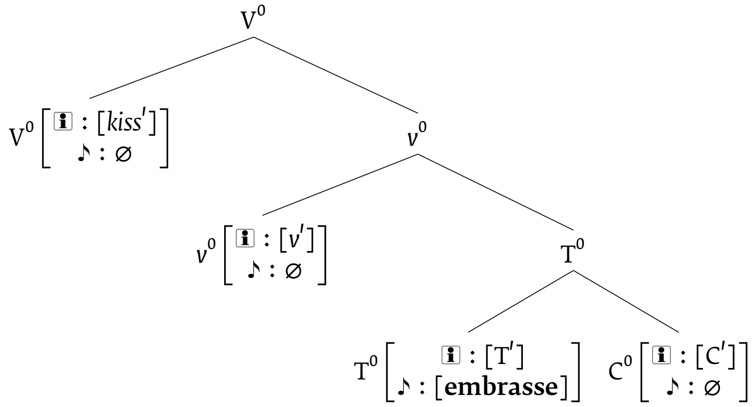


It is an empirical fact, at least insofar as English is concerned, that the lexical verb and the tense inflection must ultimately morphologically fuse although they start their syntactic lives separately (113a). We also have independent motivation for V-to-*v* raising,[20] the latter being caught between V^0 and T^0, so following Shimada (2007) we take v^0 to be the ‘attractor’ of the phonological features of both the V^0 and T^0 and that this takes place before the excorporation from the verbal head-complex, as shown in (113a). Given that languages do not tend to pronounce all the copies of a chain (99), we take the pronunciation index to be specified on v^0 and once excorporation takes place, the correct word order is in fact derived without running into technical problems. Shimada (2007: 18) further assumes that “only the phonetic content moves, but the meaning of each heads remains in its ‘home’ position.”

So the English V-lowering in the sense of Pollock (1989) translates into ♪-attraction on v^0. For French, Shimada proposes that the ♪-attracting property lies with T^0 which absorbs the phonetic content of neighbouring heads.

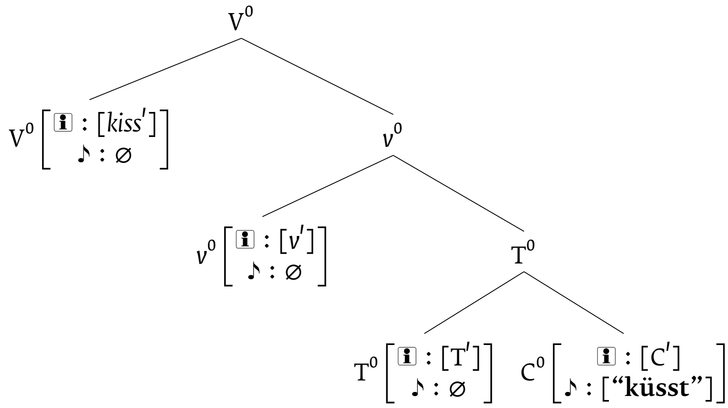
(114) The verbal head-complex for French ‘Jean embrasse souvent Marie’:

20 Shimada’s model inadvertently makes the following prediction: all languages which do not have V-to-*v* raising are head-final. While it is not immediately clear to me whether this is true, Ian Roberts (p.c.) refers me to Huang’s (2013) analysis according to which Mandarin Chinese may lack V-to-*v* raising.



There's one final option left for ♪-attraction and that is the case of ♪-saturation on C^0. Shimada takes this to be the case with V2 languages. (115) shows this for German.

(115) The verbal head-complex for German (V2) 'Johann küsst Maria':



The 'directionality parameter' can also be straightforwardly encoded in Shimada's (2007) system. This may be done by translating "the parameter that decides whether head movement moves a head to the left or the right, since the complement of a head is a constituent out of which the head has moved by head movement." (Shimada, 2007: 21) Shimada demonstrates that word order and directionality indeed have a direct translation into his model. We do not proceed deeper into the technical details on this front but note that the Antisymmetry model of Kayne (1994) and the 'head unfolding' model of Shimada (2007), as we label it, indeed have two common underlying ideas, namely (i) that there is a UG-provided specifier-head-complement configuration, which all languages obey, and (ii) that the 'directionality parameter' in the traditional sense does not really exist.[21]

It follows from architectural principles that no one domain confined to narrow syntax should obey a domain-internal derivational principle, such as Shimada's (2007) head-unfolding mechanics, which we have explored for the clausal spine. Shimada (2007) provides both syntactic and semantic arguments for the existence of the derivational kind we reviewed for the clausal spine to exist also in the nominal domain. We skip reviewing the intricacies of his take on the nominal domain, which is far less extensive than his analysis of the verbal domain, it however, should suffice to note the same architectural principles applying, namely the 'inversion of the spine' so as to ensure the derivational precedence, and thus structural command, of what ends up being the highest syntactic object. We depart from Shimada (2007) in that we assume the D^0 to be part of the nominal extended projection, whether viewed in the 'inverted' Shimadaean perspective or not. Shimada takes the D^0 to be merged externally to the nominal head complex preceding the D^0-selection. While the motivation for not treating D^0 as part of the extended nominal projection is not clearly stated, I suspect the reason for this is that Shimada's (2007) architectural desideratum of proposing the 'unfolding' model is to maintain a static semantics for the elements in the head complex. In his view, all members of the primary head complex, i.e. the head-containing structure preceding merger with external arguments (note that all arguments are external in this model), are inherently quantificational. The quantificational treatment of D^0 may be too far-fetched for the architectural ideals of the models—this ontological, however, interpretation is my own.

Shimada (2007) takes n^0 to correspond, in structural prominence and/or functional weight, which may be understood in the sense of Grimshaw (2000, 2005), to v^0. Determiners like *every*, on the other hand, correspond, in his model, to individual arguments of the predicate; or at least those elements responsible for the introduction of external and internal arguments. In his words, '[s]ince a *dancer* is an individual who is the agent of an event of dancing, the determiner in *every dancer* corresponds to the subject of the verb *dance*. Therefore, *every* is merged as a specifier of *n*P after the head movement of n^0 [has taken place]". (Shimada, 2007: 57) The departure point of treating D as part of the extended projection as opposed to the head of the (inherently external) argument element, has structural bearing on

21 Notice that, assuming LCA, (ii) reduces to (i), i.e. (ii) follows from (i).

our designating the ‘unfolding’ derivational steps for con-/disjunction.

HEAD MOVEMENT ACROSS EXTENDED PROJECTIONS Shimada’s (2007) model provides an elegant derivational theory of head movement but implicitly makes one crucial assumption, which constitutes a shortcoming. It accounts for instances of head movement within a single EP. Take, for instance, cliticisation of a nominal element onto a verbal element.

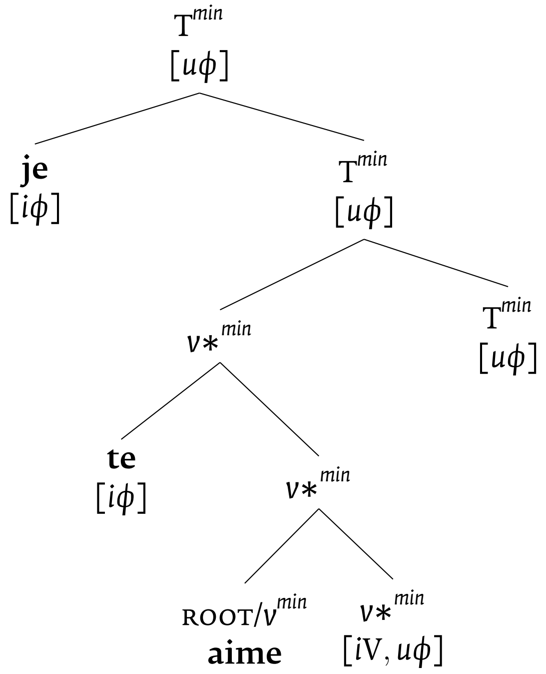
(116) Je t’aime
I you.CL-love
‘I love you’

Following Roberts (2010), we take cliticisation to be an instance of head movement. In the case of (116), then, the probe and goal of cliticisation, *qua* head movement, are not part of the same EP and, as such, fall outside of Shimada’s (2007) system. Roberts (2010), on the other hand, develops a system, which can readily account for the head movement as instantiated by cliticisation in (116). His system of head movement rests on treating the Agree relation between a probe and a goal as defective. In general, the defectivity is defined in (117).

(117) DEFECTIVITY (Roberts, 2010)
A goal G is defective iff G’s formal features are a proper subset of those of G’s probe P.

The general sketch of deriving head movement for (116), taken from Roberts (2010: 104, ex. 104), is given in (118), according to which the formal feature of the object DP (= G), i.e. {[$i\phi$]}, constitutes a subset of formal features {[$u\phi$], [iV]} on the *v* (= P), which obtains raising of the object pronoun to *v*, in line with (117).

(118)



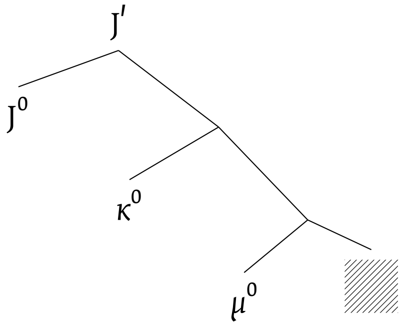
We therefore propose to extended Shimada's (2007) system to the one developed by Roberts (2010) since there is nothing immediately mutually-excluding or contradictory in the two models.

EXTENSION TO JUNCTION As stated, it follows from independent principles that cross-categorial structural isomorphism should obtain insofar as the core mechanism of the structure building is concerned. Assuming that head movement underlies all syntactic structure, for Shimada's (2007) motivations, then we may straightforwardly transplant the idea to the derivation of coordination.

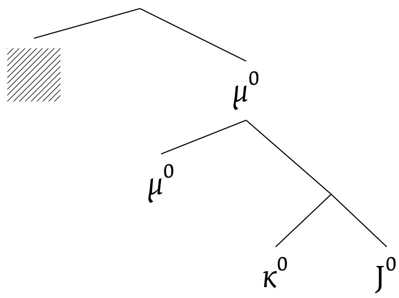
Shimada's (2007) model rests on some foundational structural preliminaries such as positing a primarily composed head-complex of a given extended projection, which obligatorily requires head movement out of the head-complex for type-driven reasons (which also constitutes a first ever theory of head movement, which is inherently motivated on semantic grounds). Thus, in elementary technical terms, a 'Shimadisation' of any given syntactic structure may be achieved without breaching many, or any, minimalist principles of synatctic derivation.

We have motivated on independent grounds a syntactic structure for coordination, which features three heads: two conjunct/disjunct selecting (denoting) heads (μ^0/κ^0 resp.) and a super-structural junction head (J^0). Take the constituency of the J^0 and the internal coordinand, featuring both μ^0 and κ^0—a structure we have preliminarily proposed for exclusive disjunction on the grounds of Avar and Dargi data. A Shimadisation of the motivated structure (119a) is thus technically achieved by inverting the head relation as in (119b).

(119) a. Motivated structure:



b. Shimadisation of the motivated structure:



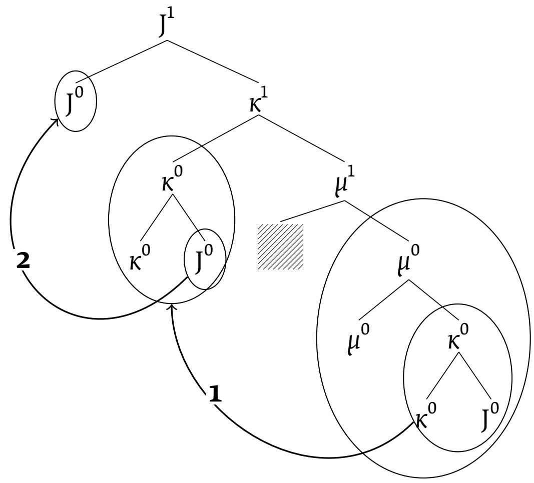
In case of the derivation of the internal coordinand in the exclusive disjunction construction such as the ones in Dargi in Avar, repeated below as (120) and (121) respectively, with internal coordinands marked, the derivation would successfully obtain.

(120) **ya ra** pilaw b-ir-eħe, [**ya ra** nerğ] b-ir-eħe
κ μ pilaf(ABS) N-do-FUT.1 κ μ soup(ABS) N-do-FUT.1
(‘What shall we make for lunch?’) ‘We’ ll make (either) pilaf or soup.’ (van der Berg 2004: 204)

(121) **ya gi** Sasha [**ya gi** Vanya]
κ μ S κ μ V
‘either Sasha or vanya.’

Assuming that the coordinand is merged in the  argument slot as specifier to the coordination head-complex as shown in (119b), headed by the μ head spelt out as *ra* in Dargi and *gi* in Avar. This is derivationally followed by the excorporation of the μ complement headed by κ^0, realised as *ya* in both Dargi and Avar. Assuming that no ♪-movement takes place prior to excorporation, we obtain the correct word order and, as we shall see in chapter three, the correct compositional intepretation. The last head to excorporate from the κ-dominated head complex is J^0, which will serve as the introducer of the external coordinand derived in the same fashion. We sketch this derivation in (122), ignoring the semantically relevant λ-slots.

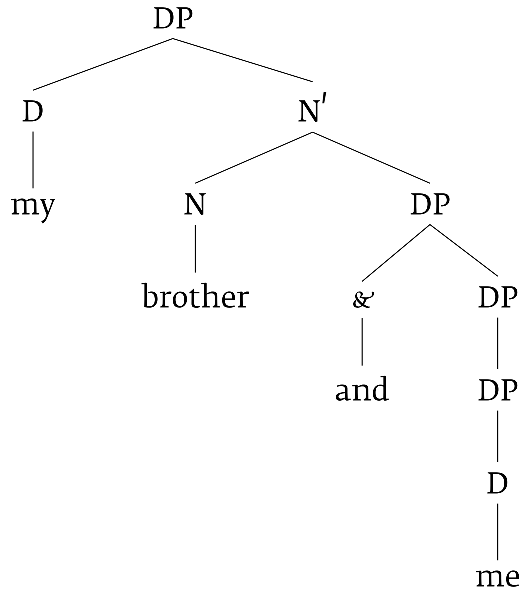
(122) Head-unfolding JP:



Let us now turn to the question of the syntactic status of the external coordinand, which is not without problems, neither when adopting Shimada's (2007) model nor any other theory for that matter.

Once the syntactic status of the external (left) coordinand is considered, the discussion of the status of D^0 with respect to its being within the extended projection (Grimshaw 2000, 2005) or outside the extended nominal projection (Shimada, 2007) becomes relevant. If the μ-κ head complex from the second (external) coordinand were within the *same* extended projection as the internal coordinand's head complex, containing J^0, we would essentially end up with the syntactic structure for coordination proposed by Velde (2005), which essentially utilises the Boolean Projection motivation from Munn (1993), which achieves the 'freely' available option of Boolean complementation of the external coordinand, which takes a BoolP, headed by a coordinator (Bool^0), as a complement. For reasons of syncategorematicity of coordinators, Velde (2005) leaves out the Bool/& label, which technically does not exist since labels are only defined for minimal categories. In Velde's (2005) system, & is not treated as a minimal category, hence other related problems, such as projection, do not arise; the syntactic status of coordination in Velde's (2005) system is given in (123) below.

(123) Velde's (2005) take on nominal coordination (his ex. 25, p. 30):



This structural take on coordination, however, technically allows movement from within the external coordinand, which does not form a constituent independently from the internal coordinand. On the other hand, if we assume that the head complex merging the external coordinand is subsequently merged as an argument to a pre-formed J^1 complex (122), then we do not only attain the prohibition of extraction from within the external coordinand, which follows from Huang's (1982) ban on extraction from specifiers, but we also arrive at a syntactically complete constituency of the internal coordinand.

This subsection has introduced Shimada's (2007) head-complex theory of incorporation. On a general and conceptual level, we have arrived at an elegant theory of incorporation, which we have tried amalgamating with Roberts's (2010) model of defectivity with success. On a more specific level, we have transplanted the excorporation system to coordination. This way, our three-head system of coordination (35) can be restated in terms of a single head-complex (119).

We will further employ Shimada's (2007) model in Chapter 5 (specifically, §5.4) where we propose an analysis of a Japonic focus-relativisation construction.

2.6 Chapter summary

In this chapter, we substantiated den Dikken's (2006) JP analysis by providing it with a wide and novel cross-linguistic support. Furthermore, we elaborated on the JP syntax of (exlusive) disjunction, which we have shown to feature five heads: a silent J^0 and two sets of κ and μ heads. After flipping the derivational system upside-down by drawing from Shimada (2007), we have proposed a head complex analysis of the JP coordination structure, which features successive excorporation of functional heads. We now turn to the diachronic and empirical portion of the thesis by investigating the syntax of coordination in Indo-European (IE) and relating it to the theoretical issues raised in this chapter.

3

The Indo-European double system

3.1 Introduction

This chapter presents an archaeological dig for superparticles in Indo-European (IE). There are two general desiderata for this chapter, namely to show (P)IE superparticles and the grammar of coordination and quantification have two properties:

i. There existed two types of coordinating particles (and consequently, two types of coordination constructions).
ii. There existed two types of interpretation for one of the two types of coordinate particles.

We will refer to the property in (i) as the 'double system of coordination.' The general aim, then, is to tease apart the taxonomies and have one of the grammatical properties (the second one) automatically fall from the system which we have already begun to set up in the previous chapter.

Across the entire IE family, two morphosyntactic patterns of coordination are found as Agbayani and Golston (2010) have investigated most recently. In one type of coordinate construction, the coordinator occupies the enclitic (peninitial, or second) position with respect to the internal (second) coordinand (124a). In another type, the coordinator is initially placed between any two, or more, coordinands (124b), as the the minimal representative pair from Homeric Greek shows in (124). Diachronically, the change from the two competing structures with peninitial and initial positions to the initial type is uniform across the board in IE.

(124) a. ἀσπίδας εὐκύκλους λαισήϊά τε πτερόεντα.
aspidas eukuklous laisēia **te** pteroenta
shields round pelt and feathered

'The round shields and fluttering targets.'

(Il. M. 426)

b. κεῖσ' εἶμι καὶ ἀντιόω πολέμοιο
keīs' eīmi **kaì** antiō polemoio
there go and meet battle

'Go thither, and confront the war.'

(Il. M. 368)

The proposed synchronic analysis of the two coordinate structures, represented in (124a) and (124b), identifies two coordinate positions: I will show that enclitic (peninitial) coordinators occupy one of those positions, while the orthotone (initial) coordinators occupy *both* coordinator positions. By looking into the fine-grained structure of coordination synchronically in IE languages, a diachronic account resting on the feature-checking mechanism will present itself straightforwardly. The morphosyntactic change in word order patterns in coordination will be shown to not only have ramifications in terms of linearisation (change from peninitial to initial position), but is tightly related to the semantics underlying the two positions we identify syntactically. I show that the alternation between the two (124a) and (124b) constructions is not free and random but rather that it obeys the phasal 'logicality' of derivation.

The roadmap for the chapter is the following: in §3.2, we explore the 'double system' as sketched above, deriving a uniform syntactic structure for IE coordination and extending, in the following section (§3.3), the independence of the embedded μP-cycle, which we have alluded to in the previous chapter. In §3.4, we apply this syntactic structure to particular IE languages by presenting detailed comparative morphosyntactic analyses according to the IE subfamilies (branches). §3.5 presents technical details in form of a synchronic analysis of the JP structure for coordination in light of the IE double system. The last section, §3.6, extends this analysis diachronically and theorises on syntactic-semantic change of JP in IE. We discuss the main finding in §3.7

3.2 The double system: from two positions to two heads

Having motivated a fine-grained J-μ complex for coordinate construction, both theoretically and empirically in the previous chapter, we now address the central concern of this chapter, the IE coordinate construction. The existence of two types of construction with respect to the pen/initial positioning of the coordinator does not only correlate with

(i) the alternation in linear placement of coordinator but also

(ii) the very morphological structure of the the two types of coordinators heading pen/initial constructions.

In the following two subsections, we take each of the two (i, ii) properties in turn.

3.2.1 Alternation in linear placement

We start our discussion with a diachronic perspective on IE syntax of coordination, which shows linear alternation in coordinator placement. The earliest IE languages show that there existed two syntactic types of coordinate structures. One in which the coordinator occupies the initial, and another in which the coordinator occupies the peninitial position with respect to the internal coordinand.

Klein (1985a, 1985b) provided the statistical facts for Ṛgvedic, and Agbayani and Golston (2010) a generalised syntactic account for IE more generally, that the alternation between initial and peninitial placements of the coordinator patterns with the category of the coordinands. The analysis we develop here will amount to a generalisation according to which the peninitial (enclitic) coordinators generally do not coordinate clauses while the initial coordinators can.

The following pairs of initial (a) and peninitial (b) coordinate configurations from Sanskrit, Greek, and Latin exhibit the alternation in linear placement of the coordinating particle.

(125) Homeric Greek:

a. ἀσπίδας εὐκύκλους λαισήϊά τε πτερόεντα.
aspidas eukuklous laisēia **te** pteroenta
shields round pelt and feathered
'The round shields and fluttering targets.' (Il. M. 426)

b. κεῖσ' εἶμι καὶ ἀντιόω πολέμοιο
keīs' eīmi **kai** antiō polemoio
there go and meet battle
'Go thither, and confront the war.' (Il. M. 368)

(126) VEDIC SANSKRIT:

a. वायविन्द्रश्च चेतथः सुतानां वाजिनीवसू
vā́yav-īndraś-**ca** cetathaḥ sutā́nāṃ vājinīvasū
Vayu-Indra-**and** rush.2.DL rich strength-bestowing
'Vayu and Indra, rich in spoil, rush (hither).' (ṚV 1.002.5[a])

b. पर्षि तस्यां उत द्विषः
párṣi tásyā **utá** dviṣáḥ
save.IMP.2.SG this **and** enmity
'Save us from this and enmity.' (ṚV 2.007.2[c])

(127) CLASSICAL LATIN:

a. vīam samūtem **que**
life safety and
'the life and safety' (Or. 1.VI.28-9)

b. ad summam rem pūblicam **atque** ad omnium nostrum
to utmost weal common and to all of us
'to highest welfare and all our [lives]' (Or. 1.VI.27-8)

The syntactic duality of the double placement of the coordinator extends beyond the three classically representative IE languages above. It is clear from these pairs of examples that IE had an enclitic (2P/peninitial) and a free-standing (1P/initial) series of coordinators. We could distinguish the two types of configurations by positing that the peninitially placed (enclitic) coordinator induces some form of movement, either syntactically or postsyntactically, but that the difference lies only in the linearisation of the surface placement of the coordinator. Let us now briefly sketch the empirical facts surrounding this taxonomy of two types of coordinators in IE.

Old Avestan, just like Ṛgvedic, distinguishes between (a seemingly discourse) initial *uta* and enclitic *ca*, predominantly confined to nominal coordinations:

(128) OLD AVESTAN:

a.

uta	mazdå	huruϑma	haoma
and	wisdom.M.SG.GEN	increase.M.SG.NOM	haoma.M.SG.VOC

raose	gara	paiti
grow.2.SUBJ.MID	mountain.SG.M.LOC	toward

'And [thus] may you grow upon that mountain, O Haoma, [bringing] the increase of wisdom, [...].' (AvYH. 10.4)

b.

yūžəəm	aēibiiō	ahurā	aogō
you.2.SG.NOM	them.PL.DAT	lord.M.SG.VOC	strength.N.SG.ACC

dātā	aṣ̌ā	xṣ̌aϑrəm	**cā**
give.2.PL.AOR.IMP	truth.N.SG.INST	power.N.SG.ACC	and

'O Lord, may you give strength to them2 through Truth and that power [. . .]' (AvYH. 29.10)

Hittite, along with other Anatolian languages, distinguishes between the initial, and often discourse-initial, *nu* and enclitic *(y)a*, which also predominantly features in nominal coordinations.

(129) HITTITE:

a.

nu	kán	Mursilin	kuennir	**nu**	ešar	ieir	**nu**
and	PRT	Mursilis.ACC	they.killed	and	blood	shed.3.PL	and

Hantilis	nahsariyatati
Hantilis	feared.3.SG.M

'And they killed Mursilis and they shed blood and Hantilis was afraid.' (2BoTU. 23.1.33-35)

b.

anšu.kur.ra.meš	LÚ.meš is.guškin	**ya**	humandan
charioteers	grooms.golden	and	all

'Charioteers and all the golden grooms.' (StBoT. 24.*ii*.60-61)

c. 
kass **a** za URU-az parnanzass **a** [UD]U.A.LUM
this.NOM and PTC city.NOM house.NOM and ram

DÙ-ru
become.3SG.IMP
'and let (both) this city and house become the ram'
(KUB. 41.8 iv 30.)

Old Church Slavonic also boasts a pair of coordinators: an initial *i* and a peninitial adversative relative marker *že* (cognate with Greek γε):

(130) OLD CHURCH SLAVONIC:

a. дѣдъ мои и оцъ мои и инии мнози
dědŭ moi, i otĭcŭ moi, i inii mnodzi
grandfather my and father my and those many
'My grandfather, my father, and those many others . . . '
(VC. 14[8])

b. ⰰⰸⱏ ⰶⰵ ⰳⰾⱓ ⰲⰰⰿⱏ
Azŭ **že** gljǫ vamŭ . . .
I but.REL tell.1.SG.PRES you.DAT
'But I tell you ...' (CM. Mt. 5:28)

Similarly, Old Irish possessed a complex *ocus*, which occupied the first position, and a simplex *ch* (<∗k^w*e*, cf. IIr. *ca*, Lat. *que*, etc.).

(131) OLD IRISH:

a. boí Conchubhur ⁊ [=**ocus**] maithi
was.3.SG.AOR C.M.NOM.SG and the nobles.PL.NOM
Ulad i nEmuin
Ulstermen.M.PL.GEN in Emain Macha
'Conchobar and the nobles of the Ulstermen were in Emain Macha.'
(CCC, 1.1; Ó hUiginn 1991: 3)

b. ba≠**ch** ri Temrach
COP-and king Tara.GEN
'And he was king of Tara.' (EILw. 4.179)

Among the old Germanic languages, only Gothic boasts a double set of coordinators differing in the linear placement: an initial *jah* and an enclitic *uh*.

(132) GOTHIC:

a. 𐌰𐌺 𐌰𐌽𐌰 𐌻𐌿𐌺𐌰𐍂𐌽𐌰𐍃𐍄𐌰𐌸𐌹𐌽 𐌾𐌰𐌷 𐌻𐌹𐌿𐍄𐌴𐌹𐌸 𐌰𐌻𐌻𐌰𐌹𐌼
ak ana lukarnastaþin **jah** liuteiþ allaim
neither on candle.DAT.SG and light.IND.3.SG all.DAT.PL
𐌸𐌰𐌹𐌼 𐌹𐌽 𐌸𐌰𐌼𐌼𐌰 𐌲𐌰𐍂𐌳𐌰
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.' (CA. Mt. 5:15)

b. (𐌲𐌰𐌻𐌰𐌹𐌸 𐌹𐌽 𐍀𐍂𐌰𐌹𐍄𐌰𐌿𐍂𐌹𐌰 𐌰𐍆𐍄𐍂𐌰 𐍀𐌴𐌹𐌻𐌰𐍄𐌿𐍃
(galaiþ in praitauria aftra Peilatus
came.PRET.3.SG in judgement hall.ACC.SH again P.NOM
𐌾𐌰𐌷) 𐍅𐍉𐍀𐌹𐌳𐌰 𐌹𐌴𐍃𐌿 𐌵𐌰𐌸 𐌿𐌷 𐌹𐌼𐌼𐌰
jah) wopida Iesu qaþ **uh** imma
and called.PRET.3.SG J.ACC said.PRET.3.SG and him.M.DAT.SG

'(Then) Pilate entered into the judgment hall again, and called Jesus, and said unto him.' (CA. Jn. 18:33)

While Gothic still shows the dual type of coordination (132), there is no such evidence for other early Germanic languages. The only early Runic inscription we have is the one in (133), where a medial conjunction *andi* is employed.

(133) RUNIC GERMANIC:

a. ·ᚨᛁᚷᛁᛚ· ᚨᚾᛞᛁ· ᚨᛁᛚᚱᚢᚾ·
.aigil **.andi** .aïlrun.
Aigil.PN and Aïlrun.PN

'Aigil and Aïlrun.' (Pfor-I; Looijenga 2003: 253)

The enclitic series is generally and freely prone to reduplication. As Gonda (1954) and Dunkel (1982) note, a peninitial connective like $*k^w e$ is traditionally reconstructed with a twofold syntax: both single (X Y $*k^w e$) and double structures (X $*k^w e$ Y $*k^w e$), as the following three pairs representatively show.

(134) VEDIC AND CLASSICAL SANSKRIT:

a. धर्मे च अर्थे च कामे च
dharme **ca** arthe **ca** kāme **ca**
dharma/law.LOC and commerce.LOC and pleasure.LOC and
मोक्षे च भरत ऋषभ यद् इह अस्ति तद्
mokṣe **ca** bharata ṛṣabha yad iha asti tad
liberation.LOC and Bharata giant which here is.3.SG that
अन्यत्र यद् न इह अस्ति न तत् क्वचित्
anyatra yad na iha asti na tat kvacit
elsewhere which not here is.3.SG not that anywhere

‘Giant among Bharatas whatever is here on Law, and on commerce, and on pleasure, and on liberation is found elsewhere, but what is not here is nowhere else.’ (Mbh. 1.56.34)

b. वाय॒व् इन्द्र॑श् च चेतथः सु॒ताना॑ं वाजिनीवसू
vā́yav īndraś **ca** cetathaḥ sutā́nāṃ vājinīvasū
Vayu Indra and rush.2.DL rich strength-bestowing

‘Vayu and Indra, rich in spoil, rush (hither).’
(ṚV 1.002.5[a])

(135) HOMERIC GREEK:

a. ὃς ᾔδη τά τ᾽ ἐόντα τά τ᾽
os ede tá **te** eonta tá **te**
which were (=know.PLUP) the and exist.PART the and
ἐσσόμενα πρό τ᾽ ἐόντα
essomena pró **te** eonta
exist.FUT before and exist.PART

‘That were, and that were to be, and that had been before.’
(Il. A. 70)

b. ἀσπίδας εὐκύκλος λαισήϊά τε πτερόεντα
aspidas eukuklous laisēia **te** pteroenta
shields round pelt and feathered

‘The round shields and fluttering targets.’
(Il. M. 426)

(136) CLASSICAL LATIN:

a. iam tum tendit **que** fovet **que**
already then pursue and favour and

‘Already then, she *both* pursued it *and* (also) favoured it.’
(Aen. 1.18)

b. vīam samūtem **que**
life safety and
'the life and safety' (Or. 1.VI.28-9)

The polysyndetic pattern of enclitic coordinators in (134a), (135a) and (136a) seems to have carried an emphatic component, akin to the modern English emphatic conjunction with *both...and*. We find the same reduplicative pattern with emphatic/focal semantics in Old Church Slavonic (OCS), which survives in contemporary SerBo-Croatian, among other contemporary Slavonic languages. It is OCS, and its diachronic descendants, that shows the independence of linear placement and semantic force behind the coordinator. Proto-Slavonic has independently syncretised the prepositive (initial *atque*-type) and postpositive (peninitial/enclitic *que*-type) coordinators but only lexically. As the following OCS example in (137) shows, conjunctor *i* has both the conjunctive semantics of the initial *atque*-type coordinators in IE as well as the emphatic/focal semantics of the enclitic *que*-type coordinators. While the dual semantics—to be adequately addressed below—is retained in Slavonic, the moprho-lexical difference between the two classes of coordinators has been collapsed. We will return to the syntax of this collapse below. In (137), the first pair (a) shows (reduplicative) polysyndetic coordination with emphatic/focal meaning, while the second pair (b) is an example of a monosyndetic construction.

(137) Old Church Slavonic:

a. ⰱⱁⰻⱅⰵ ⰶⰵ ⱄⱔ ⱂⰰⱍⰵ ⰿⱁⰳⱘⱋⰰⰰⰳⱁ ⰻ ⰴ҃ⱎⱘ ⰻ ⱅⱑⰾⱁ
boite že sę pače mogǫštaago **i** dšǫ **i** tělo
fear but REFL rather be.able and soul and body
ⱂⱁⰳⱆⰱⰻⱅⰻ
pogubiti
destroy
'But rather fear that which is able to destroy *both* soul *and* body.'
(CM. Mt. 10:28)

b. ⰱⱘⰴⱑⱅⰵ ⰶⰵ ⰿⱘⰴⱃⰻ ⱑⰽⱁ ⰸⰿⰻⱗ ⰻ ⱌⱑⰾⰻ ⱑⰽⱁ ⰳⱁⰾⱘⰱⰹⰵ
bǫděte že mǫdri ěko zmiję **i** cěli ěko golǫbĭe
be but wise as serpents and harmless as doves
'Rather be wise as serpents, and harmless as doves.'
(CM. Mt. 10:16)

Note that the focal additive meaning related to polysyndeticity has been retained in some of the contemporary varieties of Slavonic. The following are parallel examples from Matthew in SerBo-Croatian:

(138) Contemporary SerBo-Croatian:

a. Bojte se više onoga koji može **i** dušu **i** tijelo pogubiti
fear REFL more that which may and soul and body destroy

'But rather fear that which is able to destroy *both* soul *and* body.'
(Mt. 10:28)

b. budite dakle mudri kao zmije **i** bezazleni kao golubovi
be therefore wise as serpents and harmless as doves

'Rather be wise as serpents, and harmless as doves.'
(Mt. 10:16)

In this subsection we have shown that IE indeed freely allowed reduplication of the coordinator. We have also explored the possible semantic side-effect of such reduplication yielding a focus-sensitive effect identical to the English *both ...and* construction, which is paraphrasable as *not only ...but also*. We now turn to another feature of the double system of coordination, namely the word-structure of the particles in question.

3.2.2 Morphemicity

There is one additional, and for our purposes crucial, fact distinguishing the initial and the peninitial types of coordinators. The difference also lies in the morphological structure of the two series.

While peninitial coordinators are monomorphemic, the initial coordinators are not. Initially placed coordinators are bimorphemic and as such are decomposable synchronically or diachronically into two coordinators, each underlying a morpheme. Greek *kai*, for instance, derives from ∗*kati*, itself being a concatenation of ∗k^w*e* + ∗*te* (Beekes 2010: 614, Boisacq 1916: 390). Conversely, as Dunkel (1982, 2014a,b) etymologises it, Indo-Iranian (IIr.) *uta* comprises the coordinator *u* + *ta* (<∗h_2*(é)u* + ∗*te*); Gothic coordinators *jah* and *jau* result from ∗*yo* + ∗k^w*e* and ∗*yo* + ∗h_2*u* respectively. Dunkel

(1982) reconstructs two [±ENCLITIC] series of four coordinators for PIE. One series is orthotone and another enclitic as shown in Tab. 3.1[1].

ORTHOTONE	ENCLITIC
$*k^w$*ó* / $*k^w$*í*	$*$-k^w*e*
$*h_2$*éw*	$*$-h_2*u*
$*$*yó*	$*$-*yo*
$*$*tó*	$*$-*te*

TABLE 3.1.: *Dunkel's (1982) reconstruction of two coordinator series in IE*

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

Dunkel's orthotone connectives, however, are not found in independent (uncomposed) word-level compositions in any of the attested daughter languages, which begs the question of redundancy of the orthotone series. In its stead we may simply assume a single, inherently enclitic, series, out of which bimorphemic coordinators are composed. This reasoning derives the empirical facts in Tab. 3.2 in a more economical way. Dunkel's latest and extensive work (Dunkel 2014a; 2014a) contains much more data on composed particles, into which we do not delve further.

The Greek particle και is historically composed of two parts which can be traced back to PIE $*k^w$*e* and $*$*te*. (Beekes 2010: 615, Ruijgh 1967: §293, *int. al.*)

The OW coordinating particles *cen* and *cet* are treated as having a dyadic etymology in line with Dunkel (2014b: 422ff.) who treats the two particles as sharing a common additive/comitative particle which can be traced back to PCel. $*$*ko*- (Dunkel, 2014b: 423; fn. 5 and ref. therein). For details on the etymological decomposition of OW *ce-n*, see Dunkel (2014b: 410ff.; fn. 55) (cf. also Falileyev 2000: 25 for comparative evidence and further references) and for details on the decomposition of OW *ce-t*, see Dunkel (2014b: 425; fn. 16;) (cf. also Falileyev 2000: 27 for comparative evidence and further references).

The historical decomposition of Slovenian *in(u)* is supported by Trubačev (1980: 168), Vasmer (1953: 483), Feu (1961), and references therein.[2]

1 The philological notation h_2 refers to the *a*-colouring laryngeal.

2 As I am reminded, there is also Russ. *no* 'otherwise' and Russ. *inó* 'then'. We will be

	DEPENDENT / COMPOSED					INDEPENDENT	
	$*k^we$	*∗te*	$*h_2u$	*∗yo*	*∗nu*	[+ε]	[−ε]
$*k^we$		Gr. *kai* OW *ce-t*	—	—	OW *ce-n*	IIr. *ca* Lat. *que* Gr. *te* OIr. *ch* Goth. *uh* Gaul. *cue* Ven. *ke* Celtib. *ku*	—
∗te	OIr. *to-ch* Hit. *tak-ku*		—	—	—	Gr. *de* Alb. *dhe* Skt. *tu*	Sl. *to*
$*h_2u$	Skt. *u ca* Lat. *at-que*	IIr. *u-ta* Gr. *au-te* Lat. *au-t*		—	Slov. *i-n(u)*	IIr. *u* Gr. *au* CLuw. *ha*	Sl. *i*
∗yo	Goth. *ja-h*	—	Goth. *j-au*		—	Hit. *ya* TochA. *yo* Myc. *jo*	—
∗nu	OIr. *na-ch*	OIr. *na-de*	—	—		—	Hit. *nu* OIr. *no* Slov. *no*

TABLE 3.2.: *Clitic combinatorics as strategy for development of orthotone coordinators.*

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 mor-

concerned with the latter form which has the etymology and decomposition given in Tab. 3.2 (according to Vasmer), but the former is distinct (cognate with the numeral 'one' in other languages).

phemes are distributed between J^0 and the head of its complement, μ^0, as per Tab. 3.2.[3] This idea is summarised in (139) with the three types of coordinate construction; Classical Latin *(at)que* is taken as an example (∅ is a notation for phonological silence). Recall that 'peninitial' refers to the 2P placement of the μ particle.

(139) a. PENINITIAL COORDINATE CONSTRUCTIONS

i. *Peninitial polysyndetic coordination* (134a, 135a, 136a, 137a):

$$\Big[[_{\mu P}\ \ \underset{que}{\mu}\ \ \text{coord}_1\ ]\ [\ \underset{\varnothing}{J^0}\ [_{\mu P}\ \ \underset{que}{\mu}\ \ \text{coord}_2\ ]] \Big]$$

ii. *Peninitial monosyndetic coordination* (134b, 135b, 136b, 137b) with phonologically silent μ^0_{EXT}:

$$\Big[[_{\mu P}\ \ \underset{\varnothing}{\mu}\ \ \text{coord}_1\ ]\ [\ \underset{\varnothing}{J^0}\ [_{\mu P}\ \ \underset{que}{\mu}\ \ \text{coord}_2\ ]] \Big]$$

b. INITIAL (BIMORPHEMIC) COORDINATE CONSTRUCTIONS (173a) with phonologically silent μ^0_{EXT}:

$$\Big[[_{\mu P}\ \ \underset{\varnothing}{\mu}\ \ \text{coord}_1\ ]\ [\ \underset{at}{J^0}\ [_{\mu P}\ \ \underset{que}{\mu}\ \ \text{coord}_2\ ]] \Big]$$

The analysis of compound coordinators sketched in (139b), 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 analysis put forth here also makes an empirical prediction for IE. Our having assigned the lower μ-headed coordination structure a category status, we predict the independence of μP.

3.3 The independence of the lower cycle

According to the model we have been proposing, the syntax of coordination is broken down into categories of two kinds. While the higher J^0 is taken

3 The notation [±ε] in Tab. 3.2 refers to whether a particle is a Wackernagel element, requiring second-position ([+ε]), or not ([−ε]). The theory and details behind the notations are addressed below.

to join coordinate arguments, its complement μP is thus, *mutatis mutandis*, predicted to be an independent phrasal category. By virtue of being junctional, J^0 establishes a two-place relation between coordinands (a formal default of coordination). μP, on the other hand, does not establish a two-place coordinate relation, which leads us to the possibility there are mono-argumental and morphosyntactically coordination-like constructions headed by μ in IE. Given the generalisation on monomorphemic enclitic coordinators, now treated as μ^0s, we need to find in IE mono-argumental constructions headed by monomorphemic μ particles like Latin *que*, Sanskrit *ca* or OCS *i*. This is in fact what we find in all IE branches. Independent μPs are of three types: polarity constructions ('I didn't see *any*one'), free-choice constructions ('You may have *any/whichever* one') and focus constructions ('*Even* he came in'). In the former two, μPs contain a μ^0 and a *wh*-element. The following examples show a consistent spread of μPs, marked with brackets, across the full range of early IE languages.

Proceeding from east to west, we start with Indo-Iranian. Both Ṛgvedic and post-Vedic Sanskrit show the non-coordinate use of the coordinating particle *ca*, where it forms a free-choice expression of the *wh-ever*-type (140a,140b), or a negative polarity item (140c). When not combined with a *wh*-host, the particle forms an additive expression with focus semantics, akin to the function of *also/even* in English, as shown in (140d).

(140) VEDIC & CLASSICAL SANSKRIT:

a.

प्रतीदं	विश्वं	मोदते	यत्	किं	च	पृथिव्याम्	अधि
prátīdáṃ	viśvam	modate	yát	[kīṃ	**ca**]	pṛthivyā́m	ádhi
this	world	exults	which	[what	μ]	world.F.ACC	upon

'This whole world exults *whatever* is upon the earth.'

(ṚV 5.83.9[a])

b.

यदि	अभ्युपेतं	क्व	च	साधु	असाधु	वा
yady-	abhyupetaṃ	[kva	**ca**]	sādhu	asādhu	vā
if	promised to be accepted	where	μ	honest	dishonest	or

कृतं	माया
kṛtaṃ	mayā
done.PST.PART	1.SG.INSTR

'If you accept *whatever* I may do, whether honest or dishonest.'

(BP. 8.9.12)

c.

न	यस्य	कश्	च	तितितर्ति	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.’

(BP. 8.5.30)

d. चिन्तयमः च न पश्यामि भवतां प्रति
[cintayaṃś- **ca**] na paśyāmi bhavatāṃ prati
thinking.PRES.PART μ NEG see.1.SG you unto
वैकृतम्
vaikṛtam
offence.ACC

‘*Even* after much thinking, I fail to see the injury I did unto you.’
(Mbh. 2.20.1)

In Latin, too, the combination of a *μ* particle and a *wh*-term may yield a free-choice item like ‘whatever’ in (141a). Alternatively, the combination may yield a universal quantificational expression like ‘all’ or ‘each’, as examples which Bortolussi (2013) collected in (141b–141d) show.

(141) LATIN:

a. ut, in quo [quis **que**] artificio excelleret, is in suo genere
that in who [what *μ*] craft excels, is in his family
Roscius diceretur
R spoken

‘so that he, in *whatever* craft he excels, is spoken of as a Roscius in his field of endeavor.’ (Or. 1.28.130)

b. Sic singillatim nostrum unus quis-**que** mouetur
so individually we one wh-*μ* moved

‘So each of us is individually moved’ (Lucil. *sat.* 563)

c. Morbus est habitus cuius-**que** corporis contra naturam
sickness is reside wh-*μ* body contrary nature

‘The sickness is the situation of any/every/each body contrary to nature’ (Gell. 4.2.3)

d. 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)

Note the same free-choice meaning in Gothic, where the combination of a *wh*-term like ‘where’ and a *μ* particle *uh*, diachronically deriving from

$*k^w e$, yields 'wherever' as (142a) suggests. Just as in Latin, and other IE languages, the *wh*+*μ* combination may also form a universal quantificational expression as per (142b).

(142) GOTHIC:

a. 𐌸𐌹𐍃𐍈𐌰𐌳 𐌿𐌷 𐌲𐌰𐌲𐌲𐌹𐍃
[þishvad **uh**] (...) gaggis.
[where *μ*] go.2.SG.PRES.ACT.IND
'**wherever** you go' (CA. Mt. 8:19)

b. 𐌾𐌰𐌷 𐍈𐌰𐌶 𐌿𐌷 𐍃𐌰𐌴𐌹 𐌷𐌰𐌿𐍃𐌴𐌹𐌸 𐍅𐌰𐌿𐍂𐌳𐌰
jah [hvaz- **uh**] saei hauseiþ waurda
and who.M.SG and *pro*.M.SG hear.3.SG.IND words.ACC.PL
𐌼𐌴𐌹𐌽𐌰
meina
mine
'And **every** one that heareth these sayings of mine'
(CA. Mt. 7:26)

In Old Church Slavonic, we focus on one kind of *μ* particles: the conjunctive *i* particle. In non-coordinate uses, *i* was additive-focal (cf. Sanskrit ex. 140d), and the crucial morphemic ingredient for NPIs. In (143a), we show the additive role of *i*.

(143) OLD CHURCH SLAVONIC:

a. ⱂⱁⱄⱏⰾⰰ ⰺ ⱅⱁⰳⱁ ⰽⱏ ⱀⰹⰿⱏ
posŭla [**i** togo] kŭ nimŭ
sent.3.PL.AOR [*μ* him.M.SG.ACC] to then.PL.DAT
'He sent *also* him to them.' (CM. Mk. 12:6)

b. ⱀⰵ ⰿⱁⰳⰾⱏ ⰱⰹ ⱅⰲⱁⱃⰹⱅⰹ ⱀⰹⱍⰵⱄⱁⰶⰵ
ne moglŭ bi tvoriti [n-**i**-česo-že]
NEG be-able.PP would.3SG do [NEG-*μ*-what-REL]
'... he would not be able to do anything.' (CM. Jn. 9:33; Willis 2000: 328, ex. 15)

We also find the additive use of the coordinator *pe* in Tocharian:

(144) TOCHARIAN:

a. [ñemintuyo ypic olyiyaṃ sārt[h]
[jewels.PL.INST full ship.F.SG.LOC caravan.M.SG.OBL
Jambudvipac **pe**]
Jambudvipa.M.SG.ALLT and/μ]
yāmuräṣ, ṣpät koṃsā
having been made.SUPP.ABS.M.SG.ABL seven day.M.PL.PERLT
kñukac wraṃ
neck.SG.ALLT water.SG.LOC

'With a caravan to Jambudvipa *also* having been made in a ship filled with jewels [. . .]' (TA, Puṇyavanta-Jātaka, 5[a])

While Classical Armenian did not possess the enclitic $*k^w e$-type coordinator, we can ascertain its loss in the pre-Classical period, since the remnant $*k^w e$ still shows in fossilised non-coordinate form, with the semantics aligned with other IE languages.

(145) CLASSICAL ARMENIAN:

a. եթէ ո ք
et'e [o- **k'**] . . .
if who- μ

'If *anyone* [strike (thee) upon thy right cheek . . .]' (VT. Mat. 5.39; Klein 1997: 196)

b. երբէ ք
[erbe- **k'**] . . .
[time.LOC μ]

'At *any* time/*ever*.' (VT. Mt., 5.39; Klein 1997: 191)

Hittite, along with the rest of the Anatolian family, also shows mono-argumental functions of the coordinator, of which there were two kinds: *kki/ kku* and *(y)a*. In non-coordinate uses in combination with *wh*-hosts, the former creates negative polarity terms (146a), while the latter creates universal quantificational expressions (199a,199b), a common feature in IE.

(146) HITTITE:

a. nu-wa ÚL [kuit **ki**] sakti
and-QUOT NEG [who μ] know.2.SG.PRES

'You know *nothing* (=not *anything*)' (KUB XXIV.8.I.36)

b. 
nu DUMU.MEŠ-ŠU [kuišš-**a**] kuwatta utnē paizzi
J sons.his who-$\mu = \forall$ somewhere country.LOC went
'**Each** of his sons went somewhere to a country.'
(KBo. 3.I.1.17–18)

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

Old Irish *ch*, itself a reflex of PIE $*k^we$, aside from the coordinate function, also creates free-choice (147a) and universal quantificational (147b,147c) expressions.

(147) OLD IRISH:

a. [ce **ch**] taibre
[what μ] give.2.SUBJ
'*what*[so]*ever* thou may give.'
(Zu ir. Hss. 1.20.15; Thurneysen 2003: 289)

b. [ce **ch**] orr
[what μ] slay.3.M.SUBJ
'*whichever* he may slay.'
(Anecd. II.63.14.H; Thurneysen 2003: 289)

c. á huili duini .i. a [ca-**ch**] duini
voc all man i.e. voc wh-μ=every man
'O, all men i.e. O, every man' (Wb. 10c20)

The morphosyntactic independence of μP across a wide range of IE languages is strong evidence for the J^0-μ^0 coordination complex defended here and elsewhere (cf. Slade 2011, Winter 1998, Szabolcsi 2014c, *inter alia*). There is additional semantic evidence for the proposed structure, which gives rise two different interpretations. In the absence of J^0, μPs are predicted to have the three kinds semantic contribution (additive focus, polarity, free choice).

By the same reasoning, we predict, for instance, that the Slovenian coordinator *in*, being derived from a compounding of Proto-Slavonic $*i$ and adverbial-like connective ∗*n* ,[4] is not of μ but of J category, which explains its inability to form a polarity/free-choice item with a *wh*-element (148), unlike SerBo-Croatian (149), which has retained the Proto-Slavonic monomorphemic ∗*i* (Derksen, 2008: 207), taken here to be of μ category.

(148) * in kdo
J who
'anyone/whoever'

(149) i (t)ko
μ who
'anyone/whoever'

The combination of a conjunctive particle with *wh*-terms is a solid diagnostic for μ-status in our system. We have thus identified two syntactic position, to which we will assign a static semantics via lexical entries in the next chapter.

In the following section, we devote some detailed attention to each of the IE branches.

3.4 Branch-wise analysis

The aim of this section is to empirically substantiate the claim we have made for IE coordination, namely, that it operated a double system. We now take each of the IE branches in turn and demonstrate this. We will also use a morpheme-breakdown paradigm notation to explicate the idea we have been pursing, namely the particle compounding. We list in (150) an example of such a morpheme-breakdown for English disjunction (interrogative) markers.

(150) English disjunctive/interrogative morphemes:

	either	
n	**either**	
wh	**ether**	
	or	
n	**or**	

4 For details on the bimorphemic and dyadic etymology of Slov. *in*, see Trubačev (1980: 168), Feu (1961), and references therein.

In the following subsections, we will aim to provide as concise a discussion as space permits of the connective particle systems for all IE families, focussing on representative languages. As we do so, we also pick up on some synchronic and diachronic topics of interest in light of our analysis.

3.4.1 Greek

Humbert (1954: 374ff.) lists the following particles for Attic as attested in the fourth and fifth centuries AD:

(151) ἀλλά, ἆρα, ἄρα, ἀτάρ, αὐτάρ, αὖ, αὖτε, αὖτις, γάρ, γε, δαί, δέ, δή, ἦ, ἤ, καί, καίτοι, μάν/μήν, μέν, μέντοι, οὖν, περ, που, τε, τοι, τοιγάρ, τοιγάρτοι, τοιγαροῦν, τοίνυν

Throughout the subsections, we will be reviewing the connecting particle sets that each of the language families features. The descriptive aim is to uncover the patterns underlying the particle sets (lexicon) since we are concerned with the morphosyntax of the particles—and in the subsequest chapters, we will add the semantic aspect, which will rest on the morphosyntax, *qua* compositionality.

A subset of the list in (151) is reordered below with respect to the central morphological role of particles like τε, τοι, etc. It is clear from (152) that a set of six particles can give rise to nine particle forms since the τε, τοι particles combine with others.

(152) Connecting particles in Homeric.:

αὖ	
αὖ	**τε**
καί	
καί	**τοι**
καί	**τε**
μέν	
μέν	**τοι**
ἤ	
ἤ	**τε**

For an exhaustive descriptive treatment of Greek particles, see Denniston (1950) and, especially, Ruijgh (1971).

Homer's *Odyssey* and *Iliad* are dated to 750–650 BCE, following Taplin (1993). Hesiod's three works (Th, WD, HS) are dated to the same Homeric period (Griffin 1993, *inter. al.*). Consider the distribution of the two coordinator types in Homer and Hesiod in Tab. 3.3, where we list the number of occurrences of καί and τε, and the ratio of the occurrences per author, which suggests a rather 'balanced' grammar of conjunction.

	καί	τε	Σ
Homer: Il & Od	5,287(56%)	4,091(44%)	9,378
Hesiod: Th, DW, & SH	512(44%)	554(56%)	1,176
Σ	5,799(55%)	4,755(45%)	10,554

TABLE 3.3.: *Grammatical status of 8th c.* BCE *conjunction system of Greek*

We will observe the same 'balance' of pen/initial coordinators in Vedic, as well as other IE languages for which we have early written record.

period	text(s)	καί (N)	τε (N)	Σ(καί, τε)	καί (%)	τε (%)
8th c. BCE	Il, Od, Th, DW, SH	5,799	4,755	10,554	54.95%	45.05%
5th c. BCE	Hist	3,671	1,465	5,136	71.48%	28.52%
2nd c. CE	GNT	7,715	200	7,915	97.47%	2.53%
15th c. CE	Chron	1,839	40	1,879	97.87%	2.13%

TABLE 3.4.: *Grammatical change in the Greek conjunction system of Greek from 8th c.* BCE *to 15th c.* AD

Decker (2013) gives statistical and distributional statistics of the coordinate use in the Greek *New Testament*.

'EPIC' (NON-COORDINATE) MEANING What has traditionally been labelled 'epic τε', is, as Probert (2015: 109) explains in synchronic, contemporary linguistic theoretic, terms as an adverb that appears in some relative clauses, normally non-restrictive ones. (see also Goldstein 2014) The observation that non-coordinate τε occurs in non-restrictive relative clauses ("expressing permanent states of affairs", Probert 2015: 108), goes back to Ruijgh (1971).

Kvičala (1864) presents a theory of the 'generalising τε' according to which the semantics of the indefinite pronominal term coupled with τε yields

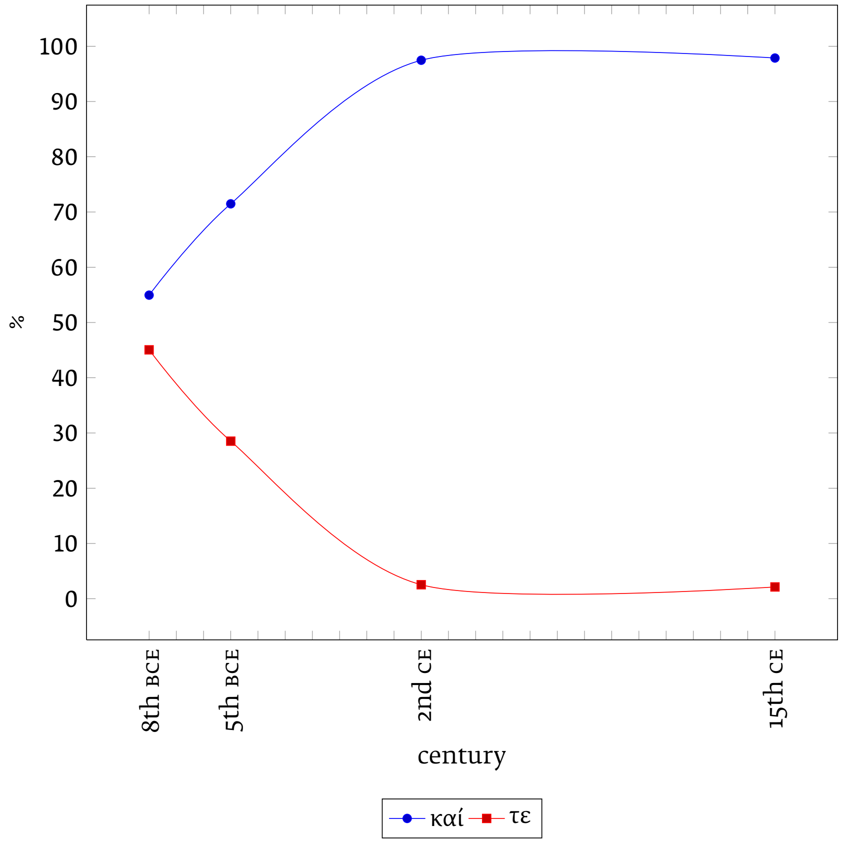


FIGURE 3.1.: *Grammar of conjunction in Greek: καί and τε from 8th c.* BCE *to 15th c.* CE

an *irgend*-type indefinite semantics. Lammert (1874) later took up Kvičala's (1864) programme and refuted it by demonstrating that the indefinite terms like ὅς τε as related to ὅς τις are very rare. The term ὅς τε generally functions as a relative-anaphoric term and the indefinite semantics related to the construction is excluded.

Termed 'epic τε', the classical philological scholarship has long recognised the non-coordinate meaning of τε (e.g. Hoogeveen 1829), covering a range of constructions found in the Epic period of the language, which we could describe using modern linguistic terms such as additivity, relativisation, and modality.[5] In the examples below, we list some non-coordinate uses of τε. First, notice the focus-sensitive (emphasising) role of in (153).

5 Philological scholars use terms like 'responsive' (Denniston, 1950: 520), or 'superadditory' (Hoogeveen, 1829: 181).

(153) αἶψά τε φυλόπιδος πέλεται
aipsa **te** phulopidos peletai
quick *μ* battle-cry.FEM.GEN.SG become.PRES.MP.3.SG
κόρος ἀνθρώποισιν
koros anthrōpoisin
satiety.M.NOM.SG men.M.DAT.PL

' When there is battle men have [suddenly][F] their fill of it' (Il. T. 221)

Consider also the additive function, as shown in (154) and (155), which seems in line with the general emphatic function

(154) ὅς κε θεοῖς ἐπιπείθηται
os ke theois epipeithētai
REL may.PRT gods.M.DAT.PL be-persuaded.PRES.SUBJ.MP.3.SG
μάλα τ' ἔκλυον αὐτοῦ.
mala t(e) ekluov autoū
very.ADV *μ* head.IMPRF.3.PL self.M.3.GEN.SG

'If any man obeys the gods, they listen to him **also**.' (Il. A. 218)

(155) βόθρον ὄρυξ' ὅσσον τε
bothrov oruks ossov **te**
hole.M.ACC.SG dig.AOR.ACT.1.SG REL.N.ACC.SG *μ*
πυγούσιον
pugousion
of-a-length.M.ACC.SG

'[dug] a pit, and one **too** of the measure of . . . '
(Od. L. 25; trans. by Hoogeveen 1829: 182, §X)

Although we have reviewed the core Greek particles, we cannot, as Morpurgo Davies (1997: 69) warns, assume *a priori* that all Greek dialects shared the same particles and made the same extensive use of them. To corroborate this claim, we now take into our scope evidence from Mycenaean, Cypriot and Arcadian.

ARCADIAN As Morpurgo Davies (1997) shows, only two particles occur reasonably frequently: κάς/καί and δέ, while others, such as μέν, τε, ἀτάρ and ἀλλά are rare.[6] In what follows, we take each of the representative particles in turn.

Arcadian τε, although rather rare, shows that it constitutes "a panhellenic phenomenon" since "the history of τε everywhere, including Arcadian, cannot be wholly dissociated from that of κάς/καί, largely because of its scarcity of occurence is determined by the success of κάς/καί." (Morpurgo Davies, 1997: 53–54) In Arcadian, τε tends to be confined to bimorphemic compound forms, where τε is lexically in second position (cf. Lat. *at·que*), which includes forms such as εἴ·τε, μή·τε, and οὔ·τε, where we are employing · to demarcate the relevant morphemes. Outside such compounds, Arcadian τε occurs three times in inscriptions and consistently in combination with καί, forming a (generalised) conjunction structure of the following type:

(156) $\Big[\big[\, Z^0_i$ τε $XP_j \,\big] \big[$ καί YP $\big] \Big]$, where $i \in j$ structurally

The following three examples are from those three structures, where τε in the first conjunct in (157) takes the form of ζ' and κά corresponds to καί elsewhere. The exhaustive data, borrowed from Morpurgo Davies (1997: 54, ex. 1–3), is to show that, at least, the 'simple' τε is no longer part of the language as reflected by Arcadian.

(157) [κακô]ς ζ' ἐξόλοιτυ κὰ ὄζις τότε δαμιοϛοργε̂
[kakō]s **dz'** heksoloitu **ka** hodzis tote damioworgē
let.perish **and** horribly **and** whoever then *damioworgē*
[ἀφάε]σται
[haphae]stai
let.pay
'Let him perish horribly and let whoever is then *damioworgē* pay . . . '
(Dubois 1986: ii, 196; possibly from Pheneos, ca. 500 AD;
Morpurgo Davies 1997 *op. cit.*)

(158) ἅ τε θεὸς κὰς οἱ δικασσταί
ha **te** theos **kas** hoi dikasstai
the **and** goddess and the judges
'the goddess and the judges'
(IG-V2 262, 19; Mantinea, 5th c.)

6 The supposed ἀτάρ and the disjunction/alternative marker ἀλλά occur only once each; possibly twice for ἀλλά; see Morpurgo Davies (1997: fn. 5).

(159) ἃ τε ἰν E[ὐ]αίμονι καί τὰς ἰ[ν Ἐρχομινο]ῖ
tas **te** in E[u]aimoni **kai** tas i[n Herhomino]i
those **and** in Euaimon **and** those in Orchomenos
'those in Euaimon and those in Orchomenos' (IG-V2 343, 49; Orchomenos, 4th c.)

Out of the three remaining particles, κάς/καί, δέ and μέν, the latter is rare, while the other two are not. Morpurgo Davies (1997: 55) establishes the following, in her own words:

i. Arcadian, or at least the Arcadian of the inscriptions, has only a small number of particles (cf. 151),
ii. the quasi disappearance of τε must be due to a reasonably fast evolution in usage after the Mycenaean period,
iii. the form καί rather than κας of Mantinea and possibly of the rest of Arcadia is due to external influence.[7]

MYCENAEAN Mycenaean operated a system of conjunction using *qe* (𐀤) as shown in (160), which *prima facie* resembles the καί-styled conjunction (in its lexical form) but also the τε-type (in its syntactic position) in Greek. Mycenaean data is drawn from Morpurgo Davies (1997: 62–64).

(160) 𐀁𐀪𐀲 𐀂𐀋𐀩𐀊 𐀁𐀐 \\ 𐀁𐀄𐀐𐀵𐀤 𐀁𐀵𐀛𐀍 𐀁𐀐𐀁
e-ri-ta i-je-reja e-ke e-u-ke-to-**qe** e-to-ni-jo e-ke-e
E priestess has solemnly.affirms-**and** *e-to-ni-jo* have.INF
𐀳𐀃
te-o
god(dess)
'E the priestess has **and** solemnly affirms that she has the *e-to-ni-jo* for the god(dess)' (PY Ep 704, 5)

(161) 〰〰 𐀈𐀁𐀫 𐀞𐀳 \\ 𐀔𐀳𐀆 𐀇𐀹𐀊 𐀈𐀁𐀨 〰〰 𐀈𐀁𐀨
do-e-ro pa-te \\ ma-te-**de** di-wi-ja do-e-ra do-e-ra
slave father mother-but of-Diwia slave slave
𐀔𐀳 \\ 𐀞𐀳 𐀏𐀐𐀄
ma-te pa-te ka-ke-u
mother father bronzesmith

7 For etymological discussion of the κάς/καί alternation, see Lüttel (1981) and Beekes (2010).

'. . . the father (is) a slave, **but** the mother (is) a slave of Diwia . . . the mother (is) a slave, **but** the father (is) a bronzesmith'(PY An 607, 5ff)

It was in Ruijgh (1967) that the Mycenaen *de* was analogised clearly with Greek δέ, as Morpurgo Davies (1997: 63) reports.

(162) 𐀏𐀞𐀴𐀑 〰〰 𐀁𐀐𐀤 𐀐𐀐𐀕𐀜 𐀒𐀵[𐀜] 𐁅 \\
ka-pa-ti-ja e-ke-**qe** ke-ke-me-no ko-to-[no] dwo
of-Carpathos has-**and** divided? *ktonai(kek)* two
𐀃𐀟𐀫𐀭𐀆 𐀺𐀿𐀁 𐀃𐀺𐀾
o-pe-ro-sa-**de** wo-zo-e o-wo-ze
having-**but** *worzeen* NEG-*worzei*

'. . . of Carpathos . . . has two *ktonai-kek* **but** having to *worzeen* she does not *worzei*' (PY Eb 338, 1–2)[8]

If the derivation proposed in Morpurgo Davies (1997: fn. 24) to treat δέ as deriving from δή is correct, being in line with Leumann's (1949) analysis of alternations in μέν/μήν and δέ/δή, then the original function of this particle was not adversative. For further discussion, see Ruijgh (1971) whose work remains the most impressive and extant investigation of Greek τε.

3.4.2 Germanic

The only Germanic language, which shows the double system of coordinate construction is Gothic, which will be the focus of this subsection.

Gothic connective particles, as reflected by Jøhndal et al.'s (2014) database, comprise a set of altogether fifteen words:

(163) uh, aiþþau, ak, akei, alja, andizuh, aþþan, eiþau, iþ(=uh), jabai, jah, jaþþe, ni, nih, swe, þau

Focussing on the second-position *-uh*, a reflex of PIE $*k^we$,[9] we derive the following paradigm:

(164) Connecting particles in Gothic.:

8 Restoration as per Morpurgo Davies (1997).
9 Following Ringe (2006: 117), we assume PIE $*k^we$ > PGmc $*h^w$, cf. Gothic *h* in postvocalic positions corresponding to postconsonantal *uh*, also exhibited by (164).

	uh	
andiz	**uh**	
ja	**h**	
ni		
ni	**h**	
ja		þþe
ei		þþau
		þau
a		þþan
a		þþau
a		kei
a		lja
a		k

As we have already presented in passing, Gothic *-uh* shows all the traits of the IE Wackernagel coordinator (*μ* particle) not only in its restriction to second-position but also in its non-coordinate meaning. Repeated below in (165) is *uh* with the coordinate function.

(165) (𐌲𐌰𐌻𐌰𐌹𐌸 𐌹𐌽 𐍀𐍂𐌰𐌹𐍄𐌰𐌿𐍂𐌹𐌰 𐌰𐍆𐍄𐍂𐌰 𐍀𐌴𐌹𐌻𐌰𐍄𐌿𐍃 𐌾𐌰𐌷)
(galaiþ in praitauria aftra Peilatus jah)
came.PRET.3.SG in judgement hall.ACC.SH again P.NOM and
𐍅𐍉𐍀𐌹𐌳𐌰 𐌹𐌴𐍃𐌿 𐌵𐌰𐌸 𐌿𐌷 𐌹𐌼𐌼𐌰
wopida Iesu qaþ **uh** imma
called.PRET.3.SG J.ACC said.PRET.3.SG and him.M.DAT.SG

'(Then) Pilate entered into the judgment hall again, and called Jesus, and said unto him.' (CA. Jn. 18:33)

Independent in its lower cycle, i.e. not embedded under J^0, and being hosted by a *wh*-term, *uh* clearly has a non-coordinate function as indicated in the repeated pair of examples in (166). In combination with a *wh*-expression, *uh* delivers a universal-like FC expression (166a)[10] or a plain vanilla distributive universal (166b).

(166) GOTHIC:

a. 𐌸𐌹𐍃𐍈𐌰𐌳 𐌿𐌷 𐌲𐌰𐌲𐌲𐌹𐍃
[þishvad **uh**] (...) gaggis.
[where *μ*] go.2.SG.PRES.ACT.IND

10 We assume here in line with Chierchia (2013b), and develop further in the next chapter, that FCI are licensed by an interpolating modal. We assume the modal is silent in the case of (166a).

‘**wherever** you go’ (CA. Mt. 8:19)

b. 𐌾𐌰𐌷 𐍈𐌰𐌶 𐌿𐌷 𐍃𐌰𐌴𐌹 𐌷𐌰𐌿𐍃𐌴𐌹𐌸 𐍅𐌰𐌿𐍂𐌳𐌰
jah [hvaz- **uh**] saei hauseiþ waurda
and who.M.SG and *pro*.M.SG hear.3.SG.IND words.ACC.PL
𐌼𐌴𐌹𐌽𐌰
meina
mine

‘And **every** one that heareth these sayings of mine’
(CA. Mt. 7:26)

Note also that non-coordinate *uh* is not confined to *wh*-hosts only, turning them into FCIs or distributes, but rather may combine not only with other DPs (167) but also VPs (168).

(167) 𐌹𐌸 𐌹𐍃 𐌿𐌱 𐌿𐌷 𐍅𐍉𐍀𐌹𐌳𐌰
iþ is ub- **uh**- wopida
but he PRT- *μ* cried
‘but [he]^F cried’ (CM. Lk. 18:38)

(168) 𐌹𐌸 𐌹𐌴𐍃𐌿𐍃 𐌹𐌳𐌳𐌾 𐌿𐌷 𐌼𐌹𐌸 𐌹𐌼
iþ Iesus iddj- **uh** miþ im
but Jesus went- *μ* with them
‘But Jesus [went]^F with them’ (CM. Lk. 7:6)

Eythórsson (1995) assumes that the syntactic position of *uh* is invariant and heads the CP. The only explicit mention of the non-coordinate form of connective function of Gothic *uh* is in fact Eythórsson (1995: 81), who assumes that indefinites move to [Spec,CP], where *uh* is taken to be in C^0. It is unclear how universal quantification over individuals in [Spec,CP] could proceed at all.

According to Ferraresi (2005: 150), the clausal role of *uh* is to introduce a new element into the discourse. Walkden (2012: 123) proposes to treat *uh* as the lexicalisation of Foc^0 so as to allow for focus hosting. The analysis by Walkden (2012: 123) not only makes Eythórsson’s (1995) C-position more precise by virtue of assuming a fine-grained CP structure (Rizzi, 1997) but also inadvertently parallels with the intuitions of the present proposals (as is to be semantically developed in the next chapter). Our analysis will rest on the exhaustification contribution of *μ* particles, like the Gothic *uh*, which will behave like focus (they may as well turn out to be super-/subsets of Focus).

For comparative purposes, let us turn to another Germanic language. Other old Germanic languages, such as Old Norse (ON) exemplified in (169) below, have lost the double system of coordinator placement.

(169) Skáli Gunnars var gǫrr af viði einum **ok**
hall Gunnar's was made with beam one **and**
súðþakiðr útan, **ok** gluggar hjá brúnásunum
overlapping-boards on-outside **and** windows by ridge-beams.DEF
ok snúin þar fyrir speld.
and fastened these in-front-of shutter
'Gunnar's hall was made with one beam and overlapping boards on the outside, and there were windows by the ridge-beams and shutters fastened in front of these.' (BN, 77)

Note that ON head-initial *ok* etymologically parallels with Gothic head-peninitial *uh*. Syntactically, the parametric difference lies in the incorporation-triggering feature (170), which patterns with our prediction that the loss semantic polyfunctionality of *μ* superparticles (which ON *ok* is not).

(170) a. Goth. *uh*[+ε]
b. ON *ok*[−ε]

Walkden (2012) is lead to "speculate that the loss of the Gothic (and presumably Proto-Germanic) system of C-domain discourse particles was related to the restricted activation of the expanded left periphery in later Northwest Germanic languages." (p. 125)

3.4.3 Italic

Latin connective particles, as reflected by Jøhndal et al.'s (2014) database, comprise a set of altogether twelve words:[11]

(171) ac(=atque), an, atque, aut, et, neu, que, sed, simul, sive, ve, vel

11 Jøhndal et al.'s (2014) PROIEL database was used to access the digitalisation of the Latin texts, as well as texts in other languages. Once extracted, the data was statistically analysed.

Focussing on the second-position *-que*, a reflex of PIE $*k^we$, we derive the following paradigm from a subset of (171):

(172) Connecting particles in Latin.:

'AND', 'ALL'		**que**	
'AND'	at	**que**	
	et		
'OR'	aut		
	si		ve
			ve

Let us start with coordination patterns. We repeat in (173) the two signature coordination types we are focusing on: one headed by a second-position coordinator *que* and another in head initial position morphologically containing *que*.

(173) 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]' (Or. 1.VI.27-8)

b. vīam samūtem **que**
life safety and
'the life and safety' (Or. 1.VI.28-9)

We list in Tab. 3.5 the change in the grammar of conjunction from the first century BCE to the fourth century CE with relative (and absolute) values.

		et	*que*	*atque*	Σ
1st c. BCE	Att. & Off.	67.7%(3, 558)	26.8%(1, 407)	5.6%(294)	100%(5, 259)
	Gal.	48.3%(989)	34.3%(702)	17.4%(355)	100%(2, 046)
4th c. CE	Vul.	93.2%(5, 662)	6.2%(374)	0.7%(42)	100%(6, 078)
	Per. Aeth.	89.3%(785)	3.9%(34)	6.8%(60)	100%(879)

TABLE 3.5.: *Grammar of conjunction in Latin: et, que, and atque*

If we plot this graphically, we may see the decline of one system and the rise of another system of conjunction. We are also averaging over periods—hence, Gal, Att, and Off have been averaged for 1st century BCE; likewise,

	et	*que*	*atque*
1st c. BCE	62.2%	28.9%	8.9%
4th c. CE	92.7%	5.9%	1.5%

TABLE 3.6.: *Grammatical change from 1st c.* BCE *to 4th c.* CE *in the conjunction system of Latin: et, que, and atque*

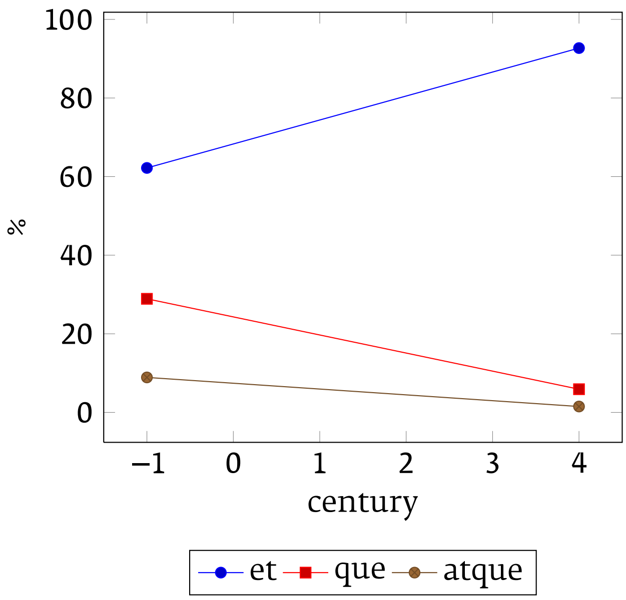


FIGURE 3.2.: *Grammar of conjunction in Latin: et, que, and atque from 1st c.* BCE *to 4th c.* CE

Vul and Per. Aeth. have been averaged to give us an idea of 4th century CE conjunction grammar.

The latest and most extensive description and analysis of the Latin system of coordination is that of Torrego (2009), who covers a range of coordinate constructions. Since we are focusing on peninitial $*k^we$ and its loss, we report in Tab. 3.7 Torrego's (2009) conclusions, where parentheses mean that the evidence is sporadic while double mark (++) denotes high frequency. Her conclusions are in line with the general trends of loss reported in Tab. 3.6 specifically and with the trends across IE languages more generally.

Let us now consider the non-coordinate forms of Latin *que*. While *wh-que* terms are quantificational, forming FCIs or distributive universals, as shown

	Early Latin	Classical Latin	Postclassical Latin	Late Latin	Romance
Conjunctive coordination					
et	+	++	++	++	++
atque/ac	+	+	(+)	–	–
-que	++	+	–	–	–
Disjunctive coordination					
ue	(+)	–	–	–	–
aut	++	++	++	++	++
uel	(+)	+	+	–	–
siue/seu	+	+	+	+	(+)
Adversative coordination					
sed	+	++	+	–	–
magis	–	+	+	+	++
nisi	–	–	+	+	–

TABLE 3.7.: *The chronology of Latin coordinators (Torrego, 2009: 482, Tab. 2)*

in (174a–174d), there are also cases where, for instance, *quoque* performs the additive role (175) which is, as we will defend, the core logical signature and semantic contribution of *que*.

(174) Latin *wh-que* as FCIs and distributive universals

a. ut, in quo [quis **que**] artificio excelleret, is in suo genere Roscius diceretur
that in who [what *μ*] craft excels, is in his family R spoken
'so that he, in *whatever* craft he excels, is spoken of as a Roscius in his field of endeavor.' (Cic., *de Or.* 1.28.130)

b. Sic singillatim nostrum unus quis-**que** mouetur
so individually we one wh-*μ* moved
'So each of us is individually moved' (Lucil. *sat.* 563)

c. Morbus est habitus cuius-**que** corporis contra naturam
sickness is reside wh-*μ* body contrary nature

'The sickness is the situation of any/every/each body contrary to nature' (Gell. 4,2,3)

d. 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)

(175) elegia quo-**que** Graecos prouocamus
elegy *wh-μ* =**also** Greeks challenge

'We challenge the Greeks [**also in elegy**]^F.' (Quint. *inst.* 10.1.93)

Bortolussi (2013) convincingly argues for a distributive universal semantics of *quisque* (174a–174d), as we have already noted.

3.4.4 Slavonic

The oldest variety of Slavonic, which we focus on, is Old Church Slavonic, which comprises the following connective particles, as reported by Jøhndal et al.'s (2014) database.

(176) a, ali, ašte, da, že, zane, i, ili, li, ljubo, ni, nъ, ovo, ta, taže, ti, tože, čъto, iako

Focussing on three second-position connectives—the disjunctive marker *li*, and the two conjunctive particles *že* and *i*—we derive the following paradigm from a subset of (176):

(177) Connecting particles in OCS.:

‘AND’/‘BUT’		**že**	
		ža	ne
	ta	**že**	
	to	**že**	
‘AND’, ‘ALSO’, ‘EVEN’		**i**	
‘BUT’	nъ		
	n	**i**	
‘NOT EVEN’		**i**	ako
‘OR’		**i**	li
‘BUT’	a		li

We will assume that OCS had two markers of *μ* category: i_{μ_1} and $že_{\mu_2}$.

NEGATIVE POLARITY Unlike Gothic or Latin, where a combination of *μ* and a *wh*-host obtained a distributive universal expression, such morhological constructions in Slavonic are NPIs. Through sections 3.2 and 3.3, we have demonstrated in passing that the OCS *i*-particle was not only a marker of conjunction but also of additivity and polarity. Consider the following two examples below, taken from Willis (2013: 370, ex. 83).

(178) ⰐⰋⰝⰅⰔⰑⰆⰅ ⰑⰕⰟⰂⰡⰛⰀⰂⰀⰀⰞⰅ
n-**i**-česo-že otŭvěštavaaše
NEG-*μ*-WH-REL=nothing answer.IMPF.3.SG
‘He answered nothing.’ (CM Mt. 27:12)

In OCS, the NPI is formed using a *wh*-stem, like *česo* in (178), that hosts the *μ* particle *i*, to form *i-česo* (*μ*+*what*, ‘anything’). Through negative concord of the matrix negative head (foolowing Zeijlstra 2004), the *μ* is realised with the negative marker as *n-i-česo* (NEG+*μ*+*what*, ‘nothing’, lit. ‘not even one thing’)

The following example is taken cited in Willis (2013: 370, ex. 83) from Večerka (1995: 516).

(179) ⰐⰋⰍⰑⰎⰋⰆⰅ ⰈⰀⰒⰑⰂⰡⰄⰋ ⰕⰂⰑⰅⰗ ⰐⰅ
n-i-ko-li-že zapovědi tvoeję ne
NEG-*μ*-who-K-REL=never command.GEN your NEG
ⰒⰓⰡⰔⰕⰘⰒⰋⰘⰟ Ⰻ ⰏⰠⰐⰡ ⰐⰋⰍⰑⰎⰋⰆⰅ ⰐⰅ ⰄⰀⰎⰟ
prěstǫpixŭ. i mĭně nikolіže ne dalŭ
transgress.PAST.1.SG and me.DAT never NEG give.PART

ⰵⱄⰻ ⰽⱁⰸⱐⰾⱔⱅⰵ
esi kozĭlęte
be.PRES.2.SG kid.GEN

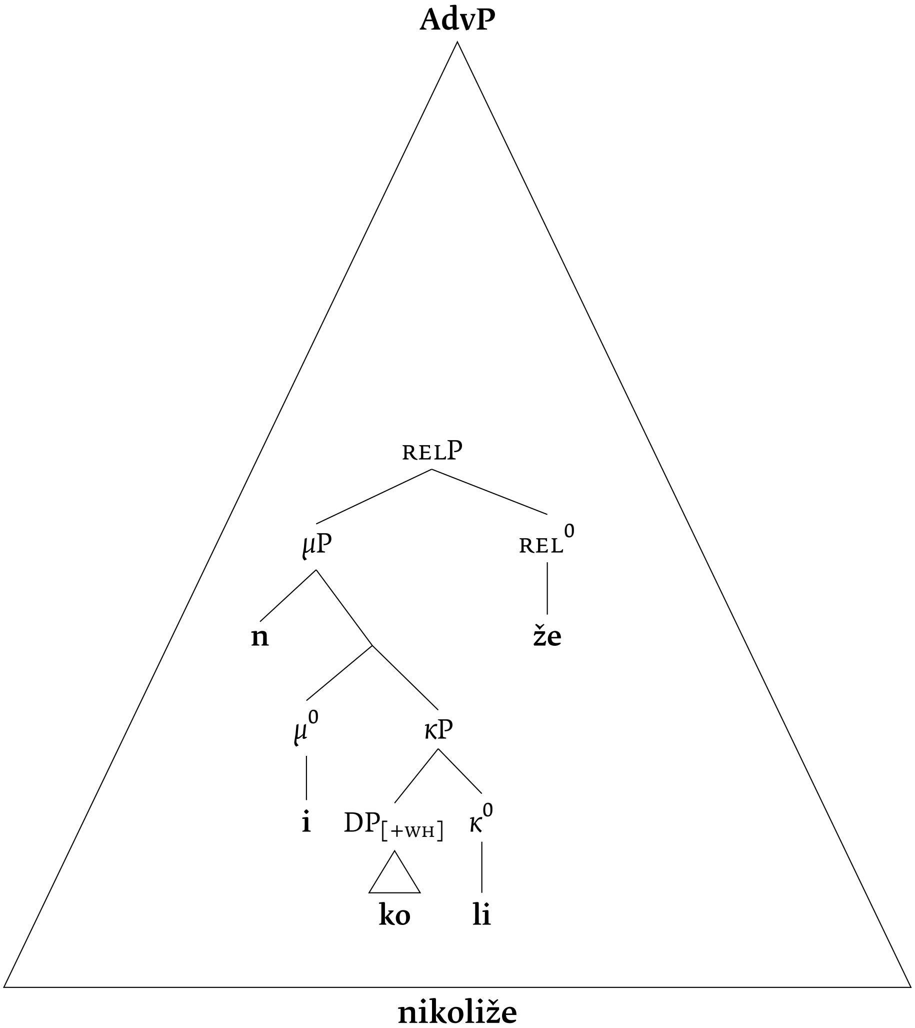
'I never broke your command but you have never given me a kid.'
(CM. Lk. 15:29)

The morphological complexity of NPIs can thus be represented in (OCS-NPI), where *n-i-koli-že* 'never', as shown in (180). Following Derksen (2008: 229) and Trubačev (1983: 135–136), I take the etymology of the polarity adverb *koli* ('ever') to consist of the neuter pronoun *ko* (< PSl. ∗*ko*) 'who' and the interrogative particle *li* (< PSl. ∗*li* (/∗*le*/∗*lě*), Trubačev 1988: 68), which we will independently categorise as a κ particle on the basis of its semantic roles, as discussed in the following chapter.[12].

We take the *n-* morpheme to be a concord realisation of the negative operator, which must be locally bound by the negation in the clause (Progovac, 1994), following Willis (2013).

(180) Morpho-semantically complex NPIs in OCS and a grammaticalisation pathway for simplification of internal structure:
$\Big[_{\text{RELP}} \big[_{\mu\text{P}}\ n_{\neg}\ \text{i}\ \big[_{\kappa\text{P}} \big[_{\text{DP}}\ ko\ \big]\ li\ \big]\big]\ \check{z}e\ \Big] \gg \big[_{\text{AdvP}}\ nikoli(\check{z}e)\ \big]$:

12 This etymology is contrary to Snoj (1997), who maintains that the *ever*-particle *-koli* is originally a locative of the word for 'time', being cognate with Skt. *kāla* (काल). (Snoj, 1997: 292)



For further details on the development of polarity in Slavonic, see Willis (2012), Blaszczak (2001) and Blaszczak (2002), among others, and Haspelmath (1997) for a typological overview.

3.4.5 Indo-Iranian

The conencting particles we find in IIr. are listed in (181).

(181) Particles in IIr.:

CONJ.		**ca**	
	u	**ta**	
	u		
ADDIT.		**ca**	
DISJ. (#1)	v		a
PRT. (NPI)		**ca**	
PRT. (FCI)		**ca**	

SANSKRIT Sanskrit in its narrowest sense applies to standard classical Sanskrit as regulated by the grammarians but may also be conveniently used more widely as equivalent to Old Indo-Aryan (OIA). In this sense the term traditionally covers both classical Sanskrit and the pre-classical or Vedic language. Middle Indo-Aryan (MIA), that is Prakrit in the widest sense of the term, comprises three successive stages of development: (1) The earliest stage is represented in literature by Pāli, the language of the canonical writings of the *Theravāda* school of Buddhism. This is a language of centuries immediately preceding the Christian era. On the same level of development are the various dialects recorded in the inscriptions of *Aśoka* (c. 250 BCE), and also the language of other early inscriptions. (2) Prakrit in the narrower sense of the word, or Standard Literary Prakrit, represents the stage of development reached some centuries after the Christian era. The various literary forms of Prakrit were maintained by grammarians at this period and, as a written language, it has remained essentially unchanged during the following centuries. (3) *Apabraṃśa* is known from texts of the tenth century AD and was formed as a literary language some centuries prior to that date. It represents the final stage of MIA, the one immediately preceding the emergence of Modern Indo-Aryan languages, which comprise Bengali, Hindi, Gujurati, Marathi, etc. These languages only begin to be recorded from about the end of the first millennium AD and their development can be followed as they gradually acquired their present-day form. (Burrow, 1955: 2)

The diachronic analysis I provide in this chapter is based on the selected periods ranging from the first attestation of Indo-Iranian (Ir) in the form of Vedic and Avestan to forms of Modern Indo-Aryan (MdIA). As we have seen in Chapter 2, Sanskrit operated a double system of coordination: clausal coordination with medial placement of the coordination, and a sub-clausal system of coordination with non-medial (i.e. second or final) position placement of the coordinator. This double system has been completely lost in MdIA, which operate a single system of coordination with exclusively medial placement of the coordinator.

Oberlies (1998: 158) based on 'cumulative evidence' dates *Ṛgveda* within the range of 1,700—1,100 BCE. The Veda was originally composed orally and preserved in this fashion for at least 500 years before being written down, which makes dating the *Ṛgveda* difficult since it probably emerged as the result of a very long tradition of hymns, some of which go back to before the IndoIranian split, ca. 2000 BCE. it is therefore probable that it had been composed and orally transmitted as early as 1500 and probably no later than 1000 BCE, as Noyer (2011) observes. In this section, we cover the periods listed in Tab. 3.8.

TABLE 3.8.: *Diachronic periods of Indo-Iranian and Indo-Aryan*

TIME	PERIOD	CORPUS
1,700—1,100 BCE	Vedic Period	*Ṛgveda*
1,700—1,100 BCE	Avestan Period	*Avestā*
400 BCE—400 AD	Classical Period	*Mahābhārata*
c. 10th AD	early modern Period	*Apabraṃśa*
present	modern period	

The double system of coordination did indeed undergo loss and replacement by a single system. We will also see that the concept of *Old Indo-Aryan* as subsuming both Vedic and Epic/Classical Sanskrit cannot possibly be maintained once the syntactic evidence from coordination is considered, since the Vedic and post-Vedic, *qua* Classical, Sanskrit are different grammatically, insofar as coordination is concerned.

Proto Indo-Iranian (PIIr) or Indo-Iranian (IIr) is the common ancestor of Old Indo-Aryan (OIA) and Avestan. In this section, I attempt to reconstruct the syntax of coordinate complexes in Indo-Iranian. Although this sounds like a problematic task, it may be accomplished if Vedic and Avestan dialects of IIr can be shown to have the same, or at least parametrically similar, syntax of coordination.

VEDIC & OLD INDO-ARYAN The earliest document of the linguistic history of IndoAryan (IA) is the *Ṛgveda*, which is estimated to have been composed between 1,700 and 1,000 BCE (Oberlies, 1998). Vedic is the source language from which all later form of both Sanskrit and Prakrits developed.

The statistical analysis of syntactic patterns in Vedic presented here are based on the entire text of *Ṛgveda*. The statistical data on repetition of coordinators and their syntactic positions is adopted from Klein (1985a, 1985b).

In Vedic, the distribution of medial and nonmedial coordination is equal in that the ratio between initial (*utá*, *ádha*, *áthā*) and noninitial (*ca*) coordinate complexes is generally 1 : 1 as shown in Tab. 3.9, where N is the sum of all representative tokens and R the ratio between them.

TABLE 3.9.: *Syntactic distribution of Non/Medial coordinate complexes in Ṛgveda*

	MEDIAL *ca* (च)		NON-MEDIAL *uta* (उत)
	47.64%		52.36%
N	705		775
R	1	:	1.10

Statistically, *ca* is the most frequently occurring coordinator in *Ṛgveda* with 775 occurrences, which Klein (1985a: 46) divides into eight general categories of employment. We list the details of the distribution of coordinators in *Ṛgveda* in Appendix E.

Let us now turn to the Iranian branch, i.e. to Avestan and Old Persian.

IRANIAN: AVESTAN & OLD PERSIAN The literature on Avestan and Old Persian, as is often the case with other ancient IndoEuropean languages, is characterised by an absence of in-depth studies dealing with syntax.

Both Vedic and Avestan evolved out of an earlier form, which is unrecorded by any direct documentation but it may be reconstructed in considerable detail by means of comparison. By comparing early OIA with the very closely related Iranian, it is possible to form a fairly accurate idea of the original PIIr from which both Iranian and Aryan languages have developed. By comparing IA and Iranian with the other IE languages, it is possible, therefore, to reconstruct in general an outline of the characteristics of the original language from which all IE are derived. In the previous section, I have outlined a statistical sketch of Vedic coordination, which reinforced the theoretical analysis I provided in Chapter 2. In this section, we turn to and compare the established facts about Vedic with the system of coordination in Avestan and Old Persian.

Like the *Ṛgveda*, the *Avesta* was composed and preserved orally with rough estimation ranging between 1200 and 600 BCE, and was not put into writing for many centuries. (Noyer, 2011) The syntax of coordination in the most archaic text of *Avesta*, that is *Yasna*, the relation between medial and nonmedial placement of the coordinator is not as balanced as is the case of *Ṛgveda*, where the ratio of distribution is 1 : 0.91 (Tab. 3.9). Avestan coordination is overwhelmingly nonmedial: 1530 instances of *ca* drastically outweigh the mere 9 instances of *utā*. The ratio is thus:

(182) NON-MEDIAL : MEDIAL = 1 : 0.006

The double system of coordination that operated in Vedic is thus replaced by a single system of nonmedial and overwhelmingly polysyndetic coordination. A further diachronic asymmetry comes from the later form of Persian, namely Old Persian texts composed around the 6th c. BCE, which inversely show predominantly medial coordination.

Unlike the *Ṛgveda*, where *utá* and *ca* are competing conjunctions, each characterised with syntactic specialisation with regards to different categories, occurring 705 times and 775 times respectively, the leading exponent of coordination by far in Old Persian is *utā*, an Iranian cognate counterpart of Vedic *utá*. Although the coordinators are morphologically and etymologically cognate across Vedic and Avestan (183), their syntax seems very divergent. The etymologies below are based on Misra (1979: 227), where the bimorphemic IE etymology of *uta* is based on Dunkel (1982, 2014b,a).

(183) a. *uta* < IIr. ∗*uta* < IE ∗*u* + ∗*te* [OP *uta*, Skt. *uta*, Gr. *ute*
b. *ca* < IIr. ∗*ca* < IE ∗*k*^{w}*e* [Skt. *ca*, OP *cā*, Lat. *que*
c. *vā* or *və* < IIr *vā* IE *we*, cf. Skt. *vā* Gk. *ē̄*, Lat *ve*

The 100 occurrences of *utā* include 55 instances of sub-clausal coordination, which Klein (1988) subdivides into five subgroups, although only two configurational classes are relevant for our syntactic purposes. Of these, the single most frequent construction is, as expected, *X utā Y*, as shown in examples (184) through (186).

(184) Pārsa **utā** Māda
Persian **and** Median
'The Persian and Median.' (DB, 2.18)

(185) kāra Pārsa **u[tā** M]āda
sent.1.SG.PAST Persian **and** Median
'(Therefore) I sent off The Persian and Median (army).' (DB, 2.81-82)[13]

(186) Parϑava **utā** Vạrkāna
Parthia **and** Hyrcania
'Parthia and Hyrcania.' (DB, 2.81-82)

The Burgbau inscription (DSf) also involves the same type of head-initial coordination, as shown in the following examples.

(187) martiyā karnuvakā ta[yaiy] aϑa^{n}gam akunava^{n}tā avaiy Yaunā
men.3.PL stone those made.PAST were those Ionians
utā [S]pardiyā
and Sardians
'The stone-cutters who made the stone, those were Ionians and Sardians.' (DSf, 47-49)

It seems that the overwhelmingly predominant form of simplex nominal coordination is that involving *utā*, not *ca*, which is in stark contrast with Avestan and Ṛgvedic.

(188) xraϑum **utā** aruvastam
wisdom **and** activity
'wisdom and activity' (DNb, 3-4)

(189) ušīy **utā** framānā
understanding **and** command
'understanding and command' (DNb, 28)

Statistically, there is no difference between clausal and sub-clausal role of OP *utā*, unlike in Vedic. OP *utā* is also consistently head-initial as there

13 Cf. DB 3.29-30.

are no occurrences of second or final position placement of *utā*. Table 3.10 shows the distributional facts about OP *utā*. There are only 14 instances of *cā* in OP, which amount to merely 10 coordinate constructions of which 3 are uncertain and 2 are probably wrongly interpreted, that is *cā* in those two cases served a different syntactic role. (Klein, 1988: 402)

TABLE 3.10.: *Syntactic distribution of utā in Old Persian*

	SUB-CLAUSAL	
	INITIAL	POLYSYNDETIC
	63.63%	36.36%
N	35	20
	CLAUSAL	
	INITIAL	POLYSYNDETIC
	75%	25%
N	33	11

We have seen from the Iranian branch of IIr., with Old Avestan as the easrliest language, operated a predominantly head-final and 2P system of coordination and that there were only 0.6% instances of medial coordination expressed by *utā*. In Old Persian, however, the later form of Iranian, the system seems to have undergone a reversal from exclusively non-medial to exclusively medial as less than 10% of instances were headed by head-final *cā*.

Now we turn to Classical Sanskrit, where we see that the diachronic asymmetry of coordination that took place in the transition from Avestan to Old Persian, is not an anomaly restricted to the Iranian branch of IE but is also clearly indicative of the history of Old IA.

CLASSICAL SANSKRIT For detailed statistical analyses, I concentrate on the first 151 chapters of the first book of *Mahābhārata*. In Vedic, we saw that the earliest form of Sanskrit operated a double system of coordination: the medial placement of the coordinator (such as *utá*) does not not trigger movement, neither of the entire complement, nor an element within it, which is associated with a movement-triggering feature on a coordinating head such as *ca* or *vā*.

In Classical Sanskrit, represented by the extensive texts of *Mahābhārata* and *Rāmāyana*, there are altogether 39,369 instances of coordinate structures, almost exclusively involving a nonmedial coordinator, as indicated in Appendix E. The medial coordination of the *utá*-type is almost entirely nonexistent in Classical Sanskrit. For further details, see Mitrović (2011) and references therein.

Classical Sanskrit is, in this respect, a black sheep in the IE family since all other languages that had a Wackernagel-type coordinator lost the enclitic coordinator and replaced it with an orthotonic (freestanding) marker (we will return to this in §3.6). We conjecturally relegate this exceptional fact to language contact with the head-final Dravidian language family. There are a number of features of Sanskrit which have not been inherited from (P)IE such as the quotative marker *iti* (इति) (Krishnamurti, 2003: 36–37) or the general retroflex phonology.[14] Under this conjectured view, the retention of peninitial coordination markers in Sanskrit is contact-fed by Dravidian, which had, and still has, non-initial coordination markers.

THE POST-CLASSICAL PERIOD It is evident from the earliest MdIA texts, written in early Marathi and/or Hindi, that a single system of medial coordination operated as in the earliest attestations of Marathi (13th c.), coordination was only medial. (Alklujar, p.c.) As Tagare (1948: 334) notes, the 10th century (early MdIA) Prakrit text of *Apabraṃśa* possessed the same set of coordinators that were used in earlier Prakrits. We conjecture that the loss of non-medial coordination took place sometime between the post-classical Sanskrit and Prakrit period (4th c.) and thirteenth century AD, leaving the analysis of Prakrit coordination for further research.

Synchronic IA languages all show exclusively medial placement of the coordinator. Hindi coordinate complexes, for instance, are consistently and harmonically head-initial, as shown in examples (190) through (191).

(190) मनोज लम्बा अौर पात्ला है
Manoj lambā **aur** patlā hai.
M tall **and** thin is
'Manoj is tall and thin.' (Snell, 2003: 15)

14 For further debate and evidence, see Witzel (1999) and Kuiper (1991).

(191) मेरे पिता **और** चाचा दोनों राजनेता हैं
mere pitā **aur** cācā donõ netā haĩ.
my father **and** uncle both politicians are
'My father and uncle are both politicians.' (Snell, 2003: 19)

Bengali also shows initial headed coordination, whereby *ebaṃ* and *o* are employed for conjunctive coordination and *bā* for disjunctive or contrastive (i.e. adversative) coordination, as indicated in examples (192) through (194).

(192) বৃস্কর কেঢৌ কালমপ্কে দেখিল এবং মারিল
bṛmkara keḍhau kālamapke dethila **ebaṃ** mārila
viper hollow tree.LOC saw **and** killed
'He saw a viper in the hollow of the tree and killed it.' (Yates, 1849: 118)

(193) গো ও মেস ও মহিস ও ছাগল চরিটেছে
go **o** mesa **o** mahisa **o** chāgala cariṭeche
cow **and** sheep **and** buffalo **and** goat feeding.PL
'The cow and sheep and buffalo and goat are feeding.' (Yates, 1849: 118)

(194) নৌকাতে বা অশ্বে সহৌব
naukāte **bā** aśbe sahauba
boat **or** horseback go.1.SG
'I shall go by boat or on horseback.' (Yates, 1849: 119)

In Gujarati, there is also no surviving contemporary trace of non-medial coordination, since coordination is consistently medial, that is head-initial.

(195) છગન્ અંને મગન્ અવ્ય
chəgən əɳ məgən avya
Chagan **and** Magan come.3.PL.PAST
'Chagan and Magan came.' (Doctor, 2004: 68)

(196) છગન્ અવ્યો પણ મગન્ ગયો
chəgən avyo pəɳ məgən gayo
Chagan come.3.SG.PAST **but** Magan go.3.SG.PAST
'Chagan came but Magan went.' (Doctor, 2004: 69)

PERIOD	*uta* (उत)	*ca* (च)
archaic	45.562%	54.438%
early	2.912%	97.088%
epic	0.838%	99.162%
classical	2.213%	97.787%
medieval	0.740%	99.260%
late	0.699%	99.301%

TABLE 3.12.: *Development and loss of the double system of coordination in Indic*

The contemporary Iranian branch of IIr. also shows a single system of coordination, which is harmonically initial, as shown in the example from modern Persian in (197).[15]

(197)

یا	انگلیسی	و	فرانسه	یاد	بگیرید	یا	آلمانی	و
ya	engelisi	vä	färanse	yad	begir-id	ya	almani	vä
either	English	**and**	French	memory	intake.2.SG	**or**	German	**and**

روسی
rusi
Russian

'Either learn English and French or German and Russian.'
(Tabain, 1975: 30)

We have seen in this subsection, that Vedic operated a double system of coordination (a sub-clausal postpositive and a sub/clausal prepositive system), which was lost by the time of Classical Sanskrit. Avestan also does not seem to have operated a double system; it may be conjectured that (*a*) the double system had been inherited from IE and that Avestan lost it, or (*b*) that it never developed a double system.

In Tab. 3.12, we list the general statistical details of the double system of coordinate construction in Indic, spanning from Vedic (arhaic) to Late Indic. The trends are plotted in fig. 3.3. The details are listed in Appendix E.

15 Cf. the disjunction marker *ya* (یا) with the initial interrogative particle *āyā* (آیا). See Mauri (2008) and Korn and Öhl (2007) for discussion.

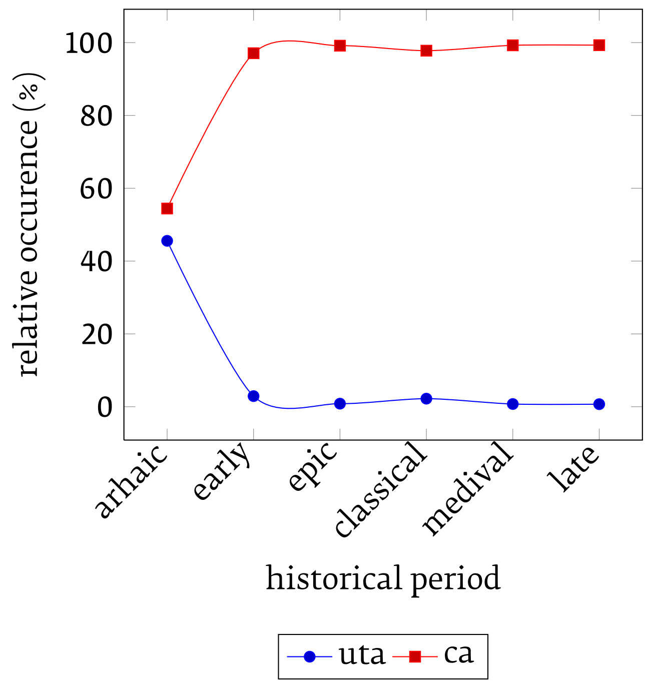


FIGURE 3.3.: *The loss of the double system of coordination in Indic*

3.4.6 ANATOLIAN

Anatolian is a branch of IE, dated as having split the earliest from the IE core. Wener (1991) presents a branch-internal cladistics for Anatolian, which we show in Fig. 3.4.[16]

For the Anatolian branch, we will predominantly be focussing on Hittite. There are many connecting particles in Hittite, which we list in (198), following a sub-word decompositional style we have established by now.

(198) Particles in Hittite:

16 See Hoffner and Melchert (2008) for further details on history and cladistics of Anatolian.

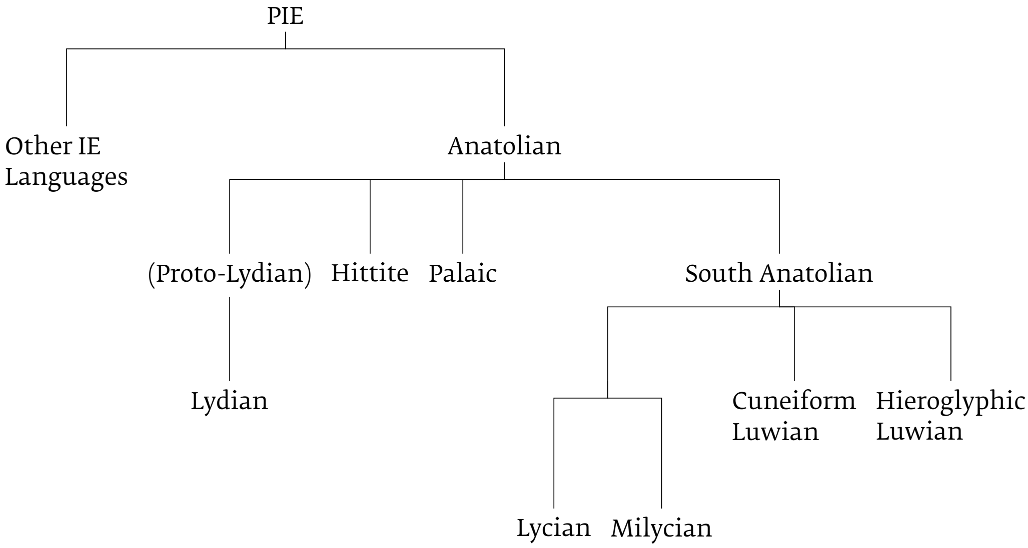


FIGURE 3.4.: *A cladistics of the Anatolian branch (Wener, 1991)*

CONJ.	(y/m)	**a**
ADDIT.	(y/m)	**a**
PRT. (FC, '-EVER')	(y/m)	**a**
PRT. ('∀')	(y/m)	**a**
DISJ. (#1)	naš(šu)-m	**a**
PRT. (NPI)		**kki**
		kka
DISJ. (#2)	(a)	**ku**

We now turn to examine the basics of the syntax and semantics of some of these particles, featuring in *wh*-expressions as quantificational terms and in non-coordinate structures and contexts, where they perform (non/scalar) additive functions.

INDEFINITE EXISTENTIALS Indefinite and (negative) polar existentials in Hittite are formed through a morphological combination of a *wh*-term and a particle. In Hittite, a *wh*-pronoun *kui-* (𒆪𒄿) 'who, which' performs both interrogative and relative functions, and also combines with superparticles to form quantificational expressions. As Hoffner and Melchert (2008: 149) note, the indefinite pronoun '*some*(one), *any*(one)' is *kuiški* (𒆪𒄿𒆠), composed of the (inflected) *wh*-pronoun *kui-* (𒆪𒄿) plus particle *-kki* (𒆠) or *-kka*

(𒆠).[17]

WH-QUANTIFICATIONAL EXPRESSIONS On the other hand, the universal distributive '*each*(one), *every*(one)' quantificational expressions correspond to *kuišša* (𒆪𒅖𒊭), comprising of an inflected *kui-* (𒆪𒅖) plus the conjunction -*a* (𒀀) / *-ya* (𒅀) 'also, and'.[18] Listed below in (199) are repeated examples of universal quantificational expressions in Hittite:

(199) a. 𒉡 𒌉𒈨𒌍𒋗 𒆪𒅖𒊭 𒆪𒉿𒀜𒋫 𒌓𒉈𒂊 𒉺𒄑𒍣
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)

b. 𒉡 𒆪𒀉𒋫 𒅈𒄩𒅀𒀭 𒆠𒈾𒄑𒍣
nu [kuitt-**a**] arhayan kinaizz[i
J what-μ = ∀ seperately sifts
'She sifts **everything** separately.' (KUB XXIV.11.III.18)

Interestingly, the free-choice 'who*ever*' type expressions are analogous but not identical to universal distributives *kuišša* (𒆪𒅖𒊭). As Hoffner and Melchert (2008: 150) show, while universal distributive *kuišša* (<*ku-iš-ša*) 'each, every(one)' shows geminate -šš-, the free-choice *kuiša* (<*ku-i-ša*) 'whoever' features the non-geminating conjunction *-a* (𒀀) / *-ma* (𒈠). The parallel between Hittite 'kuišš-**a**' and Latin 'quis-**que**' has also been established early on by Hahn (1933).[19]

ADDITIVITY The particle *-(y)a* also performs an additive function, with both scalar ('even') and non-scalar ('also') flavours.

17 Hoffner and Melchert (2008: 150) explain the *-kki/-kka* duality: the particle of *kuiški* regularly appears as *-(k)ki* when the vowel in the immediately preceding syllable is *i* (*kuiški, kuinki, kuitki, kuedanikki*) and as *-(k)ka* in other environments.

18 Palaic conjunctions and particles seem to be very similar in this respect—see Carruba (1970: 46–47,60).

19 For an empirically exhaustive account of universal distributive quantification in Hieroglyphic Luwian, see Bauer (2014: Chapter 3) in particular.

(200) kinunn≈a≈[(war≈at≈kan] [(k)]āsa lagāri nu≈wa≈kan *ANA* 2
now-and-QUOT-they-PRT voici it topples now-QUOT-PRT to 2
E[(N.SISKUR)] [(k)]uit apēdani UD-ti KAXU-az E[(ME-a)]z
patron.ritual what on that day from mouth from mouth
uet nu≈wa≈kan apē≈**ya** uddār *QATAMMA* lagāru
it came now-QUOT-PRT those-μ.**too** words likewise it may topple

'. . . look here, they are toppling. What$_i$ came from the two ritual patrons' mouth and toungue on that day, may **also** those words$_i$ likei-wse topple!'
(IBoT 4.13 & Kbo 2.3 iii 18–22; Goedegebuure 2013: 36, ex. 17)

(201) nu memian apūss≈[**a**] *UL* TIL-ner
and/now matter those-EVEN not they resolved

'. . . and **even they** did not resolve the matter.' (Goedegebuure 2013: 38, ex. 22; KUB 56.19 ii 19–19)

For further details on the additive meaning of the μ particle *(y)a* in Hittite and its interaction with other elements of the syntax, see Goedegebuure (2013), Huggard (2014) and Melchert (2009b). Thorough analyses of the Hittite C-system can be found in Probert (2006) and in Garrett (1994).

COORDINATION Two additive μPs—each of them additive, as per examples above—yield conjunction, as motivated by our model, via a silent J^0. The two examples below, repeated from the beginning of this chapter, show the conjunctive meaning that obtains whether a μ marker *(y)a* is repeated in both conjuncts (202b) or not (202a).

(202) a. anšu.kur.ra.meš LÚ.^{meš}is.guškin **ya** humandan
charioteers grooms.golden and all

'Charioteers and all the golden grooms.' (StBoT. 24.*ii*.60-61)

b. kass **a** za URU-az parnanzass **a** [UD]U.A.LUM
this.NOM and PTC city.NOM house.NOM and ram

𒆕𒊒
DÙ-ru
become.3SG.IMP
'and let (both) this city and house become the ram'
(KUB 41.8 iv 30.)

In Chapter 4, we will develop a semantics for the intuition that [also XP]+[also YP] delivers [XP]+and+[YP].

3.4.7 TOCHARIAN

Tocharian is not a single language, hence we will, as we go along, distinguish Tocharian A (TA) and Tocharian B (TB). Where no distinction is drawn in the discussion, the facts hold across TA and TB.

TB boasts the following coordinators with provided etymologies from Adams (2013).[20]

(203) TB coordinators and particles:
  a. Conjunctions:
    i. **wai** 'and' [?>∗*wē*; cf. *wa* 'therefore, nevertheless']
    ii. **ṣpä~ṣäp~ṣ** 'and' [+ε] [Underlyingly /*ṣäpä*/; of uncertain etymology. Possibly a combination of two particles]
    iii. **kaṣp** 'and only' [No etymology provided.]
    iv. **ṣpak** 'and also, moreover; more'
  b. Disjunctions:
    i. **epe** 'or' [Etymology obscure. TA also has *epe*. Possibly a combination of two particles—discussed below]
    ii. **wat** 'or; rather than' [Possibly a combination of two particles: ∗*wē+tu*; cf. *wa* and *wai*]
  c. Other particles and terms:
    i. **k**(**ä**) emphatic particle
    ii. **po** 'all, every, each'

One theory cited in Adams (2013) is to treat *epe* as $*h_1o$-*wē* where the -*wē* is the PIE ∗*wē*. This falsely predicts the existence of the form ∗*eye* in TB, instead

20 The [+ε] notation refers to obligatory enclisis of the particle.

of *epe*. Instead, I propose to etymologise TA and TB *epe* as a combination of the initial ∗*wē* and the particle *pe*, which is (very) conjecturally a reflex of PIE ∗k^{w}*e*.

TA, on the other hand, boasts a similar set of coordinators and particles, taken from Krause and Slocum's (2009) dictionary.

(204) TA coordinators and particles:

a. Conjunctions:
   i. **śkaṃ** 'and, also, and also'
   ii. **ra** 'also'
   iii. **no** ([enclitic] conjunction) 'however; but' [adversative, hence *epe no*, *wat no*]; '(al)though; then' [TA *nu* and TB *no* reflect PTch ∗*nū* from PIE ∗*nū*—Sanskrit *nū*, Greek *nn*, Latin *num*, Gothic *nu*, Lithuanian *n*, all 'now,' OCS *nъ* 'but, however,' Hittite *nu* connective sentence initial particle, etc.]
   iv. **rano** 'also, in addition; even though; however' [*ra*+*no*]

b. Disjunctions:
   i. **epe** 'or' [Etymology obscure. TB also has *epe*. Possibly a combination of two particles—as discussed above]
   ii. **pat** 'or'

c. Other particles:
   i. **k** (emphatic particle), indeed, even
   ii. **puk** 'all, every' [*pu*+*k* = *μ*+*wh*-term]

From the lists in (203) and (204), some common features of the Tocharian particle system emerge.

(205) Connective particles in Tocharian:

		TA			TB	
CONJ.				ṣä	**pä**	
				ṣ	**pa**	k
				kaṣ	**p**	
PRT. ('∀')		**pu**	k		**po**	
DISJ.	e	**pe**		e	**pe**	
		pa	t			
PRT. ('even')		**k**			**k**(**ä**)	
CONJ.	ś	**ka**	m			

In what follows, we briefly review the semantics underlying such particles.

TEMPORAL UNIVERSALS We hypothesise that the temporal universal *puk* derives from *pu* + *k*, the former cognate/reflex of additive/conjunctive *pe* and the latter a *wh*-base (<∗*kwo*).

(206) ṣñi ṣñaṣṣesā
one's.REFL.SG.GEN through-relatives.M.PL.PERL
ortāsā ∿∿∿ eṃtsu
through-glories.M.PL.PERL having-seized.PRET.PART
cwal ārlā **puk**
at-birth.SG.OBL (and-)death.SG.PERL always.INDECL
ṣñaṣṣesaṃ ywārckā säm kayurṣṣ
relatives.M.PL.LOC among.LOC he.DEM.M.SG.NOM bull.M.SG.NOM
oki nuṣ spānte
like bellows.CAUS.PRES8.SG-ACT confidently
'Through one's relatives, through glories (?) ∿∿∿ having received at birth (and) death (?).' (TA. PJ.28)

INDEFINITE EXISTENTIALS There are at least two indefinite-forming strategies in Tocharian. In TA, the particle *saṃ* is used, which does not feature any *μ*-like subparticles.

(207) mā täpreṃ$_i$ **saṃ** poñcäṃ
not so some/any entire.M.SG.OBL(<*puk*)
saṃsāris kāripac
cycle of birth.M.SG.GEN harm.SG.ALTR.ALL
sāspärtwu ālak
located/become.PRET.PART.M.SG.NOM (an)other.M.SG.NOM
wram naṣ kosne$_i$ ālāsune
thing.SG.ALTR.ALL is.SUPP.PRES as.CORREL sloth.SG.ALTR.NOM
'There is not another thing (which has) become (lit. turned) so for the injury of the entire world as (has) sloth' (TA. PJ.10)

In TB, the indefinite marker is *ksa* (*kca*, acc.), which is etymologically identical with a *wh*-stem form ∗k_u*se* as Pinault (1997: 470–472) notes. Again, no *μ*-marker is found in combination with the *wh*-expression to form an indefinite or polar expression.[21]

(208) mā tañ **kc**≈āyor aille nesau
NEG you INDEF.ACC-gift give AUX
'I am not to give thee **any** gift' (TB, 23b5[C])

THE MANY FACETS OF *NU* The PIE particle ∗*nu* has its reflexes in Tocharian. In TA, it can assume a variety of meanings, paraphrasable as *now*, *even*, *anyway*. In TB (*no*), it functions as an adversative marker, akin to *but, however, (al)though*.

In (209), we gave evidence of TA *nu* functioning as an emphatic ('indeed'-type) particle.

(209) cami ālāsuneyis **nu** tsraṣṣune
DEM.M.SG.GEN sloth.SG.ALTR-GEN **indeed** strength.SG.ALTR-NOM
pratipakṣ nāṃtsu tämyo
opposite.SG.NOM being.SUPP.PRET.PART therefore
tsraṣṣune ñi ārkiśoṣyaṃ
strength.SG.ALTR-NOM my.M.SG.GEN world.SG.ALTR-LOC
puk-aṃ pruccamo pälskaṃ
all-M.SG.LOC best.M.SG.NOM opinion.SG.ALTR-LOC
'**Indeed of this**, sloth being the opposite, therefore, strength (is) in the world in my opinion altogether the best thing' (TA. JP 14)

TA *nu* can also bring about adversative meaning as (210) shows:

(210) pāsmāṃ niṣpal
guarded.M.SG.NOM.PRES.PART.MDPASS property.SG.ALTR-NOM
lo näkṣäl wär
away perish.M.SG.NOM.GERNV water.SG.ALTR-NOM
por lāś lyśi
fire.SG.ALTR-NOM kings.M.SG.ALTR-NOM thieves.M.PLNOM
mñe kärṣneñc amok **nu** mā
resources.OBL cutt-off.PRES.PL.ACT skill.SG.ALTR-NOM **but** not

21 We explore this in Chapter 5.

näknäṣträ, nispalis śkaṃ
vanish.M.SG.NOM.PRES10.MDPASS property.SG.ALTR-GEN and
amok tsmār
skill.SG.ALTR-NOM root.SG.ALTR-NOM

'Guarded property is to be made vanish; water, fire, kings (and) thieves cut off (one's) resources. **But** skill does not vanish, and of property skill (is) the root.' (TA. JP 17)

This last example is rather rich, since it simultaneously shows the use of *nu*, the enclitic *śkäm* and nominal asyndetic coordination.

In TB, *no* is adversative, hence of the same semantic kind as *nu* in TA, as (211) shows.

(211) tappre kauś yey. mā **no** nta totka **rano**
high up went.IMPRF.3.SG.ACT not **but** NEG.INTSF little **even**
parna präntsitär
over flow.IMPRF.3.SG.MDPASS

'it went up high. But it did not overflow, not even a little.' (TB, B107/THT 107 2)

Note also the particle *rano* in (211), which is itself composed of the adversative *no* and an additional particle *ra*, to which we now turn.

PARTICLE *RA* Our prime candidate for *μ* category, as we have been motivating it, is the TB particle *ra*, which Adams (2013) translates as an additive marker, corresponding to English 'also', and Sanskrit *ca*.[22] Take the following examples exhibiting the additivity (anti-exhaustivity 'not only') of the *ra* marker.

Under negation, signalled by the negative marker *mā*, the additive marker yield negated conjunction/discjuntion of the type 'neither . . . nor'.

(212) ma nesn āyor ma **ra** telki
not there gift not *μ* sacrifice

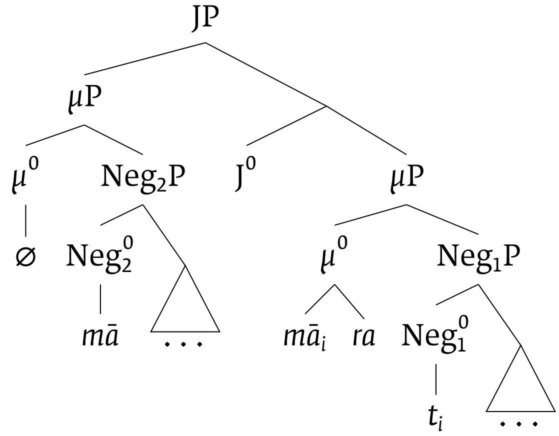
'there is no gift, **neither** [is there] sacrifice' (TB, 8a1)

22 Adams (2013) also finds a comparative function of *ra*, corresponding to English 'like' and Sanskrit *api*. Interestingly, the Ancient Greek τε also exhibits the comparative function—see Denniston (1950: 529) and references therein. It is not readily obvious to me how the semantic unification of alternative-based quantification and comparatives would proceed, hence I ignore it here and, potentially, leave it for future research.

(213) ma tn≂onuwaññe śāya nauṣ ma **ra** śaiṃ ksa t≂ompostäṃ
not immortal live earlier not μ support some afterwards
'he did not live here immortally earlier, **neither** will anyone live [immortally] hereafter'
(TB, 26a5)

The negative coordination of the latter type features two negative phrases, headed by *mā*. In the internal coordinand, the negative head raises to μ^0 (*ra*).

(214) Coordination of negative clauses in TB:



Note also the lower-cyclical role of *ra* as a marker of (universality or) free-choice, as per (215). The *wh*-μ combination also features in plain universal terms, like *everyone* in (216).

(215) [ke]t **ra** śaulassu
who μ venerable
'who**ever** is venerable' (TB, 23b4)

(216) taiknesa **ket ra** kartses paspārtau poyśi [i]nāṣle
thus who μ good turned Buddha honored
'in this way the Buddha [is] to be honored [who has] worked for the good of **everyone**' (TB, 30b8)

Consider now the additive function of *ra*.

(217) te ñiś yāmu tam **ra** yāmu
this make that *μ* =also make
'this I [am to] make, **also** that I [will] make' (TB, 338b1)

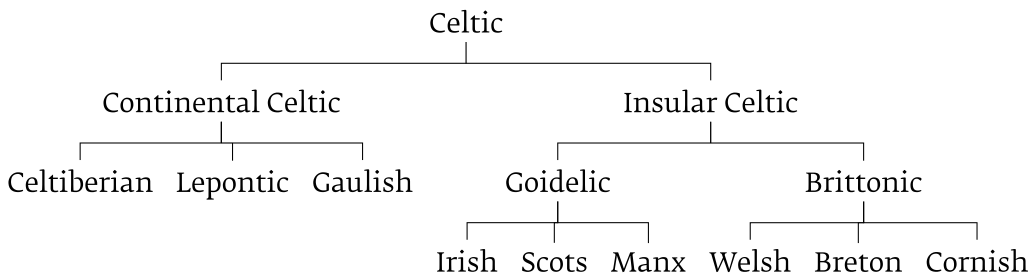
The additivity of *ra* may also be scalar in the sense of 'even'.

(218) kau[ṣentai] **ra** . . . snaimīyäṣlñe ṣek tākoym
murderer *μ* without harm this AUX
'may I be without harm **also/even** among murderer[s] . . .'
(TB, K-3b2)

3.4.8 Celtic

The Celtic branch of IE internally falls into two categories, namely Continental Celtic, comprising of Celtic languages spoken in Continental Europe, and Insular Celtic, which is a sub-branch of Celtic languages spoken on the British Isles, comprising of Goidelic and Brittonic. The linguistic genetics of the Celtic branch can be represented as per (219), following Newton (2006: 4; 2007: 19).

(219)



In the following two paragraphs, we review the core connecting particles in Old Irish, Old Welsh, and Gaulish.

OLD IRISH The two connecting particles we focus on in this section are head-initial *ocus* and peninitial *-ch*.

As Thurneysen (2003: 549; §880) writes, *-ch* 'and'—corresponding to Lat. *que*, Skt. *ca*, Gaul. *(eti)-c*[23]—occurs in very early texts only and usually infixed after three kinds of proclitics:

23 We address Gaulish below.

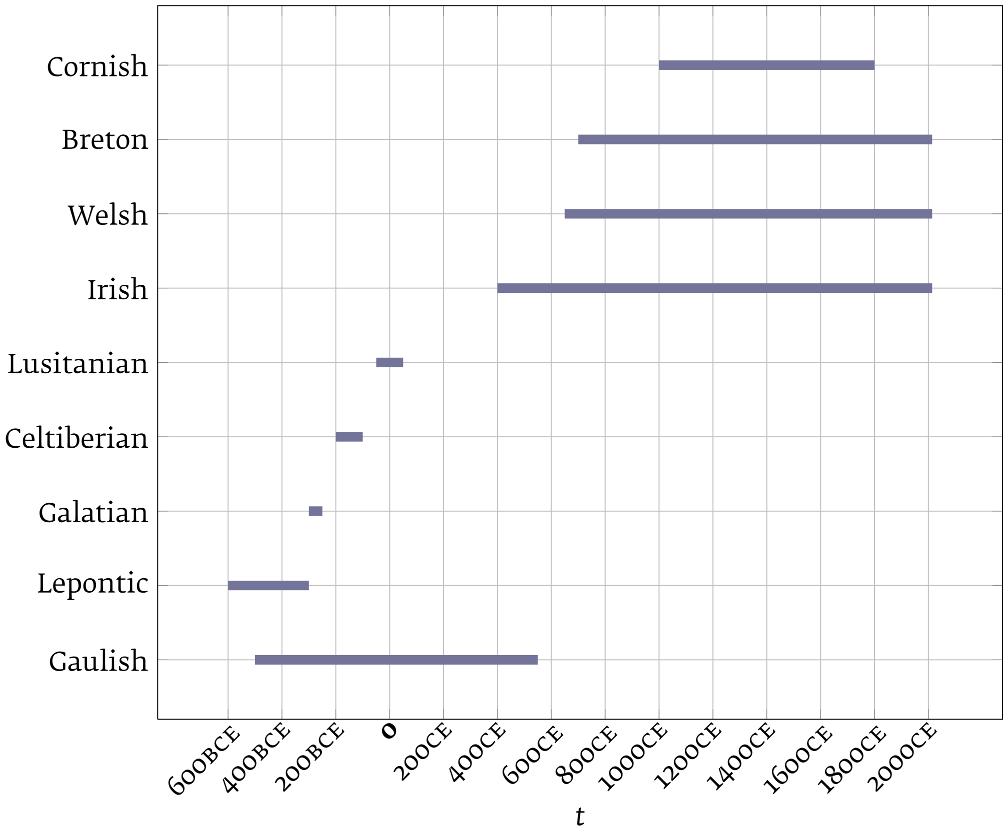


FIGURE 3.5.: *A diachronic sketch of Celtic languages and their lives (Ziegler, 2009)*

(220) proclitic hosts of *-ch*:

i. *ro-* [aspectual marker]

ii. *to-* [preposition, reanalysed as aspectual marker]

iii. *ba-* [copula]

One way to explain the confined class of *-ch* hosts in (220), is to posit the structural position of *-ch* in the clausal periphery, which is in line with Eythórsson's (1995) analysis of *-uh* in Gothic. Following an idea of Roberts (2004), aspectual markers incorporate into FIN^0. The following two examples are in line with this analysis.

(221)

ꝼeꞃ	óanélaꞇ	beċ	ꞃoċlameṫaꞃ	ꝼoꞃᵹull
fer	óa≠n≠élat	be[i]ch	ro≠**ch**≠lamethar	forgall
man	from-swarm	bees	ASP-**and**.*μ*-ventures	testify

'a man from whom bees swarm away **and** who ventures to testify." (EILw. IV. 190; Thurneysen 2003: 549)

(222)

ba	ċ	ꞃı	Ꞇemꞃaċ
ba	**ch**	ri	Temrach
COP	and	king	Tara.GEN

'And he was king of Tara.' (EILw. IV. 179; Thurneysen 2003: 549)

Note that enclitic connective *-ch* is only found in the *Laws* with one one example surviving in the MG, indepently confirming the archaic status of the *Laws*. In other texts, only head initial coordinators are found, the details of which are presented in Appendix F.

Aside from *-ch*, other particles and particle composites are found in OIr. The Milan Glosses (*Milan Codex Ambrosianus*/MG) exhibit those connective particles listed in the following table.

These particles are grouped according to morphemic common denominators in (223), with many other connective particles listed in Appendix F fitting this picture. For a convincing philological analysis of the morphological non-atomicity of *ocus*, see Griffith (2008) in particular.

(223) Connecting particles in OIr.:

PARTICLE	TRANSLATION	# of tokens
os	even, and	28
no	or	236
dano	also, too	108
-ċ	and	1
noċ	alt.+and	33
ocus	and	750

TABLE 3.13.: *Connecting particles and their instances in Old Irish (Milan Glosses)*

CONJ.	o	**cu**	s
		ch	
	no	**ch**	
CONJ./'EVEN'	o		s
DISJ.	no		
ADDIT.	da-no		

OLD WELSH A window into Old Welsh (OW) superparticles we are digging for in IE is work by Falileyev (2000). In (224), we report a rather inclusive list of OW coordinating particles and the relevant NPIs, indefinites, and interrogatives.

(224) OW coordinating particles and related meanings:

a. COORDINATORS:

i. (**h**)**a**(**c**) 'and' (MW *a*; OB *(h)a*) (Falileyev, 2000: 1,2,78–9)

ii. **nou** 'or' (MW *neu*; MDW *neu*; *OIr nó, nú*) (Falileyev, 2000: 121)

iii. **cen** 'even though' [MdW *cyd, cyn*] (MW *cin*, OB *cenit*, cf. Ogham Ir. CI) (Falileyev, 2000: 25)

iv. **cet** 'even though' (MW *ket*) (Falileyev, 2000: 27)

v. **hacen** 'but' (MW *hagen*, C *hagen*, B *hogen*, ha-c-en) (Falileyev, 2000: 79)

vi. **hac**(**c**)**et** 'and, so'; according to Williams (1927: 265), decomposible into *ac* 'and' + *et* (as in *nogyt, noget*) 'so' (MW *hagen*, C *hagen*, B *hogen*, ha-c-en) (Falileyev, 2000: 80)

b. ADDITIVE MARKERS:
   i. **hithou** 'she (her, it) too' (conjunctive pronoun; MW *hithe(u)*; OB *itou*; MC *ythe*; MdW *hithau*) (Falileyev, 2000: 86)

c. INTERROGATIVE/INDEFINITE TERMS:
   i. **pa** 'what, which', interrogative and relative particle (MW *pa*; MDW *pa*; MC *py, pe*, OB *pe*) (Falileyev, 2000: 126)
   ii. **pan** 'when' pron./conj. (MW *pan*; MDW *pan*; OIR *cuin/can*) (Falileyev, 2000: 127)

d. FREE CHOICE ITEMS:
   i. **pinnac(c)** 'whatsoever' [FC] (MW *bennac, b(y)nnac*; MDW *bynnag*; MC *penak, pynag, penag*; OB *pennac*); suggesting an internal structure of a *wh*-word (*pin*) coupled with a conjunctive particle *ac*. (Falileyev, 2000: 131)

We group the particles and their combinations from the list above into a pattern, centering on $*k^we$, which clearly shows a combinatorial morphosyntax of the OW connectives, featuring a small set of underlying particles, namely *c(e), h(a), t(e)* and *n(o)*.

(225) Connecting particles in OW.:

CONJ.	(h)a		
	(h) a	**c**	
	ha	**c**(**c**)**e**	t
'EVEN THOUGH'		**ce**	n
		ce	t
'BUT'	ha	**ce**	n
DISJ.	nou		

GAULISH Koch (1982) and Eska (1992) report on the conjunction system of Gaulish as reflected by the Chamalières tablet, a.k.a. the Chamalières inscriptions (CI),[24] with a focus on *eti-c*, analysed as a copula (*eti*) followed by a conjunctive connective (*-c*). The etymology of Gaul *eti-c* as *∗esti-∗kwe* finds further support from Matasović (2009: 119,176) and Delamarre (2003: 167).

(226) lotites snī regu-**c** cambion
quicken.2. us.ENCL.*pro* straighten.1.SG-**and**.*μ* croocked.ACC

24 For details of the CI, see Koch (2006: 398–399).

'You quicken us **and** I right the wrong [*lit.* straighten the crooked one]' (CI; Koch 1982: 90)

Aside from *-c* being employed as a conjunctive marker, as both the examples above and below exhibit, its combination with a *wh*-term yields a (conjectured) FC interpretation (my own):

(227) Eti-**c** Segouī toncnaman
COP.3-**even**.*μ* strong one.GEN.SG.ATTRIB oath.ACC
toncsiiont-io: meion, pon-**c** sesit
swear.3.PL.FUT-REL.PRT small.N.NOM/ACC when-**ever**.*μ* sows.3.SG
buet-id ollon;
be.3.SG.SUBJN-it great/whole.N.NOM/ACC
regū-**c** cambion exsops
straighten.1.SG.PRES-**and**.*μ* crooked.N.NOM/ACC blind

'And it is the oath of the Strong One that they shall swear [*or*, and it is the destiny of the Victor they shall attain]: the small (?) thing—**whenever** he sows it—it shall become great, **and** I right the wrong without eyes' (CI; Koch 1982: 109)[25]

In the following inscription, the enclitic *-c* may be given a focus-sensitive interpretation (*even*); this interpretation is my own.

(228) Anedion uediiū-mī diiiuin
inner God.ACC.ATTRIB beseech.1.SG-1.SG divine.ACC.ATTRIB
risū naritū Mapon(on) Aruernatin:
tablet.INST magic.INST Maponos.ACC Arvernatis.ACC.ATTRIB
lōtites-snī eθθi-**c** sos briχtiā
quicken.2.SG/PL-ACC.1.PL COP.3-**and**.*μ* them.ACC.3.PL magic.INST
Anderon
infernal beings.GEL.PL

'I beseech the chthonic (?), divine Maponos Arvernatis by means of (**even** this) magic tablet: quicken (?) us, i.e., those (named herein), by the magic of the underworld spirits' (CI; Koch 1982: 108)

Identical peninitial placement of the $*k^{w}e$ connective, reflexing as *-c* in Gaulish, is also found in the *Alise-Sainte-Reine* inscription from the 1st c. CE.

25 Interpretation of *pon-***c** ('when+$*k^{w}e$') as a FCI 'whenever', as opposed to 'and when', is mine.

(229) MARTIALIS · DANNOTALI \\ IEVRV · VCETE · SOSIN \\
M son of D bestowed on U this
CELICNON EII-**C** \\ GOBEDI · DVIIONTIOO
chalice it is-**and** by means of the smiths who serve
VCVETIN · \\ · IN ~~~~ ALISIIA
U in Alisiia

‘*Martialis* son of *Dannotal* bestowed, on *Ucuentis*, this chalice **and** it is by smiths who serve Ucuentis in Alisia.’ (L-13)

In the last two subsections, we turn to two IE languages, or language families, which do not show the coordinate system of double placement.

3.4.9 Armenian

Armenian does not, as we have remarked in §3.3, show a double system of coordination in the sense that other older IE languages do. We have conjectured that the Wackernagel placement of a $*k^w$*e*-type connective was lost given Classical Armenian’s relatively late earliest record. We can, still, finds remnants of 2P syntax, inherited from PIE, in Classical Armenian by examining its lexicon of connective particles.

Given in (230) is a morphologically paradigmatic list of Classical Armenian particles.

(230) Connecting particles in Armenian:

‘ALSO, EVEN, AND’	**ew**	
	ew	s
‘ONLY’	**ew**	et‘
‘ANY-/-EVER’	**-k**	

For a detailed overview of the particle system of Armenian, see Klein (1997) for an internal analysis, and Klein (2011) for a comparative analysis of negation and NPIs in a subset of IE language.

Classical Armenian shows only the medially placed coordinator, as shown in (231), taken from Krause and Slocum (2004).

(231) Ընդ այն ժամանակս եկաց ի գործ
ənd ayn žamanaks ekac‘ i gorc
at that time took.AOR.3.SG PREP post.ACC.SG

հազարապետութեան կայսեր ի վերայ Փիւնիկեցւոց եւ
hazarapetut‘ean kayser i veray P‘iwnikec‘woc‘ **ew**
chiliarch.GEN.SG emperor.GEN.SG over Phoenicians.GEN.PL **and**
Պաղեստինացւոց, Ասորւոց եւ Միջագետաց,
Pałestinac‘woc‘, Asorwoc‘ **ew** Mijagetac‘,
Palestinians.GEN.PL Syrians.GEN.PL **and** Mesopotamians.GEN.PL
Մառինոս որդի Ստորգեայ
Maṙinos ordi Storgeay
Marianus.NOM.SG son.NOM.SG Storgius.GEN.SG

‘At that time Marinus, son of Storgius, took the post of the emperor’s chiliarch over [the Phoenicians **and** Palestinians], [the Syrians **and** Mesopotamians].’ (MKHist II: 30)

The conjunctive particle *ew* may also double as shown in the negative polysyndetic construction in (232).

(232) Եւ ոչ լուցանեն ճրագ եւ դնեն
Ew oč‘ luc‘anen črag **ew** dnen
and/also NEG light.PRES.3.PL candle.ACC.SG **and** put.PRES.3.SG
ընդ գրուանաւ
ənd gruanaw
under bushel.INST.SG

‘**Neither** do men light a candle, **and** put it under a bushel’
(VT, Mt. 5:15)

Repeated in (233) are two pieces of data, which show that NPIs comprised a *wh*-term and a $*k^we$-type particle.

(233) a. եթէ ո ք
et‘e [o- **k‘**] . . .
if who- *μ*

‘If *anyone* [strike (thee) upon thy right cheek . . .]’
(VT. Mt., 5.39; Klein 1997: 196)

b. երբե ք
[erbe- **k‘**] . . .
[time.LOC *μ*]

‘At *any* time/*ever*.’ (VT. Mt., 5.39; Klein 1997: 191)

Possible remnants of $*k^w e$ may also be found in the particle *isk*, whose meaning oscillates between conjunctive ('and'), adversative ('but') and emphatic ('indeed/truly'), as reported in (234) below.

(234)

Ապա	դէպ	եղեւ՝	զի	որդի	միամօր	կայսերն,	այն
Apa	dēp	ełew'	zi	ordi	miamōr	kaysern,	ayn
then	happened	it.AOR.3.SG	that	son	only	emperor.GEN.SG	that

իսկ	գտանէր	նորա	զաւակ
isk	gtanēr	nora	zawak
but/indeed/and	considered.IMPF.3.SG	his.GEN.SG	

'Then it happened that the only son of the emperor—that one was **truly/indeed** considered his progeny' (HArm IV: 5)

In the next subsection we turn to the last IE language, which—just like Armenian—does not show direct evidence of a double system of coordinate marking, due to its late record.

3.4.10 Albanian

COORDINATION PATTERNS IN THE 15TH C. The oldest Geg Albanian inscription is the *Formula e pagëzimit* (a letter from Pal Engëlli), which dates to the second half of the fifteenth century and, luckily, contains a coordinating construction, which we give in (235).

(235) EARLIEST (GEG) ALBANIAN inscription: [November 8, 1462

a.

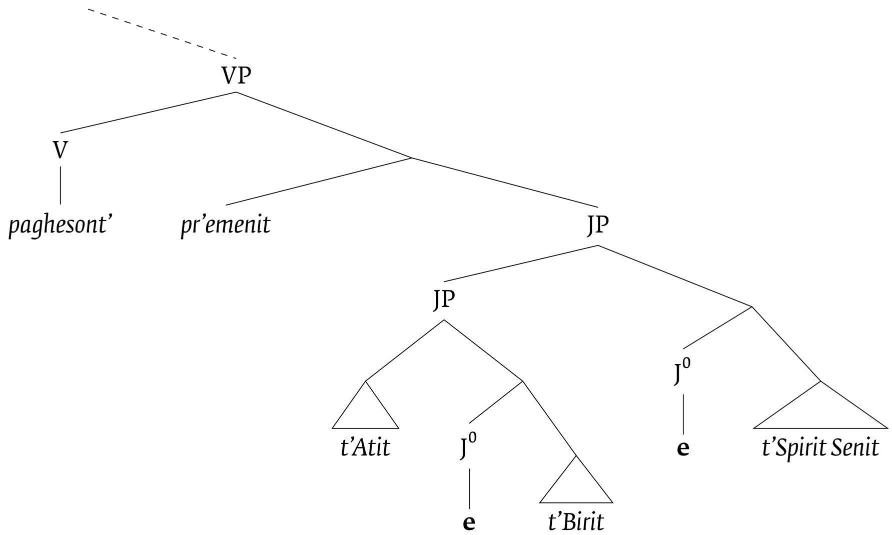
Un'te	paghesont'	pr'emenit	t'Atit	**e**
I.NOM=you.ACC	baptise.IND.PRES	in.name	the=father	**and**

t'Birit	**e**	t'Spirit	Senit.
the=son	**and**	the=spirit	holy

'I baptize thee in the name of the Father and the Son and the Holy Spirit.' (*Formula e pagëzimit*)

The conjunction marker is of an English-type insofar as its medial and head-initial placement between the conjunct is concerned. Recall our methodological preliminaries from §2.4, in which we stated that if the number of coordinands (d) equals the number of coordinators (r), then the coordination markers are structurally subjunctional. On the other hand, if the cardinal relationship between coordinands and coordinators is $r = d - 1$, then the markers are junctional, which seems to be the case with *Formula e pagëzimit* in (235).

(236) An analysis for (235):



Joseph et al. (2011) also provide a limited corpus from 16th century Geg Albanian, comprising of the earliest major text *Meshari i Gjon Buzukut* (MGB; The Missal of Gjon Buzuku), written in 1555, which shows the same grammar of conjunction as the 15th century inscription cited above.

(237) Ëndë e zanët të
in.ACC PRT.DEF.N.SG.ACC beginning.N.SG.ACC PRT.F.PL.ACC
shekullit bani
time.M.SG.GEN made.3.SG.PAST.DEF.IND.ACT
Zot'ynë qiellë **e**
lord.M.SG.DEF-our.M.NOM heavens.N.PL.ACCM.SG.ACC.INDEF AND
dhenë.
earth.DEF.M.SG.ACC
'In the beginning of time our Lord made heavens **and** the earth.'
(MGB, l. 1)

The syntax of conjunction with medial placement is identical in 20th century language:

(238) Shpija e Shqyptarit
house.F.SG.NOM.DEF PRT.F.SG.NOM.DEF Albanian.M.SG.GEN
âsht e Zotit e
is.2.SG.PRES PRT.F.SG.NOM.DEF God.M.SG.GEN.DEF **and**
e mikut.
PRT.F.SG.NOM.DEF guest.M.SG.GEN
'The house of the Albanian is of God and of the guest.' (KLD, l. 1)

Consider also the double-additive construction in (239), analogous to the double additive construction ("also ... also"), which delivers conjunctive meaning.[26]

(239) me shëmbëllën e lartë
with.ACC example.DEF.F.SG.ACC PRT.FEM.SG.ACC high.FE.SG.ACC
besnikërinë tuaj **edhe** kundrejt meje,
loyalty.DEF.F.SG.ACC your.SG.ACC *μ* =also towards.ABL me.ABL
edhe kundrejt mbarë Epirit.
μ =also towards.ABL all Eprius.M.SG.ABL
'... with the high example of your loyalty **both** towards me, **as well as** towards all of Epirus.' (BSk, l. 5)

Grouping the coordinating particles with quantificational (NPI and FC) terms, the following pattern emerges:

(240) Connecting particles in Albanian:

CONJ.		**dhe**	
	e		
ADDIT. 'ALSO/EVEN'	e	**dhe**	
DISJ.	a		po
	a		
	o-s-e		
'BUT'			po-r
'EVERY'	ç	**do**	
'ANYONE'	kën	**d**	
COMPL. 'THAT'		**që**	

For an account of the *po* marker, see Joseph (2011). Note also that Albanian *po* shares many facets with Slovenian 2P *pa*, which may suggest a common

26 We will develop a semantics for double additives in Chap. 4

IE origin and inheritance. Note also the *por* particle, where the *-r* segment seems cognate with Lith. *ir* ('and') or Toch. *ra* (<∗r+∗*a/e*), which we may hypothetically derive from PIE ∗*r*, signalling a connective 'now, therefore', according to Pokorny (1959: 62). I leave this conjecture for future research.

While the historical grammar of Albanian (Orel, 2000) makes no reference to the historical status of particles , Orel (1998) etymologises the particles we have laid out in (240) as per (241)

(241) **a** 'or, Q' (Orel, 1998: 1) From PAlt. ∗*a*, cognate with Greek ἦ (Pedersen, 1895: 322). Meyer (1891) assumed a homophony based on the duality of the disjunctive and interrogative functions of *a*; he thus explains the first intertogative *a* as cognate with Lat. *an*, the second disjunctive use as cognate with Lat. *aut*, 'or'. Pedersen (1895: 322) instead proposed that both uses have a common etymology.

e 'and, also' (Orel, 1998: 85) From PAlt. ∗*ō(d)*, going back to IE ∗*ēd*∼∗*ōd*; cf. Skt. (or indeed IIr.) *āt* and Slav. ∗*a* 'but'

dhe 'and, also' (Orel, 1998: 85) Reflecting PAlb. ∗*dō* < IE ∗*dō* as perserved in Slav. ∗*da* 'and, so that'. Orel also notes the parallel of Alb. *edhe* with Slovenian *ada* < Slav. ∗*a da*

edhe 'and, also' (Orel, 1998: 85) A sequence of two particles: *e+dhe*.

Let us now turn to contemporary Albanian patterns of disjunctive and interrogative, which were provided by Dalina Kallulli (p.c.):

(242) **A** po shkojmë?
κ PART go.1.PL.PRES
'Are we going?'

(243) **A** digjónj
κ hear.2.SG.M.PRES
'Are you listening? Can you hear?'

(244) sot **a** nesër
today κ tomorrow
'today or tomorrow'

Note the following restriction on particle combinations:

(245) **a** sot **a** nesër
κ today κ tomorrow

‘either today or tomorrow’

(246) **o** sot **o** nesër
κ today κ tomorrow
‘either today or tomorrow’

(247) * **apo** sot **apo** nesër
κ+ today κ+ tomorrow
‘either today or tomorrow’

(248) **ose** sot **ose** nesër
κ+ today κ+ tomorrow
‘either today or tomorrow’

Even though Albanian does not show evidence of a 2P placement of the coordinator, we may have evidence of diachronic presence. Albanian indefinite or NPI *kënd*, ‘someone/anyone’ is standardly etymologised as stemming from PAlb. ∗*kwon-to*, which has older origins in the PIE syntagma ∗*kuo*+∗*to* (Orel, 1998: 178) The latter PIE particle ∗*to* (> PAlb. ∗*to* > Alb. *d*) seems like a candidate to be tangibly classified as our *μ*-particle.

Equipped with a fine-tuned structure for coordination, we now turn our focus to the synchronic syntax of peninitially placed Wackernagel coordinators in §3.5. We extend this synchronic account diachronically in §3.6, where we derive a diachronic analysis of the loss of the double system.

3.5 Deriving the peninitial placement

We have empirically established that there were two canonical constructions available in IE languages: a head initial and a head peninitial one, the latter with the two mono- and polysydentic subtypes. Theoretically, given the three properties of the double system—linearisation, focus and morphemic structure—addressed in §3.2.1–§3.2.2, we derived all three properties differentiating the two canonical patterns within our JP structure.

This section addresses the syntactic derivation behind the peninitial placement of the coordinator. We first investigate the synchronic constructions in IE that feature peninitial *μ* particles and outline a diachronic account, according to which the initial pattern is the surviving one.

The second position effect has its traditional aetiology in what is known as Wackernagel’s Law. Wackernagel (1892) is credited with identifying the one generalisation that applies to the syntax of PIE, namely that some elements consistently occupy the second position in a given string of words, or, in modern terminology, in a given constituent. Suffice it to say that the 1892 generalisation is far from explanatory: it is solely a descriptive observation pertaining to word count. An explanation is, however, feasible in a theory of syntax which, for instance, attributes all configurational (word order related) differences to differences in movement. There have essentially been two theoretically different approaches to the explanatory account of Wackernagel's Law. Although both theories see the cause of the second position effect in movement, one confines this movement to narrow syntax while another places the movement in the post-syntactic module where it is subject to prosodic conditions.

The purpose of this section is not to categorically suggest a confinement space wherein the W(ackernagel)-movement takes place, but to suggest an over-arching factor of the distribution of the second position effects that the IE coordination data suggests. This factor, as it were, is the phasal architecture, to which not only the syntactic derivation is subject but also the phonological and prosodic processes that follow it.

A Wackernagel element like our μ (Lat. *-que*, Hom. *-te*, Goth. Lat. *-uh*, Skt. *-ca*, etc.) has a requirement which demands μ be preceded by a head. The clitic hosts are predominantly (of the size of) a head; we do not come across complex maximal categories preceding enclitic particles. There are instances of non-constituent sequences fronted to μ-left-adjacent position (e.g., Caes.2.11; 2.85). Such clitic hosts generally contain two adjacent heads, e.g. $[_{\mu P} [P^0\ N^0]_i\ [\ \mu^0\ t_i \ldots]]]$, which invites a prosodic analysis. See Embick and Noyer (1999: 280–281) for a prosodic account of Latin *-que* on this matter. Brian Agbayani and Chris Golston (p.c.) also bring to my attention the dislocation patterns associated with Homeric *de*, which unlike *te*[27] may move phrasal constituents to its left.[28]

(249)	a.	[τῇ δεκάτῃ]	δ'	ἀγορήνδε	καλέσσατο	λαὸν	Ἀχιλλεύς
		[tē dekatē]	**d'**	agorēnde	kalessato	laon	Axilleus
		[the tenth]$_i$	**and** t_i	to-assembly	called	host	Achilles

‘ but on the tenth Achilleus called the people to assembly’

(Il. A.54)

27 See Denniston (1950: 516, fn. 1) for arguments and references.

28 I am grateful to Brian Agbayani and Chris Golston for bringing these exceptions to my attention.

b. [ἐκ τῶν ἔμπροσθεν] δὲ ἀνάσκεψαι
[ek tōn emprosthen] de anaskepsai
[from the previous]$_i$ **and** t_i consider
'and consider this from the previous cases' (Crat. 389[a])

c. [καὶ τῶν παρ' ἑαυτῷ] δὲ βαρβάρων ἐπεμελεῖτο
[kai tōn par' eautō] **de** barbarōn epemeleito
also the near himself **and** barbarians took-care-of
'and he also took care of the barbarians near him' (Anab. 1.1.5)

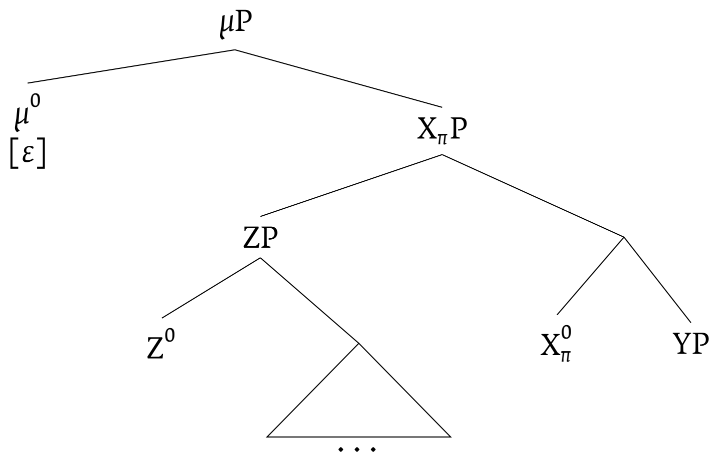
Since non-head hosts are far rarer than head hosts, we resume the discussion accounting for the head dislocations, although the overall traits of the analysis we develop could extend to XP movement. Let us assume that *μ* particles come hardwired with an [EPP]-like feature [ε] which, unlike [EPP], attracts and induces movement of the closest and the smallest syntactic object, a terminal/head. The link between [EPP] and [ε] is made empirically even clearer in light of non-head hosts of *de* in (249) above. Just like [EPP], [ε] must be checked in line with the principle of economy ("as soon as possible"). If there is a syntactically available object satisfying the two 'movement criteria'—i.e., the syntactic object is (a) the closest (b) X^{min}—then [ε] is checked syntactically. If there is no eligible local terminal in the syntactic structure, [ε] is checked post-syntactically, as per economy ("better later than never"[29]). The visibility and eligibility of such head targets is determined, as we shall see, by phasality.

Phases, as domain delimiters for structure building, do not only concern syntactic processes. It is a standard minimalist assumption to view phasal heads as 'closing off' a cycle, which is—upon merger of the phasal head, X^0_π—transferred to the two interfaces for semantic and phonological processing (interpretation and externalisation respectively). A phase therefore not only partitions narrow syntactic derivation into logical building blocks but also delimits post-syntactic operations and synchronises them with narrow syntax. In this direction, Samuels (2009: 242) takes as a starting point the conceptual argument laid out in the foundational work by Marvin (2003: 74): "If we think of levels in the lexicon as levels of syntactic attachment of affixes, we can actually say that Lexical Phonology suggests that phonological rules are limited by syntactic domains, possibly phases." Samuels thus proposes a Phonological Derivation by Phase (PDbP), which "relies on a cycle that is not proprietary to phonology." (Samuels, 2009:

29 See Preminger (2011) for a theoretical connection with, and background on, this kind of crash-tolerating economy.

243) Combining Samuels's theory with the concept of post-syntactic movement, we should predict the domain or scope of such operations based on the narrow syntactic derivation. Assume μ in (250) is a Wackernagel-type coordinator specified with [ε], which represents the requirement for peninitial placement. Let's assume it takes a phasal complement $X_\pi P$, which has ZP as its specifier and YP as its complement.

(250)



a. ε-checkable terminals narrow syntactically: ∅

b. ε-checkable terminals post-syntactically: $\{Z^0, \ldots, X^0_\pi\}$

c. closest accessible terminal: Z^0

Since the phasal head, X^0_π, triggers the transfer of its complement, only the edge of $X_\pi P$ is accessible to outside operations. The head of ZP is ineligible for narrow syntactic head movement, possibly for reasons to do with anti-locality.[30] Post-syntactically, movement takes place, checking [ε]. Should the ε-accessible domain of heads be non-empty, we predict narrow syntactic incorporation to take place, in line with the aforementioned economy. Nominal coordinations of the type in (251) thus get linearised narrow syntactically since the set of ε-accessible terminals would not be empty, unlike in (250).

30 Other reasons for blocked incorporation include the ECP (Chomsky, 1986), from which it follows that only heads of complements can incorporate (see Roberts 1991: 210). generalisation that incorporation

(251) अज॑नयन्॒ मन॑वे क्षाम॒ अपश॒ च
ájanayan mánave kṣā́m apáś$_i$ *ca t$_i$*
for.men created.MID.3.SG.M earth (J) water μ
'For men he created the earth and water.' (ṚV 2.20.7[c])

On the other hand, a structure like the one in (252) could only be an instance of post-syntactic movement since the target of movement is syntactically inaccessible and incorporable (head-immovable) as the set of ε-accessible terminals is in fact empty (null C^0) and does not contain the *wh*-terminal, which originates within the specifier of the *kártvā*-headed CP. Assuming "phonology doesn't have to 'read' syntactic boundaries," since "it just applies to each chunk as it is received" (Samuels, 2009: 250), the syntactically inaccesible *wh*-temrinal *yā́* is made available to μ^0 post-syntactically, thereby checking via movement the [ε] feature.

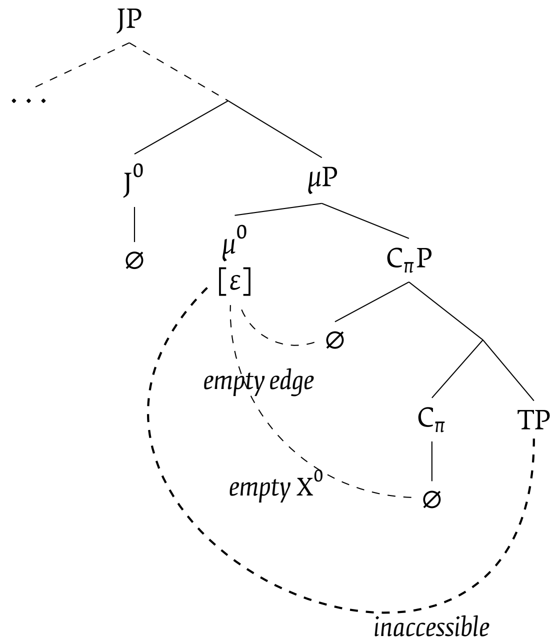
(252) कृ॒तानि॒ या च॒ कत्वा॑
kṛtā́ni yā́$_i$ *ca t$_i$* kártvā
made.PRT. (J) which.REL μ to.be.made.FUT.PART
'. . . what has been and what will be done.' (ṚV 1.25.11[c])

So far, we have set a system of post-syntactic rescue for ε-checking, appealing to post-syntactic access of the internal structure of specifiers and availability of post-syntactic incorporation of narrow syntactically frozen specifiers. Now we turn to cases where the edge, comprising of a specifier and head, of a phasal category is empty. Take (253):

(253) हन्ति रक्षसो॑
hanti rakṣáso
slay.PRES.3.SG demons.ACC.PL
'He slays the demons.' (ṚV 5.83.2[a])

The present verb *hanti* seems to sit in T^0 with the object, the demons, lower in the structure, presumably in its V-complementing *in situ* position. Assuming the category of (253) is that of CP, we see that CP edge is empty: the indicative C^0 is phonologically null and no syntactic material has been extraposed or otherwise moved to any of the left-peripheral CP specifiers, such as a Rizzian Focus head. Should such a CP undergo coordination, the [ε] feature on μ^0 would not be deleted. Given our assumptions, the derivation would crash due to this. The structure in (254) sketches this scenario, where there are no syntactically or post-syntactically accessible terminals within μ^0's search domain. The Wackernagel effect is therefore blocked by virtue of there being no suitable post/syntactic material below μ^0.

(254)



a. ε-checkable terminals narrow syntactically: ∅
b. ε-checkable terminals post-syntactically: ∅
c. closest accessible terminal: ∅

The structure in (253) is nonetheless a coordinand: as last resort, the otherwise silent J^0 receives phonological realisation for ε-checking reasons. The full internal coordination structure of (253) is given in (254). The last resort mechanism *qua* phonological realisation of J^0 may be analogised to expletive subjects in a language like English. Just as there is no subject (in the *v*P) eligible to raise to [Spec, TP] in sentences like '*it* is raining,' an expletive subject is realised as last resort. Equally, when there are no eligible heads for [ε]-checking, J^0 is overt.

(255)

उ	त॑	हन्ति	रक्षसो॑
u	*-tá*	hanti	rakṣáso
J	μ	slay.PRES.3.SG	demons.ACC.PL

‘And he slays the demons.’ (ṚV 5.83.2[a])

The proposed analysis is also an explanation of an empirical generalisation that has not only been extensively shown to hold not only in Ṛgvedic (Klein 1985a,1985b) and Old Persian (Klein, 1988) but across the vast array of ancient IE languages (Klein 1992, Agbayani and Golston 2010).

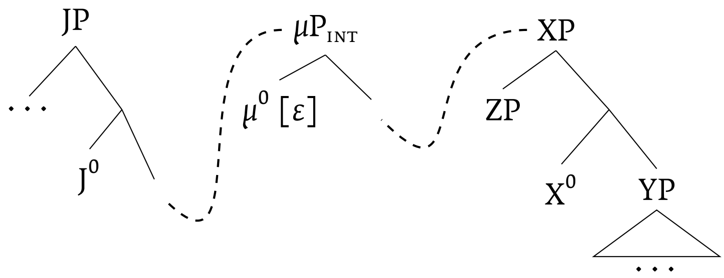
(256) CATEGORIAL GENERALISATION:
Peninitial coordinators tend not to feature in clausal coordinations.

Since clauses (CPs) are inherently phasal (Chomsky 2001, *et seq.*), they provide the selecting head μ with far less search space, or in the case of (255), an empty set of possible incorporees. In non-CP coordinands, [ε] may be checked by virtue of access to terminals in μ^0's complement's interior. The derivation of non-clausal coordination is therefore strictly cyclical:[31] once an XP is derived (cycle I), it is selected by μ^0 (cycle II.) whose [ε] feature is checked Agree-wise. The μ category is in turn incremented by J^0 (cycle III.), as shown in (257a). The external coordinand[32] is merged in [SPEC,JP] (cycle IV.) in line with cycles II. and III. Stopping off the derivation at the point of the second cycle obtains bare μPs with focal/polar/scalar semantics (140)–(147). The third J^0-cycle yields a syntactic structure for coordination. Diachronically, the change occurs in the collapsing of the second and third cycles, whereby μ^0 and J^0 feature in a single cycle and thereby inherently yielding bimorphemic coordinators, morphologically and lexically deleting [ε] on μ^0, which in time gets ‘buried’ under J^0, as instantiated in (257b). The interdependence of the J-μ complex may be empirically and technically analogous to proposals by Chomsky (2008) and Richards (2007), among others, who claim that T^0 is lexically defective, bearing no ϕ-features of its own, and instead inherits its ϕ-features from the phase head C^0. In light of this, μ^0 can be analysed as lexically defective, requiring an overt (clitic hosting/*) J^0 to delete [ε].

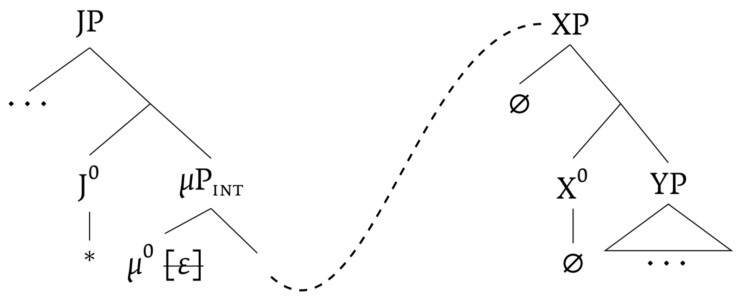
(257) a. *III.* *II.* *I.*

31 Note that I employ the term ‘cycle’ rather pre-theoretically and these have no role other than to describe the derivational steps involved in the construction of JP.

32 The derivation of the external coordinand is ignored here.



b. *II.* *I.*



This view predicts that the loss of enclitic monomorphemic coordinators, and the inverse rise of the inherently initial bimorphemic coordinators, entails the loss of independent *μ*P, which features in focal additive, polar and scalar construction as in (140)–(147). This is in fact confirmed.[33]

Diachronically, the last resort option of realising an overt J^0 to host the *μ*-particles (257b) becomes the first response,[34] as schematised in Fig. 3.6. Clausal coordination type generalises to all categories as μ^0 comes 'preinstalled' with a hosting morpheme.

So far, we have been developing a system, we have identified two syntactic position for connective particles—J^0 and μ^0/κ^0—arguing that the spell-out interaction of the two positions yields head-initial coordination markers in IE. We do not, however, mean that *all* head initial coordinators are com-

33 The only exception to this diachronic interlock between changes in word order and semantics, would be a case where μ^0 would not carry [ε] and thus would not get buried under J^0 in time. The Slavonic branch is such an exception, which has lexically syncretised the entries for J^0 and μ^0 as *i* but the semantics of the coordinate/non-coordinate constructions clearly shows that two forms of *i* existed in OCS, which is preserved in most branches of synchronic Slavonic.

34 We use the term 'first response', again, very pre-theoretically to label any form of movement which is not triggered by last-resort economy.

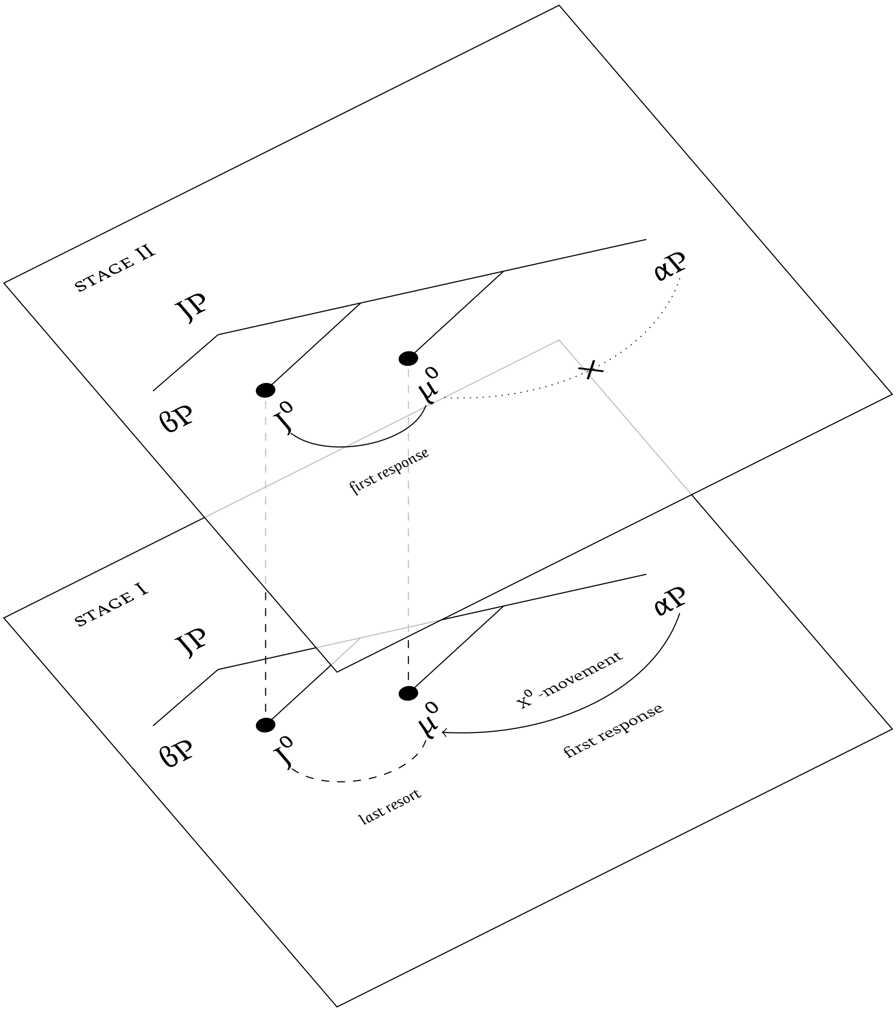


FIGURE 3.6.: *A diachronic sketch of syntactic development of coordination in Indo-European.*

posed of J^0 and μ^0. One diagnostic for J-composed first-position markers in IE is the iterativity property.[35]

Recall the lexicalisation of J^0 (*és*) in a language like Hungarian, where the Junction morpheme cannot reduplicate.

(258) a. Kati **és** Mari
K J M

35 The following segment owes its existence to Brian Agbayani and Chris Golston (p.c.), who have rightfully raised issues concerning the analysis as it stands so far.

'Kate and Mary'

b. * **és** Kati **és** Mari
J K J M
'(both) Kate and Mary'

The problematic, *prima facie* J-comprising, cases in IE come from Latin *et* and Greek *kai*, where they may reduplicate. Take Latin *et*, which historically originates as an adverb meaning 'yet, still, equally'. (de Vaan, 2008: 195) We have developed an analysis according to which J is phonologically realised as a last resort when movement from within the internal coordinand (complement to μ) is prevented. Assuming *et* was reanalysed from an adverb, the realisation of J would not be derivationally triggered (assuming 'last resort' as such a trigger). Instead, *et* is an independent coordinate head—which we label η—assumed to be structurally higher than μ but lower than J.

(259) HIGH-MIDDLE-LOW COORDINATE CYCLES:
$J^0 \rangle \eta^0 \rangle \mu^0$

The same reasoning would apply to Hittite *nu*, which originates as a temporal adverb 'now', which also synchronically shifts into its adverbial meaning in Hittite. Such sub-junctional coordinate heads are predicted to double in simplex coordination (cases when two arguments are coordinated), unlike the J head. The idea of a 'middle cycle' η^0 position is also in line with den Dikken's (2006) original idea that even modern English 'and' is not a realisation of the J head but is rather a realisation of some sub-junctional phrase. While den Dikken (2006) does not say much about this sub-junctional projection, we put forth a working hypothesis (259), although the concern with η^0 fell outside the scope of the present work and is at this stage left for future research.

3.6 Syntactic reconstruction & change

The synchronic optionality between last-resort J^0-realisation and first-response incorporation from within the complements, lends itself to a diachronic analysis, that is, from this optionality to the survival of a single (latter) option.

We have shown that all branches of IE (except Albanian and Armenian) boasted two series of coordinators: a non-enclitic (orthotonic) one, and an enclitic one. What is more, all branches of IE exhibit a diachronically uniform trend, namely the loss of enclitic and takeover of orthotonic coordinators. In later Greek, for instance, the copulative τε becomes rare, τε . . . καί, already frequent in Homer and other idioms, tended, in the course of time, largely to replace τε . . . τε, as Gonda (1954: 185) notes, drawing from and additionally referring to Schwyzer and Debrunner (1950: 573).

Also in Latin, *-que* disappeared at the beginning of our era. Double *-que* is proper to ancient Latin and as an archaism adopted by Catullus and the poets of the Augustean and later periods; prose authors, generally speaking, usually avoid using it, as the standard grammars tell us (Stolz et al., 1928: 656). (Gonda, 1954: 185) Latest investigation of Ledgeway (2015) confirm this also. As Gonda (1954: 185) reports, in Oscan we only find *nep*, *neip*, in Umbrian *neip* for "non, neve, nec . . . nec" (Planta, 1897: 469), corresponding to the Lat. *neque*, *nec*, which survives in the Romance languages. In these forms the short endings *-p*, *-c* < $*k^{w}e$ were for long supported by the negative particle with which they formed unity. (Gonda, 1954)

This leads us to consider the enclitic series as the archaic variant, while the orthotone series represents an innovative syntax of coordination, which we idealistically plot in Fig. 3.7, representing the innovative pattern in red and the archaic enclitic pattern in blue. The speed of change is also considered: condensed points on the graph represent slow speed as changes start slowly, then gather speed—represented with separated points on the graph—and ultimately then reduce speed once innovation (red) is achieved. As Roberts (2007: 298) notes, this pattern of change can be described as 'slow, slow, quick, quick, slow' as dubbed by Denison (1999).[36]

Apart from the uniform diachronic decline of the second-position conjunction markers, which we have categorially labelled and identified as μ^0, across IE language, we have also demonstrated the uniform syntactic and semantic behaviour of such μ markers, namely the second-position (peninitial) configuration and non-conjunctive (polar, universal, free choice) meaning, respectively.

The reconstruction programme we adopt is that laid out in detail by Walkden (2014).

(260) THE BORER-CHOMSKY CONJECTURE (BCC) (Baker, 2008: 353)

36 For a detailed overview, see also Denison (2003).

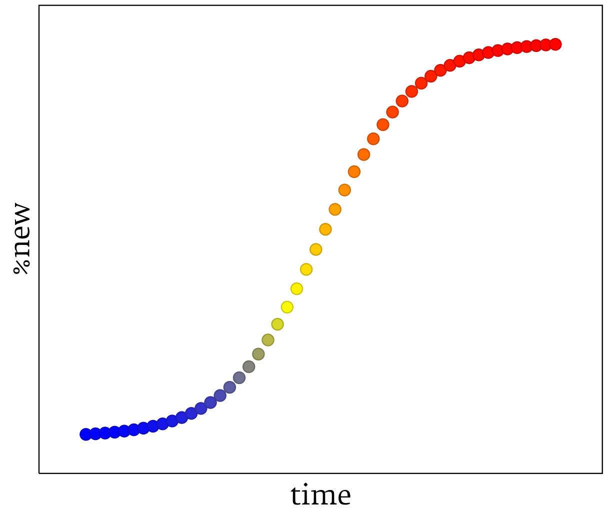


FIGURE 3.7.: *An idealised S(igmoid)-curve for diachronic change (Bailey, 1973)*

TABLE 3.14.: *Semantic distribution of the meanings of μ markers across IE*

LANGUAGE (FAMILY)	μ MARKER	CONJ.	ADDITIVE	DISTR.	NPI	FCI
Homeric (Grk)	-τε	+	(+)	−	−	(−)
Gothic (Gmc)	*-uh*	+	(+)	+	−	+
Latin (Itl)	*-que*	+	(+)	+	−	+
Old Church Slav. (Sl)	*i*	+	+	−	+	−
R̥gvedic (IIr)	*-ca*	+	+	−	+	+
Hittite (Ant)	*-(y/m)a*	+	+	+	−	+
Tocharian B (Tch)	*-ra*	+	+	+	−	+
Old Irish (Cel)	*-ch*	+	(+)	+	−	+

All parameters of variation are attributable to the features of particular items (e.g. the functional heads) in the lexicon.

(261) A possible feature specification of T^0, after Adger and Smith (2005) and Walkden (2014: 55, ex. 30)

$$T^0\begin{bmatrix} i\text{TENSE} : \text{PAST} \\ u\text{CASE} : nom \\ u\text{NUM} : \\ u\text{PERS} : \end{bmatrix}$$

The syntax of PIE $*k^we$ can be reconstructed in so far as its Wackernagel second-position is concerned. Across earliest IE languages, all μ markers have the second-position requirement, except Slavonic, which we have formalised using the head-movement triggering [η]-feature. Aside from this feature, we also stipulate an intrinsic categorial [$i\mu$]-feature.

(262) $*k^we = \mu^0\begin{bmatrix} i\mu \\ +\varepsilon \end{bmatrix}$

In the next chapter, we look closely at the semantics of μ particles.

3.7 Chapter summary

This chapter looked at the synchronic and diachronic status of word order in Indo-European (IE) coordinate construction. It empirically established that all earliest attestations show that IE boasted a double syntactic system of coordination where the coordinate constructions were essentially of two types:

(i) in one type, the coordinator occupies the INITIAL position with regards to the second conjunct, as is the case in synchronic IE languages;

(ii) in another type, the coordinator is placed in the PENINITIAL position with regards to the second conjunct, which is the standard effect of the so-called Wackernagel's law, which describes the fact that the syntax required particular elements to be second in position.

The first desideratum was therefore to unify syntactically the two series of coordinate structures, which has been accomplished by appealing to den Dikken's J(unction) structure. The proposed analysis has given both types (i) and (ii) the same structure, namely a double-headed coordinate structure. The Wackernagel type (ii) construction, obtaining peninitial placement of the coordinator, consisted of a covert high J^0 and an overt lower μ^0 carrying an incorporation-triggering feature [ε], which We have taken to be on a par with [EPP], which is itself reducible to the requirement that syntactic objects follow a metrical boundary as developed in Richards (2014). For now, I leave this theoretical trajectory and potential explicandum for future research. Coordination structures in which [ε] may not be checked (syntactically or postsyntally), feature an overt realisation of J^0, which acts as checker. We have thus explanatorily derived the empirical generalisation concerning IE coordination.

(263) a. i. INITIAL coordinators (i) in IE are generally BIMORPHEMIC
ii. PENINITIAL coordinators (ii) in IE are generally MONOMORPHEMIC

The J-μ system is also aligned with the model of Distributive Morphology. Assuming morphemes correspond to syntactic heads (Halle and Marantz 1994, *et seq.*), initial coordinators, of (i)-type, are taken to instantiate phonologically both of the two coordinate heads (J^0+μ^0), while enclitic coordinators (of (ii)-type) are instances of partially spelled out JP structure.

If nothing else, we have demonstrated in this chapter that the marriage of theoretical syntax and historical IE linguistics is a very fruitful one. since we have attempted to resume definitively a 106 year old topic dating back to Meillet (1908). Gonda (1954) was among the first to resume the discussion and to formulate the problem precisely:

> "The question may, to begin with, be posed whether we are right in translating Skt. *ca*, Gr. τε, Lat. *que*, etc., simply by our modern 'and' in regarding the prehistoric $*k^w e$ as a conjunction in the traditional sense of the term. It is a matter of general knowledge that many words which at a later period acted as conjunctions originally, or at the same time, had other functions." (Gonda, 1954: 182)

Gonda (1954: 182) continues to note that "the relation between the copulative [coordinate] τε (τε A) and the 'epic' [non-coordinate] τε (τε B) has never been correctly formulated." The same problem, in different descriptive terms, extends to other IE branches where, abstractly, a coordinate $*k^w e$A and a non-coordinate $*k^w e$B have beenIt is hard to envisage a correct formulation without the the precise tools that theoretical models make available and with which we have proposed a rather detailed formulation of this very relation.

4

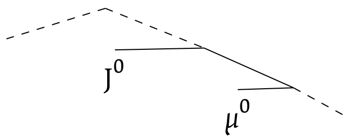
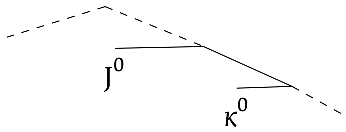
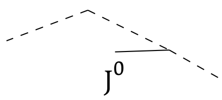
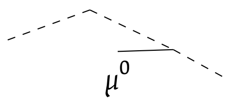
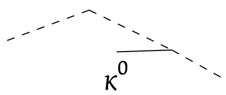
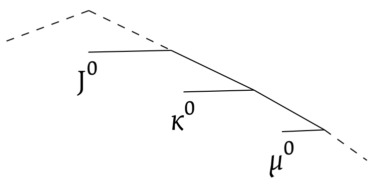
The composition of JP and its interior

4.1 Introduction

This chapter provides the semantics for the syntax we have developed in Chapter 3. It has been shown that the syntax of coordination involves two layers. The top layer, headed by J^0, encodes 'true' coordination in that it is a two-place relation, while the lower head—μ^0 for conjunctive and κ^0 for disjunctive type—is not. Independently μ^0 operator forms additive, universal-quantificational, polar, and scalar constructions, while κ^0 independently turns a proposition into a question (among other possibilities). Tab. 4.1 shows the structural parameters for JP partitions as they have been developed in previous chapters. The novel analysis of exclusive disjunction will rest on the evidence for all three heads (J^0, κ^0, μ^0) are active in composition and interpretation.

The goal of this section is to assign the three heads—J^0, μ^0 and κ^0—their logical forms and derive the different construction from Tab. 4.1 compositionally. The idea is to assign the three operators meanings from which we can derive the constructions in Tab. 4.1. It is naïve to assume the task is facile since one difficultly lies in the formally eclectic LFs we will assign to the three operators. My proposed semantic treatment of J and its interior brings together three lines of research. The semantics of J will rest on Winter's (1998) proposal on pair-formation, the semantics of μ on anti-/exhaustivity as developed in Fox (2007) and Chierchia (2013b), *inter al.*, while I'm defining the semantics of κ within the framework of the novel theory of Inquisitive Semantics (Ciardelli et al., 2013).

Table 4.1.: *Structural parameters for JP partitions*

AMOUNT OF SYNTACTIC STRUCTURE	HEADS			CONSTRUCTION TYPE
	J^0	μ^0	κ^0	
	+	+	–	coordination (conjunction)
	+	–	+	coordination (disjunction)
	–	+	–	asyndetic conjunction
	+	–	–	quantification (polar/scalar/∀)
	–	–	+	question
	+	+	+	exclusive disjunction

The structure of this chapter follows the aims we have just laid out. The three core sections—§4.2, §4.3, and §4.4—lay out a lexical entry for each of the syntactic elements. As we do so, we present a semantic analysis according to which the composition should proceed along the lines outlined in Tab. 4.1. We devote the remainder of this introduction to a review of some core previous analyses, particularly Szabolcsi (2014c) and Szabolcsi (2014a). Using this review, we set up the basics of the system within which we contextualise the proposal.

SZABOLCSI (2014A, 2014C) Ever since her 2010 work, Szabolcsi has been building a formal system of accounting for natural linguistic incarnations of lattice-theoretic concepts, as we have remarked at the beginning of Chapter 1. As we repeat Szabolcsi's (2010) idea on the denotations of μ and κ particles from (6) in (264), we also juxtapose this idea with her latest proposal (Szabolcsi, 2014c).

(264) Szabolcsi (2010):
  a. $[\![\mu]\!]$ = infimum/least upper bound (join, union, disjunction)
  b. $[\![\kappa]\!]$ = supremum/greatest lower bound (meet, intersection, conjunction)

Szabolcsi (2014c) argues that both μ and κ-style particles can be assigned a unified semantics across their incarnations. Both kinds of particles impose postsuppositional conditions which are met in the immediately larger context, as sketched in (265). We will adopt her idea of postsuppositions and will introduce them in §4.3.

(265) Szabolcsi (2014c: 10, ex. 17): Let X be the expression hosting μ/κ, and Y the immediately larger context:
  a. μ requires $[\![X]\!] \subset [\![Y]\!]$
  b. κ requires $[\![Y]\!] \subset [\![X]\!]$

What is clear is that μ and κ are no longer simple lattice-theoretic operators but rather operators that require the contexts they appear in to be of a particular lattice-theoretic structure, since $\subset$ in (265) can be thought of as a partial ordering relation. In other words, in Szabolcsi (2014c) μ and κ are indirect lattice-theoretic impositions on the output contexts.

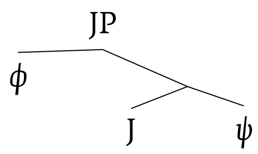
Although we adopt Chierchia's (2013b) system in the technical implementation, the spirit of the analysis follows Szabolcsi's (2014c) programme (265). The main reason for implementing the analysis in an exhaustification-based framework is the technical precision with respect to the difference between, say, 'any' and 'all'. Szabolcsi's (2014c) programme, as it stands and to the best of my knowledge, does not possess 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. This will become particularly relevant in Chapter 5, when we explore the semantic changes of particle constructions. Chierchia's (2013b) feature-based system, on the other hand, will lend itself to a featural account of historical change.

4.2 ⟦J⟧ as a tuple-forming bullet

The proposal for the meaning of J^0 is that of Szabolcsi (2013); Szabolcsi et al. (2013); Szabolcsi (2014c), who merges the syntax of Junction as developed by den Dikken (2006) and the non-Boolean semantics of conjunction as developed in Winter (1995) (and re-elaborated in Winter 1998: Chap. 8). Both authors posit, for entirely independent reasons, as Szabolcsi (2014c: 10) writes, "that the members of conjunctions and disjunctions are held together, so to speak, by otherwise meaningless elements."

Our preliminary syntactic intuition behind J(unction) was an ontological neutrality between conjunction and disjunction. The credit for the idea on translating den Dikken's syntactic neutrality to semantic neutrality goes to Anna Szabolcsi, who relates the semantics of den Dikken's J^0 to Winter (1998: Chap. 8), who proposes a primarily denotation-less semantics behind conjunction. The impression that *and* conveys Boolean *meet*, as Winter (1998: 339) subscribes, comes form the *derivational* conjunctive mechanism of interpretation rather than from the meaning of *and* itself. In the remainder of this section, we review Winter's (1998) core proposal, which we extended to disjunction.

The interpretation of den Dikken's (2006) J^0 in light of Winter (1995, 1998) is that of a bullet operator (•), which is a pair-function, taking two arguments (coordinands) and pairing them up. Once combined via •, coordinands (arguments) are paired up but have no Boolean value. The Boolean meaning is, thus, interpretationally delayed, as we shall see. The composition we are pursuing is the following:

(266) ⟦ 

⟧ $= [\![J]\!]^{M,g,w}(\phi)(\psi) = \phi \bullet \psi = \langle \phi, \psi \rangle$

The first proposal, which employs J^0 semantically may be found in the work by Slade (2011) (chapter ten, in particular), whose research agenda we follow. Hoeksema (1983), Landman (1989), Link (1984) and Winter (2001: 38) argued for a weaker—set-forming—semantics of •. I assume the strong definition of • and review below Winter's (1998) main motivation for a 'zero' • treatment of coordination before implementing it as J.

The core motivation for Winter's departure from Boolean assumption is found in wide scope coordination, which the Boolean framework cannot handle. A problem challenging the Boolean approach is its treatment of nominal conjunction. Take (267)—Winter's (1998: 340) (2)—for instance, where a Boolean treatment would compute the meaning of conjunction by intersecting the conjuncts. (267b) is clearly absurd, while 'widening' and paraphrasing the conjunction as in (267c) is clearly correct.

(267) Every cat and dog is licensed.
  a. ⟦every⟧(⟦cat⟧⋂⟦dog⟧)(⟦licensed⟧)
  b. # Everything that is both a cat and a dog is licensed.
  c. Every cat and every dog is licensed.

While assigning the disjunctive coordinator a standard Boolean denotation (*join*), Winter (1998) proposes to treat conjunctive coordinators as semantically null. In conjunctions such as *sing and dance*, the role of the coordinator is purely syntactic without any interpretational contributions. Conjunctions are therefore vacuous pairs of the form ⟨⟦sing⟧, ⟦dance⟧⟩. Conjunction of the *n*-ary form are therefore interpreted as *n*-ary tuples of conjunct denotations. The Boolean *meet* interpretation, standardly assumed for conjunction, is not, according to Winter (1998: 343), contributed by the meaning of *and* itself but is rather due to a universal grammatical operation: any tuple denotation may optionally be mapped to the *meet* of its coordinates. Coordinate constructions, such as (267), are inherently ambiguous between a 'juxtaposed' denotation and the possibly Boolean (conjoined) denotation, resulting from applying *meet* to the •-formed binary tuple. The scope ambiguity associated with coordination (267)–(??) results from the multiple possibilities to apply Boolean operations to tuples generated compositionally.

Winter (1998: 348) puts forth three premises for the interpretation of conjunctive coordination:

(268) a. Two or more denotations can be composed into a tuple. (PF)
  b. Boolean *meet* optionally maps tuples to 'flat' denotations. (UM)
  c. Wide scope interpretations of conjunction result from pointwise application of ordinary denotations to tuples. (PA)

The first two (268a,b) are implemented in a straightforward fashion via an assumption that natural language tuple denotations come from *product domains*.

(269) Winter's PRODUCT TYPES:
Let TYPE *be the set of extensional types. The set of product types is the smallest set* TYPE_p *that satisfies:*

1. $\text{TYPE} \subseteq \text{TYPE}_p$
2. *If* $\tau_1, \tau_2, \ldots, \tau_n \in \text{TYPE}_p$ *then* $\tau_1 \bullet \tau_2 \bullet \ldots \bullet \tau_n \in \text{TYPE}_p$

(270) Winter's PRODUCT TYPE DOMAINS:
For any product type $\tau_1 \bullet \ldots \bullet \tau_n$ *the corresponding domain* $D_{\tau_1 \bullet \ldots \bullet \tau_n} = D_{\tau_1} \times \ldots \times D_{\tau_n}$

In addition to function application, Winter's system can also form tuples, following van Benthem (1991: 57):

(271) Winter's PRODUCT FORMATION (PF):

a. type transition: $\dfrac{\tau_1 \quad \tau_2}{\tau_1 \bullet \tau_2}$

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

The second assumption (268b) of *universal meet* can be viewed as a non-logical axiom on top of the categorial mechanism, which is special to natural language semantics. This is defined as follows in (272) for every Boolean type τ, from Winter (1998: 349)

(272) Winter's UNIVERSAL MEET (UM):

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

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

Following Szabolcsi (2014c), we may associate the UM operator as a silent counterpart of J^0 which will apply at the root level of JP and which in Szabolcsi (2013: 15–17) is given a dynamic null MEET semantics.

The third premise handles coordinations like *every cat and dog* (267) so that the quantifier, or any other determiner, can apply to each of the paired conjunts (i.e. it can 'lower') and generate a pair of outcomes. Winter refers to this rule as *pointwise application* and defines it in sequent format:

(273) Winter's POINTWISE APPLICATION (PA):

a. type transition: $\dfrac{\Gamma \vdash \tau \quad \Delta \vdash \sigma \bullet \sigma \quad \tau, \sigma \vdash \chi}{\Gamma, \Delta \vdash \chi \bullet \chi}$

b. semantics: $\dfrac{X \Rightarrow x \quad T \Rightarrow \langle y_1, y_2 \rangle \quad x, y_1 \Rightarrow z_1 \quad x, y_2 \Rightarrow z_2}{X, Y \Rightarrow \langle z_1, z_2 \rangle}$

Therefore, whenever z_n is derived from x ad y_n (for $n = 1, 2$), we also derive the pairs $\langle z_1, z_2 \rangle$ and $\langle y_1, y_2 \rangle$. Wide scope conjunction can therefore be derived from PF, UM and PA Winter (1998: 350).

(274) $$\cfrac{\cfrac{\llbracket \text{every} \rrbracket \cfrac{\llbracket \text{cat} \rrbracket \quad \llbracket \text{dog} \rrbracket}{\langle \llbracket \text{cat} \rrbracket, \llbracket \text{dog} \rrbracket \rangle} \text{PF}}{\langle \llbracket \text{every} \rrbracket(\llbracket \text{cat} \rrbracket), \llbracket \text{every} \rrbracket(\llbracket \text{dog} \rrbracket) \rangle} \text{PA}}{\llbracket \text{every} \rrbracket(\llbracket \text{cat} \rrbracket) \sqcap \llbracket \text{every} \rrbracket(\llbracket \text{dog} \rrbracket)} \text{UM}$$

We depart from Winter (1998), however, in extending the 'non-Boolean base' of interpretation to disjunction. On top of Universal Meet (UM), repeated below, we propose our inventory also has Universal Join (UJ), which is also what Szabolcsi (2014c: §2.3) admits to.

(275) UNIVERSAL MEET (UM/⊓):

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

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

(276) UNIVERSAL JOIN (UJ/⊔):

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

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

How will an interpretational system know, which of the two Boolean operations kicks in? We follow the general spirit of Chierchia (2013b) in this respect, who proposes a syntactic presence of some operators, as we shall review in the next section(s), which yield pragmatic effects (hence the notion of 'grammaticised implicatures', since a pragmatic effect is rooted in narrow syntax). Similarly we propose that the de-Booleanised denotation of a JP is mapped onto Boolean meaning via an application of a Boolean operator, which is fully in line with Winter (1995, 1998). What was not on Winter's agenda was a syntactic backtracking, which would posit an original syntactic presence of the operators he calls into play. Assuming that semantics does not pull magic tricks by incarnating operators required for *ad hoc* interpretations—which is claim that Chierchia (2013b) implicitly defends—we will propose a syntactically present Boolean operator, call it $\beta^{(0)}$, which will assign a Boolean mapping of tuples, i.e. from pairs into Boolean expressions. If $\beta^{(0)}$ is taken to be be syntactically projected in the syntax, then the choice of $\sqcap$ (275) versus $\sqcup$ (276) can be relegated to principles such as Minimality underlying Agree. Derivational and interpretational procedures are thus rather the same.

The interpretation of a feature-checked β operator is given in (277), both in set-theoretic (i) and propositional logical (ii) forms for conjunctive (a) and disjunctive (b) Boolean operations.

(277) a. CONJUNCTION
  i. $[\![\beta^0[\text{F} : \mu]]\!] = \lambda X[\bigsqcap X]$
  ii. $[\![\beta^0[\text{F} : \mu]]\!] = \lambda \langle x, y\rangle [x \wedge y]$

 b. DISJUNCTION
  i. $[\![\beta^0[\text{F} : \kappa]]\!] = \lambda X[\bigsqcup X]$
  ii. $[\![\beta^0[\text{F} : \kappa]]\!] = \lambda \langle x, y\rangle [x \vee y]$

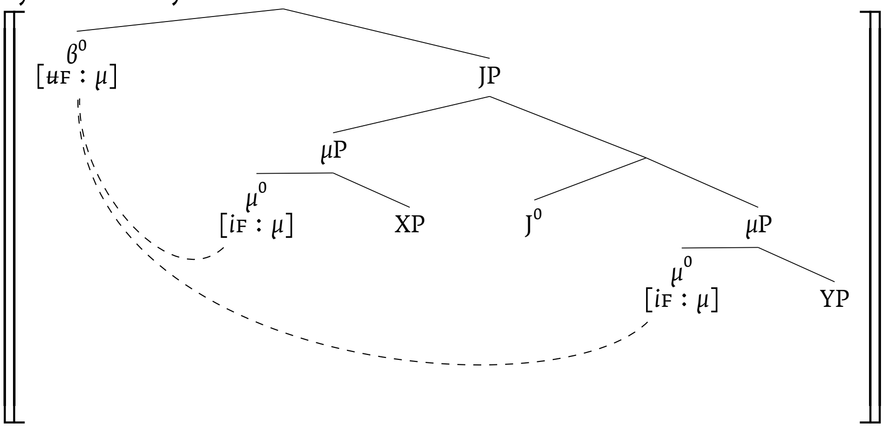
Since κ and μ superparticles contribute a join-type and meet-type meanings to the structures they appear in, respectively, we posit they carry interpretable features like [iF : κ] and [iF : μ], respectively, which undergo Agree with the Boolean β^0 operator, which is unspecified, hence carries an uninterpretable [uF :]. Once valued and checked, the structure upon Transfer to the CI interface computes the meaning and maps a JP tuple onto Boolean meaning. The features on the superparticle heads are not entirely formal: the interpretable feature [iF : κ] on κ^0 translates into UJ (276) and [iF : μ] on μ^0 is interpreted as UM (275).[1]

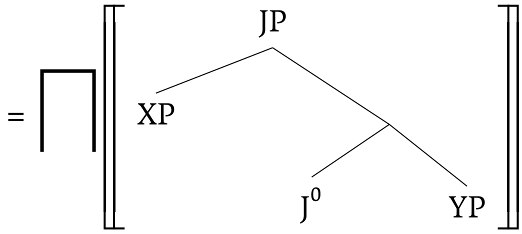
In (278) and (279), we sketch this idea and show the mapping from syntactic

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

features onto semantic Boolean operations, which in turn operate on JP-denoting tuples.[2]

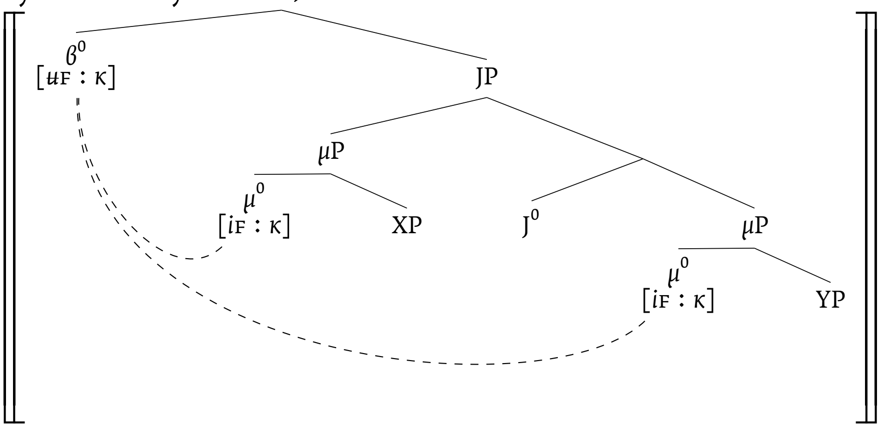
(278) Syntactically rooted MEET:



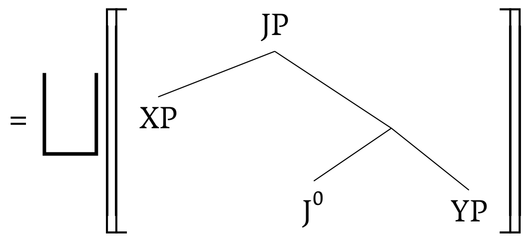


$= \bigsqcap \langle [\![XP]\!], [\![YP]\!] \rangle$
$\vdash [\![XP]\!] \wedge [\![YP]\!]$

(279) Syntactically rooted JOIN:



2 Note that the actual meanings of μ and κ particles are to perform (anti-) exhaustification and inquisitive closure of their hosts/complements, respectively, which we address in the next sections.



$= \bigsqcup \langle [\![XP]\!], [\![YP]\!] \rangle$
$\vdash [\![XP]\!] \vee [\![YP]\!]$

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

(280) MINIMALITY
  a. *β* bearing [*u*F :] must target the closest potential [*i*F]-bearer
  b. An [*i*F]-bearer XP is closest to *β* iff:
    i. *β* asymmetrically c-commands XP.
    ii. There is no other [*i*F]-bearer YP such that *β* asymmetrically c-commands YP and YP c-commands XP.
  c. *A* c-commands B iff *A* does not dominate B and the first branching node that dominates *A* also dominates B.

The application of Minimality may seem trivial in light of (278) and (279) but will become apparent and more powerful once we motivate a Junction structure which features both *κ* and *μ* heads.

We will reuse Chierchia's (2013b) Minimality once more in the next section to delimit the scope of an exhaustification operator, which will be equally rooted in syntax.

4.3 $[\![\mu]\!]$ as postsuppositionally antiexhaustive

We have seen in the previous chapter that *μ* particles feature in expressions forming Negative Polarity Items (NPIs), Free Choice Items (FCIs), universal quantifiers, additives, and distributive conjunctions. I will develop an analysis, which will rely on the framework which recognises *alternatives* as a common denominator of latter semantic phenomena. A closely related phenomenon is that of Scalar Implicatures (SIs). I will follow a model, according to which SIs should be viewed as a form of exhaustification of the assertion, a view defended in Chierchia et al. (2012) and extensively developed in Chierchia (2013b).

ALTERNATIVE ACTIVATION AND $\mathfrak{X}$ The core idea of the proposal is that lexical items, such as *any*, *-ever*, *all*, *also*, and *and*, which are morphologically unified in some languages via a μ morpheme, bring into play active alternatives. The grammatical system then acts on such alternatives in the derivation by *exhausti(fy)ng* them.

The μ marker (superparticle) essentially makes sure that the alternatives ($\mathfrak{A}$) of its host (complement) are obligatorily active, an idea proposed by Chierchia (2013a). An exhaustifier then 'filters' such alternatives. We will be adopting a focus-sensitive exhaustification operator, which we label $\mathfrak{X}$ and which is essentially a silent variant of *only*. We define $\mathfrak{X}$ in (281), which Nicolae (2013: 7, ex. 9) translates into natural language as "the assertion p is true and any alternative q not entailed by p is false."

(281) $\mathfrak{X}(p) = p \wedge \forall q \in \mathfrak{A}(p)\Big[[p \not\vdash q] \rightarrow \neg q\Big]$

Alternatives are a prominent property of focus constructions, in which focus associates with a constituent to activate alternatives, which are subsequently exhaust(ifi)ed. Consider a focus examples featuring a scalar term like 'a few' such as the one in (282), which we borrow and adapt from Nicolae (2013: 7, ex. 10).

(282) p = 'John talked to [a few]^F of the students.'

a. $\mathfrak{A}(p) = \left\{ \begin{array}{ll} p = & \text{'John talked to A FEW of the students',} \\ q = & \text{'John talked to MANY of the students',} \\ r = & \text{'John talked to MOST of the students',} \\ s = & \text{'John talked to ALL of the students'} \end{array} \right\}$

b. $\mathfrak{X}(p) = p \wedge \neg\{q, r, s\}$

Exhaustive focus therefore enriches the meaning by negating the non-entailed alternatives it brings about. Exhaustification, however, need not rely on focus: SIs are also computed along the same lines of enrichment by negating all non-entailed alternatives since scalar items are lexically endowed with alternatives, which—when activated by context—undergo enrichment through interaction with $\mathfrak{X}$. This yields SIs. This is also where the notion of *non-entailed* becomes relevant since (283a) implies, henceforth symbolised as $\rightsquigarrow$, (283b) but does not imply, henceforth $\not\rightsquigarrow$, (283c) since 'three' implies 'two' in the sense that if 'I ate three pies' then it also true that 'I ate two pies.'

(283) a. I ate three pies
b. $\rightsquigarrow$ I ate two pies
c. $\not\rightsquigarrow$ I ate four pies

Scalar items thus form entailed alternatives, the sets of which are known an Horn Scales.

(284) Horn Scales:
a. NUMERALS:
⟨one, two, three, ...⟩
b. COORDINATING CONNECTIVES:
⟨and, or⟩
c. QUANTIFIERS AND QUANTIFICATIONAL TERMS:
i. ⟨some, many, all⟩
ii. ⟨sometimes, often, always⟩

We therefore see that alternatives get factored into meaning in two ways: via focus (282) or via lexical specification, which is the case with scalar items contributing SIs, as we have just discussed. What both focus constructions and SIs have in common is that their alternatives, regardless of their source, are only optionally available. Alternatives are obligatorily active and thus in need of obligatory exhaustification in the case of Polarity constructions, as is the case with NPIs. We will review these in §4.3.1.

The system we are adopting rests on the notion grammaticised scalar implicatures, where scalar (σ) and non-scalar (D) alternatives are lexically grounded and represented as features ($[\sigma, D]$). The system also assumes, as we have seen, a covert exhaustification operator $\mathfrak{X}$ which affirms the prejacent (the assertion) and negates all the alternatives that are not entailed, as sketched above. $\mathfrak{X}$'s domain restriction of exhaustification ($\sigma\mathfrak{A}, D\mathfrak{A}$) is provided via Agree by the syntactic object carrying $[\sigma, D]$ features.

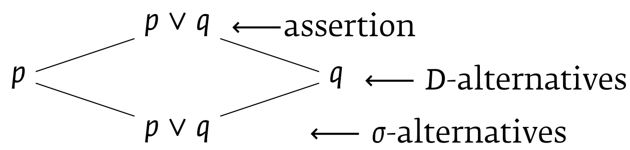
Scalar lexical items, such as coordinators like *and, or* or quantifiers like *some, all*, only have scalar alternatives, which are syntactically represented as feature specifications, namely *or* is specified with [+σ] (or [$i\sigma$]), which provides the restriction of $\mathfrak{X}$ via Agree. So in the case of enriched disjunction, which communicates negated conjunction, we have the following syntactic derivation, which maps directly onto semantic computation:

(285) I'm going to London or Paris.

a. SYNTAX:
$\Big[\ \mathfrak{X}_{[u\mathfrak{A}:\sigma]}$ [I'm going to London **or**$_{[i\sigma]}$ Paris.] $\Big]$

b. SEMANTICS:

i. $\mathfrak{A}(285a)$ =



ii. $\mathfrak{X}_{[\sigma\mathfrak{A}]}(p \vee q) = [p \vee q] \wedge \neg[p \wedge q]$

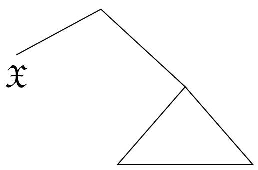
Since the restriction of $\mathfrak{X}$ is scalar ($\sigma\mathfrak{A}$; determined syntactically), the assertion $p \vee q$ is exhaustified only against the set of its scalar alternatives. The resulting meaning (285b-ii) is the intended one: 'I am going to London or I am going to Paris, and I am not going to both (London and Paris).'

We will treat μ particles as logical operators with a two-fold meaning. We will pursue an analysis under which the core meaning of μ is antiexhaustive and of a postsuppositional kind. Let us take each of the two semantic components—antiexhaustivity and postsuppositionality—in turn to sketch preliminarily the interpretational mechanics we will be pursuing.

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

In syntactic terms, we take $\mathfrak{X}$ to attach to the root of propositions,[3] as briefly sketched below.

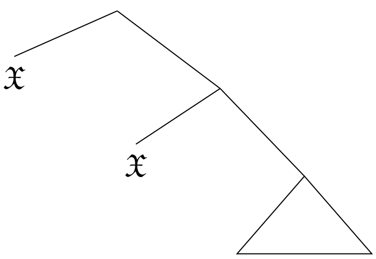
(286)



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

Structurally, this recursion of $\mathfrak{X}$ is represented via a notion of copying, which we have already involved in the syntax of Junction and the derivation of polysyndetic coordination in (84) and (85). The same syntax is also found in Bowler (2014).

(287)



Hence the lexical entry for μ particles is the one in (288), which reads "the assertion p is true and any alternative q not entailed by p is also true."

(288) $[\![\mu]\!](p) = \mathfrak{X}^R(p) = \neg\mathfrak{X}(p) = p \wedge \forall q \in \mathfrak{A}(p)\Big[[p \nVdash q] \rightarrow q\Big]$

3 Chierchia (2004, 2006) assumes $\mathfrak{X}$ attaches to TP. We do not concern ourselves too much with the syntactic position of $\mathfrak{X}$. We will develop a postsuppositional analysis of $\mathfrak{X}$: if $\mathfrak{X}$ is postsuppositionally defined, then its syntactic globality becomes irrelevant.

In negative contexts, then, μ will have the potential to return the original $\mathfrak{X}$, since negating an antiexhaustive term yields an exhaustive term, where entailment under negation is key to understanding the analysis of polarity phenomena within an $\mathfrak{X}$-based account. This will become relevant in our treatment of NPIs as well as exclusive disjunctions along with FC inferences. The notion essentially derives from Chierchia's (2013b) system and which is conceptually rooted in Chierchia (2006) and his constitution of Domain Widening (DW) processes.

In non-negative contexts, μ will make sure that a conjunction of its host and all active alternatives to its host are true. In more general terms, non-scalar exhaustification can be rescued from leading to contradictions in three ways. Consider exhaustification of subdomain alternatives of a proposition p and let q and r be subdomain alternatives to p.

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

In (290) we expand (289) and briefly state reasons (with informal paraphrases) why non-iterative exhaustification (290a) leads to a contradiction unless in company of negation (290b) or a modal (290c), or unless it applies iteratively (i.e., twice) (290d) .

(290) a. $\mathfrak{X}_{[D\mathfrak{A}]}(p) = \mathfrak{X}(p) \wedge \mathfrak{X}(q) \wedge \mathfrak{X}(r) \vdash \bot$
'only p is the case and only q is the case and only r is the case'

b. $\mathfrak{X}_{[D\mathfrak{A}]}(\neg p) = \neg p \wedge \neg q \wedge \neg r$
'neither p is the case and neither q is the case and neither r is the case'

c. $\mathfrak{X}_{[D\mathfrak{A}]}(\diamond p) = \diamond\mathfrak{X}(p) \wedge \diamond\mathfrak{X}(q) \wedge \diamond\mathfrak{X}(r)$
'only p may be the case and only q may be the case and only r may be the case'

d. $\mathfrak{X}^{R}_{[D\mathfrak{A}]}(p) = \neg\mathfrak{X}(p) \wedge \neg\mathfrak{X}(q) \wedge \neg\mathfrak{X}(r) \vdash \neg\bot$
'not only p is the case and not only q is the case and not only r is the case'

If the proposition contains negation, then all its alternatives will be entailed and the alternatives cannot be exhaustified away—contradiction will therefore not arise (§4.3.1). The presence of the modal also rescues the structure from a contradiction and yields a FC effect with respect to opening up modal options: informally, many different situations in which each of the alternatives may be the case. (§4.3.1) When exhaustification is iterative, additivity and cross-compatibility of all alternatives obtains. When the set of subdomain alternatives is salient, the reading will be additive (§4.3.3).[4] We will explore applications of this enrichment system throughout this section.

Another LF shorthand for μ, which we will be using, is the one in (291), which simply reads "*p* and all its alternatives."[5]

(291) $[\![\mu]\!](p) = \prod \left\{p\right\}^{\mathfrak{A}}$

POSTSUPPOSITIONALITY For reasons of scope-taking, as well as some other mechanical aspects, we will rely on the notion of 'postsupposition'. In contrast to presuppositions, which impose conditions on *input* contexts, postsuppositions condition the *output* context, making postsuppositional elements thus interpretationally delayed, since they come into play once the context has been updated. Given in (292) is an informal definition of postsuppositions, taken from Brasoveanu and Szabolcsi (2013: 57, ex. 4).

(292) a. A postsupposition is checked after at-issue updates are processed, so it is insensitive to left-to-right matters within the sentence. In particular, it can be satisfied by referents and facts that were introduced later than the inducer of the postsupposition.

b. All postsuppositions are effectively checked at the same time, therefore they can be mutually satisfied by the hosts of each other's inducers.

c. If at-issue updates in the sentence do not change the context in a way relevant to the postsupposition, the output and input

4 A quick lookahead: in case of exhaustification of scalar alternatives, this will deliver a universal reading ($\exists \rightarrow \forall$) as we see in 4.3.2.

5 While this 'shorthand' is far from being precise in delivering the meanings we delimit in this section, I use it purely as a simplification in the calculations in Chapter 5. This shorthand notation, if you will, stands for

$$\prod_{D/\sigma}^{\mathfrak{X}} \{p\}^{\mathfrak{A}}$$

contexts are identical in that respect. So the postsupposition must already be satisfied by the input context.

We will follow the model of Brasoveanu (2013) in setting up the system of postsuppositional evaluation. We first assume, in line with the Dynamic Predicate Logic (DPL) programme (Groenendijk and Stokhof, 1991), that the denotata of sentences, which are themselves formulas, are *context change potentials*, i.e. they are binary relations over interpretation contexts. In more formal terms, interpretations are sets of pairs (tuples) of the form in (293). Given that assignments are treated as contexts in DPL, the set of input/output context pairs is formally equal to a set of input/output assignment pairs (g and h, resp.). Assignments are additionally 'inflected' with tests: $g[\phi]$ is thus an assignment with ϕ as a test on the input context—*qua* presupposition; $h[\psi]$ is inversely an assignment with ψ as a test on the output context—*qua* postsupposition.

(293) a. ⟨INPUT CONTEXT, OUTPUT CONTEXT⟩
b. $\langle g[\phi], h[\psi]\rangle$

As Paperno (2012: 168) remarks, logical formulas in dynamic approaches to meaning, of which DPL is one, relate to *programs*, or *instructions*. For instance, a logical formula in (294) is interpreted as a twofold instruction for interpretation.

(294) $[\![\exists x[P(x)]]\!]=$
a. $\exists x$: assign a value to x (INSTRUCTION 1), and
b. $P(x)$: check if $P(x)$ is true (INSTRUCTION 2).

We will notate a postsuppositional component with $\underbrace{\quad}$ (Brasoveanu 2013 and Brasoveanu and Szabolcsi 2013 use superscripts). It is axiomatic in exhaustification-based analyses of alternative computation, such as in Fox (2007), Fox and Katzir (2011), and Chierchia (2013b), that alternatives be calculated on a propositional level. So for a simple exhaustive focus construction, like 'Mary saw $[\text{John}]^{F}$', the alternatives are achieved through pointwise replacement of 'John' to yield a list of propositional alternatives and the ultimate meaning '[Mary saw John] and it is not the case that [Mary saw Bill] and it is not the case that [Mary saw Steve], . . . '. The operator responsible for yielding and exhaustifying such alternatives hence requires wide scope. In syntactic terms, it needs to be attached at the root of the proposition, i.e. to CP.

The postsuppositional treatment gives us such wide scope for free, while accounting for local marking of focus, since an alternative to 'Mary saw [John]^F' cannot be 'Sue saw John'.

We therefore revise (288) from a normal form to a postsuppositional form, where μ is now able to combine with a non-propositional complement, say a DP, but by virtue of being a postsupposition, its application is delayed until propositional scope is attained. This way, we account for local morphological marking of μ and global scope. We will return to this in the last chapter.

(295) POSTSUPPOSITIONAL EXHAUSTIFICATION

a. Normal form:
$$[\![\mu]\!](p) = \mathfrak{X}^R(p) = \neg\mathfrak{X}(p) = p \wedge \forall q \in \mathfrak{A}(p)\Big[[p \nVdash q] \rightarrow q\Big]$$

b. Postsuppositional form:
$$[\![\mu]\!](p) = \neg\mathfrak{X}(p) = [\![p]\!]^{\langle g[\varnothing], h[\neg\mathfrak{X}(p)]\rangle} = p \underbrace{\wedge \forall q \in \mathfrak{A}(p)\Big[[p \nVdash q] \rightarrow q\Big]}$$

The μ particle will, despite its being defined over propositions (*qua* CPs), be able to combine with a DP for reasons given in fn. 8 on page 34. That is, under point-wise growth, the alternatives of a DP are calculated at a propositional level, making the denotation of a DP equivalent to a denotation of a CP (cf. Alonso-Ovalle 2006: 80, fn. 17).

4.3.1 First incarnation: polar and free-choice

POLARITY We adhere to Chierchia's (2013b) system in treating NPIs as lexical items with obligatorily active alternatives. In (most of the) old IE languages, NPIs had a transparently bipartite morphology, as we have seen: a *wh*-term and a μ superparticle. Our claim will be that it is the μ operator that is responsible for obligatory activation of alternatives of its host, i.e. the *wh*-word.

In line with Karttunen (1977), and many others, we will treat *wh*-terms as plain existentials:

(296) $[\![\text{who}]\!] = [\![\text{someone}]\!]$

The presence of the μ operator activates the alternatives of the existential (*wh*) host. We take the relevant syntactic feature on—and semantic 'dimension' of—the activated alternatives to be [*iD*], i.e. the restriction of $\mathfrak{X}$ is that of sub-domain alternatives. NPIs also have a scalar alternative, namely the conjunction of the alternative existentials (disjuncts). Once negated, scalar alternatives are consistently weaker since $\neg[p \vee q] \vdash [\neg p \wedge \neg q]$. The role of scalar alternatives in the derivation of NPIs is therefore negligible.

Take an example like the one in (297), where in the scope of negation, all of the alternatives to p, 'John didn't see anyone', become entailed by the assertion. The resulting exhaustification therefore returns the original proposition, i.e. there was no-one (at all) that was seen by John.

(297) $\Big[\mathfrak{X}_{[D\mathfrak{A}]}[$ John did**n't** see **anyone** $]\Big]$

a. ASSERTION: $(= p)$
$\neg\exists x \in \mathfrak{D}[\text{PERSON}(x) \wedge \text{SEE}(\text{JOHN}, x)]$

b. $\mathfrak{A}(p) = \Big\{\neg\exists x \in \mathfrak{D}'[\text{PERSON}(x) \wedge \text{SEE}(\text{JOHN}, x)] \mid \mathfrak{D}' \subset \mathfrak{D}\Big\}$

c. $\mathfrak{X}_{[D\mathfrak{A}]}(p) = p$

Let us see how this applies to our IE data. Given in (298) and (299) are two instances of μ-marked NPIs in Classical Sanskrit and Hittite, respectively.

(298) न यस्य कश् च तितितर्ति 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.' (BP. 8.5.30)

(299) nu-wa ÚL [kuit **ki**] sakti
and-QUOT NEG [who μ] know.2.SG.PRES
'You don't know *anything*' (KUB XXIV.8.I.36)

The NPIs seem to behave in the same way as they do in the English example (297), *modulo* one difference. As we have already seen, and will continue to explore in the following chapters, the μ particle is a conjunctive/universal and not a disjunctive/existential marker. We will therefore treat the quantificational contribution of μ-marked NPIs as universal, which return the same result. A Hittite example from (299) is paraphrased in (300)

(300) $\Big[\mathfrak{X}_{[D\mathfrak{A}]}\big[$ You do**n't** know [*what-μ*] $\big]\Big]$

a. ASSERTION: $(= p)$
$\forall x \in \mathfrak{D}[\text{THING}(x) \wedge \neg\text{KNOW}(\text{YOU}, x)]$

b. $\mathfrak{A}(p) = \Big\{\forall x \in \mathfrak{D}'[\text{THING}(x) \wedge \neg\text{KNOW}(\text{YOU}, x)] \mid \mathfrak{D}' \subset \mathfrak{D}\Big\}$

c. $\mathfrak{X}_{[D\mathfrak{A}]}(p) = p$

We will develop strong reasons for treating μ as a universal quantificational marker, as we will see in the following chapter.

FREE CHOICE Another type of environment in which μ appears is free-choice (FC). As Chierchia (2013b: Chap. 4–6) shows, the FC effect also derives from exhaustification via $\mathfrak{X}$, which we have already demonstrated for NPIs.

Take a free choice (FC) sentence like (301a) with an LF in (301b) and scalar alternatives in (301c).

(301) a. You may take ice cream or cake

b. $\diamond[p \vee q]$
where p =you may take ice cream, q =you may take cake

c. σ-alternatives = $\{\diamond[p \vee q], \diamond[p \wedge q]\}$
where σ =(strictly) scalar

Sauerland (2004) also showed that each disjunct in (301a) is also among the scalar alternatives, not only the entire disjunctions and conjunctions (301c). That is, there exists another set of alternatives $\{p, q\}$, which we call Domain alternatives (D-alternatives). This is also justified by the fact, as Chierchia (2013b) notes, that disjunction is equivalent to an existential quantification over the D-alternatives, stating that at least one member of $\{p, q\}$ is true. Conversely, $p \wedge q$ corresponds to universal quantification over $\{p, q\}$.Now the full range of alternatives to (301a) are the following.

(302) Extended scalar alternatives for (301a):

$\diamond[p \vee q]$ ⟵ assertion
$\diamond p$ $\quad$ $\diamond q$ ⟵ D-alternatives
$\diamond[p \vee q]$ ⟵ σ-alternatives

We can therefore hardwire our $\mathfrak{X}$-operator to target the *D*- or *σ*-alternatives. Then again, we could leave it unrestricted and let it target the entire subdomain, i.e. the context (C), in a loose sense.

(303) For $\diamond[p \vee q]$:
   a. $\mathfrak{X}_\sigma = \{\diamond[p \vee q], \diamond[p \wedge q]\}$
   b. $\mathfrak{X}_D = \{\diamond p, \diamond q\}$
   c. $\mathfrak{X}_{C=\bigcup(\sigma,D)} = \{\diamond[p \vee q], \diamond[p \wedge q], \diamond p, \diamond q\}$

Chierchia (2013b: Chap. 6) shows that FCIs carry with them a scalar *and* a FC implicature—the two contradict each other. Thus, the interpolation of a modal element solves this contradiction by allowing a weakening of the scalar component. Via interpolation, Chierchia predicts existential—and otherwise, universal—FC readings.[6]

(304) a. $\mathfrak{X} \ldots \diamond \ldots$ FCI$_{[\sigma,D]}$ … ∃-FCI
   b. $\mathfrak{X} \ldots$ FCI$_{[\sigma,D]} \ldots \diamond \ldots$ ∀-FCI

Syntactic evidence for universal quantification in FC *μ*Ps in, say Old Irish, comes from the linear ordering of the FCI and the modal, which in (305), repeated from above, are consistently of the universal FC type, as per (304).

(305) Old Irish:

   a. [ce **cha**] taibre
   [what *μ*] give.2.subjc
   ‘what[so]**ever** (⊨*everything*) thou mayst give.’ $[\mu_{\text{FCI}} > \diamond] \vDash \forall$-FCI
   (Zu ir. Hss. 1.20.15; Thurneysen 2003: 289)

   b. [ce **cha**] orr
   [what *μ*] slay.3.m.subjc
   ‘which**ever** he may slay.’ $[\mu_{\text{FCI}} > \diamond] \vDash \forall$-FCI
   (Anecd. ii.63.14.h; Thurneysen 2003: 289)

The same generalisation on interpolation obtains universal FC reading in Sanskrit as additionally indicated in the glosses.

6 For an extensive logical discussion of FC and FC-like phenomena, see Humbertstone (2011: 793–808).

(306) yady abhyupetaṃ [kva **ca**] sādhu asādhu vā
if promised to be accepted what μ honest dishonest or
kṛtaṃ mayā
done.PST.PART 1.SG.INSTR
'If you accept *whatever* I may do, whether honest or dishonest.'
$[\mu_{\text{FCI}} > \diamond] \vDash \forall$-FCI (BP. 8.9.12)

I do not delve deeper into the FC effect here since I trust it to be derivable and consistent with a variation on an analysis of polarity phenomena as shown in Chierchia (2013b).

4.3.2 Second incarnation: universal

In the previous section, we have seen cases when the presence of a μ-particle in combination with a *wh*-host forms NPIs by strengthening the meaning of an indefinite under negation and asserting all its alternatives are true, i.e. false under negation. In some languages, the μ-particles, on the other hand, derive universal quantificational terms, making a nominal μP '*who*-μ' translatable not as '**any**one' but '**every**one'. Consider the following data from Japanese.

(307) a. 誰 も
dare **mo**
who μ
'**every**one/**any**one'

b. どの 学生 も
dono gakusei **mo**
INDET student μ
'**all** students'

We need not reach to the far East to find such typological oscillations from polar to universal semantics since such universals are also found in the IE family—compare the following data from Old Irish (308), Gothic (309) and Hittite (310).

(308) a. na ei-plet hua-n bás
ADV PRT-dies.IMPV.3.PL PREP.DEF-PRO.DAT.SG death.DAT.SG
coitchen hua-n-epil
common.DAT.SG PREP.DEF-PRO.DAT.SG-PRT-dies.PRES.IND.3.SG

[cá -**ch**] acht foir-cniter hua-sain
[wh μ] but PRT-finish.PASS.IMPV.3.PL PREP.DAT-distinct
bás sech [cá -**ch**]
death.DAT.SG PREP [wh μ]

'Let them not die by the common death whereby **everyone** dies, but let them be ended by a special death different to **all**.'
(MCA, 73d.7)

b. hi- [cá -**ch**] -du
in.DAT [wh μ] place.DAT.SG.F

'in **every** place' (MCA, 24c.9)

(309) 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'
(*Mat.* 7:26)

(310) 
nu kuitt-**a** arhayan kinaizz[i
J what-μ = ∀ separately sifts

'She sifts **everything** seperately.' (KUB XXIV.11.III.18)

With respect to the genetic homogeneity of the data we have presented in this and the last section, one implicit problem arises: how can we treat the meaning of the IE μ particle uniformly when there seems to be clear-cut split in the meaning *wh-μ*? In a language family like Indo-Iranian or Slavonic, *wh-μ* is an NPI while in Old Irish, Gothic or Hittite, *wh-μ* is a universal quantificational term.

Our analysis of μ-containing universal terms will allow for a seemless transition between a polar-sensitive non-scalar and a polar-insensitive scalar meaning, which is parametrically regulated. We devote a vast portion of Chapter 5 to diachronic reparametrisation.

Let us now turn to the question at hand: the compositional analysis of universal terms such as those exhibited in examples (307)–(310). In the following paragraphs, we address three possible means of deriving the universal interpretation of μ-marked *wh*-phrases

One intuitive way of approaching the facts in, say, (307) is by observing that the μ-morpheme takes an inherently existential term, a *wh*-phrase, and 'turns it into' a universal distributive term.

(311) An intuition:

$[\![\text{wh-}+\mu^0]\!] = \forall \ldots$

μ^0 $\quad [\![\textit{wh-}]\!] = \exists \ldots$

This intuition can be conceptually mapped onto Chierchia's (2013b) idea of 'scale reversal'. Chierchia motivates this mechanism of reversing the scales (to be described below) on the basis of diachronic evidence of those NPIs in, say, English and Italian that have as a diachronic source completive modifiers with inherently strong scale-mate meanings. For example, take the polar behaviour of a pure NPI-marker like *at all* in contemporary English (312a) or *affatto* in contemporary Italian (313a), and compare the scalar-reverse behaviour of their diachronic ancestor in (312b) and (313b), respectively.

(312) a. I *(didn't) smoke **at all**. (Chierchia, 2013b: 161, ex. 37a)

b.

(313) a. *(Non) ho parlo **affatto**
not AUX spoke.1.SG **at all**
'I didn't speak **at all**.' (Chierchia, 2013b: 161, ex. 37b)

b.

To understand the inferential process in the use of a modern completive like *totally* in English, which is evidently on a synchronic par with its diachronic ancestor *at all* in early 16th century English (312b), we give Chierchia's (2013b: 161, ex 39) sketch of the meaning of a contemporary English completive (314a).

(314) a. I totally agree

b. I am in an agreement state *s* and *s* measures ($\mathfrak{m}$) the highest (MAX) possible value along some contextually salient dimension (intensity, completion, ...).

c. $\exists s\big[\textsc{agree}_w([\![\text{I}]\!], s) \wedge \mathfrak{m}(s) = \textsc{max}\big(\{\mathfrak{m}(s') : \textsc{agree}_w([\![\text{I}]\!], s')\}\big)\big]$

#1: RECURSIVE EXHAUSTIFICATION OF SUBDOMAIN ALTERNATIVES We maintain the antiexhaustive semantics for *μ* particles and account for the universality by specifying that the antiexhaustive operator ($\mathfrak{X}^{R}$ or $\neg\mathfrak{X}$) exhaust subdomain alternatives alone, ignoring the scalar alternatives. This computational instruction is easily hardwired into the syntax by specifying the operator with a [*D*]-feature. This line of reasoning is also explored by Chierchia (2006) and, most recently, in Chierchia (2013b: 311, ex. 18) who works with pre-exhaustified alternatives, which he encodes on the exhaustivity operator by specifying it with a [Exh-*D*$\mathfrak{A}$]-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 2013b: 119 notes this too). Since nothing hinges on this, we leave the technicalities aside.

Take the syntax of (310) as a working example. Without the *μ* particle *-a*, the object would be a *wh*-DP with indefinite or existential meaning. Since, as Chierchia (2013b: 357) eloquently puts it, "indefinites of all colouring receive meanings identical to those of *or* . . . as they are just potentially infinite disjunctions," (310) sans the meaning contributed by *μ* would be something along the lines of (315), where 'sand', 'flour', and 'ash' in (315b) 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 (315c), where 'she sifts sand' is abridged as *a*, etc.

(315) ⟦(310)⟧ − ⟦*μ*⟧ =

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 *D*-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.

(316) a. ACTIVE *D*-ALTERNATIVES:

$a \vee b$ [assertion]

a b [D-alternatives]

b. EXHAUSTIFICATION:
  i. *First level:*
  $\mathfrak{X}_{[D\mathfrak{A}]}(a \vee b) = \mathfrak{X}(a) \wedge \mathfrak{X}(b) = \bot$
  ii. *Second level:*
  $\mathfrak{X}^{R}_{[D\mathfrak{A}]}(a \vee b) = \neg\mathfrak{X}(a) \wedge \neg\mathfrak{X}(b) = a \wedge b \neq \bot$

The resulting conjunction is equivalent to universal quantification[7] which is in line with the meaning in (310) we set out to compute. Note that (316b-ii) also shows the iterative requirement of $\mathfrak{X}$ and the way in which we restrict the iterative application of $\mathfrak{X}$. In the case of (316b-ii), $\mathfrak{X}$ must apply iteratively, that is twice, since a single level of exhaustification leads to a contradiction ($\mathfrak{X}_{[D\mathfrak{A}]}(a \vee b) = \mathfrak{X}(a) \wedge \mathfrak{X}(b) = \bot$). The second layer of exhaustification, however, is no longer contradictory ($\mathfrak{X}^{R}_{[D\mathfrak{A}]}(a \vee b) = \neg\mathfrak{X}(a) \wedge \neg\mathfrak{X}(b) = a \wedge b \neq \bot$).

Given our Agree-based approach to the Boolean valuation of the Junction operator, we are in a position to make an interim generalisation: in all $[\, \mu\text{P} \, [\, \text{J}^0 \, \mu\text{P} \,]\,]$ (=μP • μP), Junction is interpreted conjunctively (=μP • μP $\Rightarrow$ $\mu\text{P} \wedge \mu\text{P}$). Therefore, in presence of μ, J^0 is mapped to MEET ($\wedge$) and the iterativity of $\mathfrak{X}$ is fed so as to prevent contradictory results in computing the meaning. The recursive character of our exhaustification-based lexical entry for μ particles is therefore, at least partly, explained.

There is further empirical support for the disjunction to conjunction shifts of the kind formally explored above. Bowler (2014) reports evidence of Walpiri lacking a morpho-syntactic distinction of conjunction and disjunction. Rather, Walpiri employs a single functional word, *manu*, which shifts its meaning from disjunctive to conjunction depending on some particular (local) contextual constraints. The core proposal of Bowler (2014) is that the Warlpiri coordinator *manu* has a disjunctive denotation which is pragmatically strengthened to conjunction, where the pragmatic strengthening procedure is carried out by Fox's (2007) $\mathfrak{X}$ operator. (317) and (317) show the main facts.

(317) Cecilia **manu** Gloria=pala yanu tawunu-kurra.
C **manu** G-3DU.SUBJ go.PST town-to

7 For details, see Appendix A, *def.* **IX–X**.

'Cecilia and Gloria went to town.' (Bowler, 2014: 2, ex. 3)

(318) Cecilia manu Gloria kula=pala yanu Lajamanu-kurra.
C **manu** Gloria NEG-3DU.SUBJ go.PST Lajamanu-to
'Neither Cecelia nor Gloria have been to Lajamanu.' (Bowler, 2014: 3, ex. 7)

Bowler (2014) accounts for the above facts by specifying the lexical meaning of *manu* as disjunctive and thus analyses the conjunctive reading as a derived one via recursive exhaustification. She additionally assumes that the disjunctive alternative set in Warlpiri does not contain the conjunctive scalar alternative, i.e. $[p \wedge q] \notin \{p \vee_{manu} q\}^{\mathfrak{A}}$, making it therefore different to the alternative set for disjunction English. Since her recursive disjunction relies solely on *sub*domain alternative exhaustification—subtitling her system with Chierchia's (2013b)—the absence of the conjunctive scalar alternative to the inherently disjunctive marker *manu* in Warlpiri makes no computational difference. It is sufficient to note that her computation independently makes use of the recursive exhaustification of the subdomain alternatives to disjunction, yielding the same effect that we derived in (316). While we have done so for discrete *generalised* conjunction and disjunction, Bowler (2014) derives it for *actual* and explicit conjunction and disjunction, which additionally contextualises our proposal.

#2: (OBLIGATORILY) RECURSIVE EXHAUSTIFICATION OF SCALAR ALTERNATIVES In the previous subsection, we laid out a possibility of deriving a universal distributive meaning of a μP when the μ^0 is hosted by an indefinite. We have shown that the first level of exhaustification of its subdomain alternatives leads to a contradiction (316b-i), which motivates a second layer of exhaustification, which delivers the desired result.

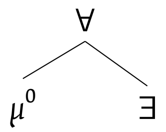
One outstanding problem remain, however. Our account, while delivering a universal term in positive contexts, delivers a polarity sensitive and NPI-type term in negative context, precisely because of the subdomain exhaustification.

(319) evidence of existential inferences under negation (Hittite, Latin, Old Irish, etc.)

To avoid non-existential inferences in negative contexts, the relevant alternative dimension of exhaustification has to be scalar. We now attempt deriving universal inferences for μ-marked indefinites which survive under negation as existentials and, therefore, carry a SI in negative contexts.

The informal and pre-theoretical intuition is the following: a *wh*-phrase, i.e., an inherently existential term (∃), is 'converted' by the μ-particle into a universal distributive term (∃), as informally sketched in (320).

(320) A pretheoretical intuition:



Both the existential and the universal are members of the same quantificational scale, assumed here to be a (un-truncated) doubleton set. Our aim is to find a mechanism which will allow for the scale reversal of kind informally demonstrated in (320).

Our inferential derivation will rely on one stipulation, namely that the application of exhaustification is obligatorily iterative. Unlike with exhaustification of subdomain alternatives, the first layer of scalar exhaustification will not yield a contradiction and, by stipulation, we will posit a reapplication of exhaustification to yield the desired result.

Provided below is an informal outline of the procedure of scalar exhaustification which we will be adopting. Note that the uninterpretable featural notation $[u\alpha]$ is a variable over the alternative feature set $\{D, \sigma\}$.

(321) a. $\left[\mathfrak{X}_{[\sigma\mathfrak{A}]}\left[\text{ I saw }\left[_{\mu P}\ \mu^0_{[u\alpha:\sigma]}\ \textbf{someone}_{[i\sigma]}\ \right]\right]\right]$

b. $\{\textbf{someone}\}^{\sigma\mathfrak{A}} = \langle \exists, \forall \rangle$

c. Inference after ...

i. first level of exhaustification:

I saw **someone** and **only someone**.

∴ I saw **someone** and I did **not** see **everyone**.

ii. second level of exhaustification:

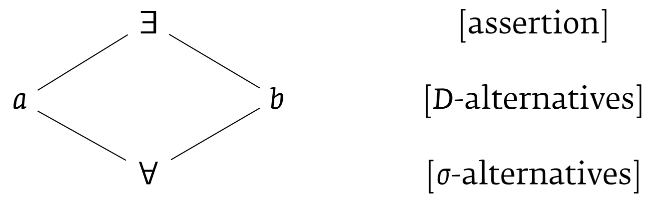
I saw **someone** and **not only someone**.

$\therefore_1$ I saw **someone** and I saw **everyone**.

$\therefore_2$ I **everyone**. $[\because \forall \vdash \exists]$

This informal procedure is formalised in (322).

(322) a. ACTIVE σ-ALTERNATIVES:



b. EXHAUSTIFICATION:

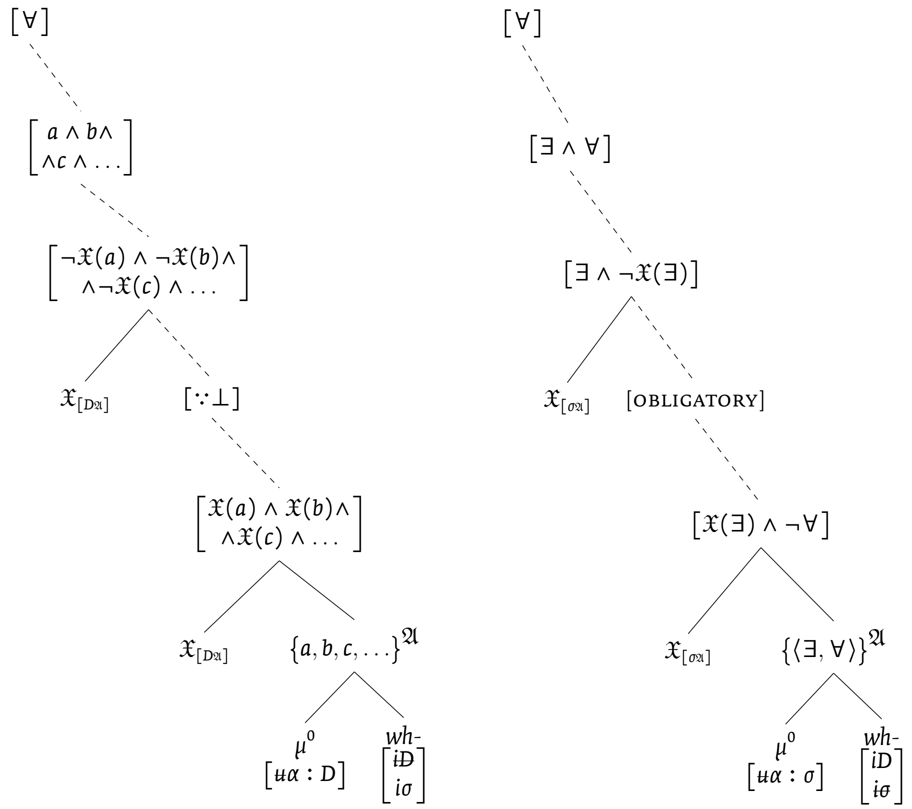
i. *First level:*
$\mathfrak{X}_{[\sigma\mathfrak{A}]}(\exists) = \mathfrak{X}(\exists) \wedge \neg\forall \neq \bot$

ii. *Second level:*
$\mathfrak{X}^{R}_{[\sigma\mathfrak{A}]}(\exists) = \mathfrak{X}(\exists) \wedge \neg\mathfrak{X}(\exists) = \exists \wedge \forall \vDash \forall$

Under the assumption of obligatory iterativity of exhaustification, we can thus derive the universal distributive inference using Fox's (2007) second-level exhaustification yielding an anti-exhaustive inference. We have, however, departed from Fox (2007) and Chierchia (2013b) 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 (323)

(323) Recursive exhaustification of . . .

a. *D*-alternatives: b. *σ*-alternatives:



4.3.3 Third incarnation: focal additive

In additive constructions, the LF We have assigned to μ is most transparently borne out, as sketched in (337), itself a repeated example from (143a). This is borne out if we take a sentence in OCS or Vedic with additive μPs below.

(324) ⱂⱁⱄⱏⰾⰰ ⰻ ⱅⱁⰳⱁ ⰽⱏ ⱀⰻⰿⱏ
posŭla [**i** togo] kŭ nimŭ
sent.3.PL.AOR [μ him.M.SG.ACC] to then.PL.DAT
'He sent *also* him to them.' (CM. Mk. 12:6)

In (324), the proposition p, being *he sent him to them*, is understood as being silently conjoined with *not only* p, hence the semantics of (324) is indeed $\phi \wedge \neg\mathfrak{X}(\phi)$, i.e., that of $[\![\mu]\!]$.

(325) यावन्त एव ते तावाश् च सः
yāvanta eva te [tāvāś- **ca** saḥ]
great.3.PL COMP they [great μ he]
'as great as they [were], he *too/also* was so great' (RV 12.45)

The LF of the second clause (= p), *tāvāś-* ca_μ *saḥ* in (325), denotes in line with (295), that p (i.e., *he was great*) and that $\neg\mathfrak{X}(p)$ (i.e., *not only he was great*). In this case, the first clause (= q), *they were great*, clearly presents the alternative that the μ (=*ca*) in the second clause ranges over. This goes hand in hand with Rooth's (1985) anaphoric theory of focus as the antecedent of the contrast is a member of the focus value of the μP.

(326) a. $[\![(325)]\!]^{\text{CLAUSE-2}} = q$
b. $[\![(325)]\!]^{\text{CLAUSE-1}} = p \wedge \neg\mathfrak{X}(p) \vdash p \wedge q$

For an *even*-containing μP, like the one found in a Classical Sanskrit sentence in (327), our definition of μ gets us half way: it correctly predicts that *even* is consistent with *also*, as opposed to with *only*, which would result in a contradiction.

(327) चिन्तयंश् च न पाश्यामि भवतां प्रति वैकृतम्
[cintayaṃś **ca**] na paśyāmi bhavatāṃ prati vaikṛtam
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.' (*Māhabhārata*, 2.20.1)

Even after much thinking is additive in that it means *also after much thinking*, coupled with an additional assertion that *much thinking* is the least likely (situation) among the alternatives. I leave aside the semantics tied to minimisers that are part of meaning of *even*-type μ for now but which seem subsumable within our antiexhaustive system with a minimal amount of theoretical addition. (We return to this in Chapter 5.) For a detailed story on *even*-exhaustification, see Chierchia (2013b: ch.3).

There is a tie between focal additivity and polarity that was explored, among the first, by Lahiri (1998), who explicitly put forth a view that alternatives associated with NPIs function in a similar way as the alternatives associated with Focus do (Rooth, 1985). In Lahiri's view, NPIs have a component of their lexical meaning that is on a par with the meaning of a scalar-additive particle like *even*. A polarity construction like 'I don't know any rockstars' is therefore paraphrasable as "I don't even know one rockstar", making "not ... any-*x*" paraphrasable and semantically equivalent to "not ... even one", making the polarity-scalarity parallel explicit. As Chierchia (2006: 538) writes, "'There is(n't) any student" indicates that the presence/absence of a student in the widened domain is the least likely possibility to be actualised which can be sustained only in DE contexts.'

We now take an excursus to further explore this route by adopting a system set up by Fox and Katzir (2011), which unifies the alternative treatment of SIs and Focus.

FOX & KATZIR (2011) As a starting point, we revisit a matter that Chierchia (2013b: 428) raises: the $\mathfrak{X}$-based alternative-sensitive unification of polar, scalar and FC phenomena does not say much, as it stands, about the interaction of focus and lexically activated alternatives. It is Fox and Katzir (2011) who address this issue and develop a framework for accounting for a range of alternative-sensitive phenomena, including focus. As Chierchia (2013b: 428, fn. 1) notes, "it remains to be seen how their ideas can be applied to the approach developed [in Chierchia 2013b]." One of the first, and only, attempts of unifying SIs and AF is Krifka (1995), who assumes that SIs are inherently focal. Since we have already set up a system based on Chierchia (2013b), let us briefly review Fox and Katzir's (2011) system of alternative computation.

To integrate focus into the system of exhaustification, Fox and Katzir (2011) redefine Rooth's (1985) type-based system of association with focus (AF) into a structure-based system that preserves the core component of Rooth's (1985) proposal, while allowing for 'symmetry breaking'. *Symmetry* is understood, in line with the literature of the field, to arise when an expression ϕ corresponds to the disjunction of two of its alternatives ϕ_1 and ϕ_2, where the two alternatives contradict each other. (328) shows the symmetry problem.

(328) Sentences ϕ_1 and ϕ_2 are symmetric alternatives of ϕ if both
a. $[\![\phi_1]\!] \cup [\![\phi_1]\!] = [\![\phi]\!]$
b. $[\![\phi_1]\!] \cap [\![\phi_1]\!] = \varnothing$ (Katzir, 2012: ex. 7)

As Fox and Katzir (2011: 7) write, SI and AF, at least insofar as the focus-sensitive particle *only* is concerned, are both pragmatically processed as conjunction of the sentence ϕ and the negations of the negatable alternatives to ϕ, which they formalise as $\mathrm{N}(\mathfrak{A}, \phi)$, where the alternative set, $\mathfrak{A}$, is determined by two factors: the context (C), and a formal restriction, labelled $\mathrm{F}(\phi)$ in their system. The crucial difference between SI and AF is the one in (329).

(329) Difference between the standard view of SI and of AF: for SI, $\mathrm{F}(\phi)$ is determined by stipulated lexical properties, namely *Horn Scales*. For AF, $\mathrm{F}(S)$ is determined by Rooth's general procedure of focus alternatives, based on semantic type.
(Fox and Katzir, 2011: 7, ex. 26)

Their proposal has a conceptually advantageous potential, namely claiming "that the alternatives for SI and AF are in fact the same." (Fox and Katzir, 2011: 1) In more detailed and formal terms, they propose an equivalence in the formal alternatives ($\mathfrak{A}^{\mathrm{F}}$) that feature in SI and AF processes, abolishing (329).

(330) $\mathfrak{A}^{\mathrm{F}}_{\mathrm{SI}}(\phi) = \mathfrak{A}^{\mathrm{F}}_{\mathrm{AF}}(\phi)$

Their account rests on the proposal laid out in Katzir (2007), who gives a structure-sensitive characterisation of alternatives (defined above as 'formal alternatives').

(331) a. $\mathfrak{A}_{\mathrm{STR}}(\phi) = \{\phi' \mid \phi' \precsim \phi\}$ (Katzir, 2007: 669)
b. $\mathrm{F}(\phi, \mathrm{C}) = \{\phi' : \phi'$ is derived from ϕ by replacing the focussed constituents $x_1, \ldots, x_n$ with $y_1, \ldots, y_n$ where $y_1 \precsim_C x_1, \ldots, y_n \precsim_C x_n\}$
(Fox and Katzir, 2011: 11, ex. 37)

Note that (331b) is a structural variant of Rooth's (1985) proposal, maintaing the type factor and allowing for symmetry breaking. This structural characterisation is also compatible with our system, where μ is a postsuppositionally (anti)exhaustive head (operator) and the structural sensitivity in (331) can be read as an LF constraint on complementation of μ.

4.3.4 Fourth incarnation: conjunctive

COORDINATE μS Let us now return to our JP-*μ*P complex construction. One meaning of *μ*P has been left unaddressed, the coordinate one, which we have started with. Let's recall the data:

(332) a. Sanskrit:

धर्मे ष आर्थे च कामे च
dharme **ca** arthe **ca** kāme **ca**
dharma/law.LOC *μ* (J) commerce.LOC *μ* (J) pleasure.LOC *μ* (J)
मोक्षे च भरत ऋषब यद् इह् आस्ति तद्
mokṣe **ca** bharata ṛṣabha yad iha asti tad
liberation.LOC *μ* Bharata giant which here is.3.SG that
आन्यत्र यद् न इह् आस्ति न तत् क्वचित्
anyatra yad na iha asti na tat kvacit
elsewhere which not here is.3.SG not that anywhere

'Giant among Bharatas whatever is here on Law, and on commerce, and on pleasure, and on liberation is found elsewhere, but what is not here is nowhere else.' (*Māhabhārata.*, 1.56.34)

b. Latin:

iam tum tendit **que** fovet **que**
already then pursue *μ* (J) favour *μ*

'Already then, she *both* pursued it *and* (also) favoured it.' (Vir., *Aen.*, 1.18)

c. Homeric:

ὃς ἤδη τά τ' ἐόντα τά τ' ἐσσόμενα πρό
os ede tá **te** eonta tá **te** essomena pró
which were (J) the *μ* exist.PART (J) the *μ* exist.FUT (J) before
τ' ἐόντα
te eonta
and exist.PART

'That were, and that were to be, and that had been before.' (Hom., *Il.* A: 70)

d. Japanese:

ビル も メアリ も 話します
Bill **mo** Mary **mo** hanashimasu
B *μ* (J) M *μ* talked

'(both) Bill and Mary talked.'

e. Avar:
keto **gi** hve **gi**
cat μ (J) dog μ
'cat and dog'

So far, we have assigned μ with an anti-exhaustive and inherently additive meaning (§4.3) and J as a pair-forming •-function. In light of the data, we need to derive the bisyndetic constructions in a fashion, which would maintain an inherent additivity while annihilating two paired (addtive) μs and return a conjunctive meaning.

Tuple-internally, the two μPs meet each other's additive component:[8] $\mu(\phi)$'s second logical conjunct $\neg\mathfrak{X}(\phi)$ is met by ψ, $\mu(\psi)$'s first logical conjunct.

A natural question now arises, namely, where is the requirement that there should be such satisfaction of conditions? We make a natural assumption that trivial and contradictory meanings are banned. (Gajewski, 2002; Chierchia, 2013b) If our μ markers activate alternatives and trigger (more or less direct) exhaustification, then exhaustification should neither be trivial or. Given our structural characterisation of alternatives, we assume the first layer of exhaustification to lead to contradiction, as noted above. Hence, in line with our assumption of 'extended' Gricean reasoning, speakers re-run exhaustification and arrive at an anti-exhaustive meaning. For this meaning to not be trivial, the domain in question must contain another propositional alternative, structurally defined.[9]

By the same token, monosyndetic conjunctions follow, *modulo* the conventional *both*-type implicature local to first conjunct. The composition and interpretation of coordinations with J-μ bimorphemic and second position monosyndetic coordinators is therefore predicted to be the same. Let's recall the IE the monosyndetic (a) and bimorphemic (b) pairs of possible constructions in the three representative languages, this time with a more precise gloss, including the silent heads.

(333) Vedic Sanskrit:

a. मा नौ म॒हान्तं॑म् उ॒त मा नौ॑ आर्भ॒कं
má̄ no mahā́ntam **u-tá** mā́ no arbhakám
(μ) not us great J-μ not us small

8 This additive 'component' is a presupposition, which we treat as a postsupposition below.
9 The same holds for the second logical conjunct of $\mu(\psi)$ which tuple-internally corresponds to ϕ. Kobuchi-Philip (2008) first developed this idea for Japanese *mo*, arguing for its inherently additive presuppositional semantics.

‘[Harm] not either the great or the small of us.’
(R̥V, 1.114.7[a])

b. वायव् इन्द्रंश् च चेतथः सुतानां वाजिनीवस्
vā́yav īndraś **ca** cetathaḥ sutā́nāṃ vājinīvasū
(μ) Vayu (J) Indra μ rush.2.DL rich bestowing strenght
‘Vayu and Indra, rich in spoil, rush (hither).’
(R̥V, 1.002.5[a])

(334) HOMERIC GREEK:

a. κεῖσ’ εἶμι καὶ ἀντιόω πολέμοιο
keīs’ eīmi **kai** antiō polemoio
there go η/J+μ meet battle
‘Go thither, and confront the war.’ (Hom., *Il.*, M: l. 368)

b. ἀσπίδας εὐκύκλους λαισήϊά τε πτερόεντα.
aspidas eukuklous laisēia **te** pteroenta
shields round pelt and feathered
‘The round shields and fluttering targets.’ (Hom., *Il.*, M: l. 426)

(335) CLASSICAL LATIN:

a. ad summam rem pūblicam **at** *-que* ad omnium nostrum
(μ) to utmost weal common J μ to all of us
‘to highest welfare and all our [lives]’ (Or. 1.VI.27-8)

b. vīam samūtem **que**
(μ) life (J) safety μ
‘the life and safety’ (Or. 1.VI.28-9)

To derive one type of coordinate construction, namely polysyndetic coordination, we need one last ingredient, the notion of postsuppositions.

We root the meaning of μ particles in the notion of antiexhaustivity, corresponding roughly to its overt counterpart *also/too* in English. A sentence, like the one in (336), is understood to mean that Bill walked in and that someone else *also* walked in.

(336) Bill, too, walked in.

An overt antiexhaustive operator like *also* is understood as a negation of the overt exhaustive operator like *only*. This way, (336) can also be understood to mean that Bill walked in and that not only Bill walked in:

(337) $[\![(336)]\!] = p \wedge \neg\mathfrak{X}(p)$, where p =*Bill walked in*

Conversely, we can formalise antiexhaustivity as in (338)[10] by detailing the idea that antiexhaustivity is negated exhaustivity (ignoring c/overt (lack of) presupposition).

(338) $[\![\text{ANTI-}\mathfrak{X}_C(p)]\!] = [\![\neg\mathfrak{X}_C(p)]\!] = p \wedge \forall q\Big[q' \in C[q \Rightarrow q']\Big]$

Constructions of μP will therefore always carry a scalar implicature (SI). SIs, as Chierchia (2013b: ch. 1, p. 10) describes, might be viewed as a mechanism to gain more information from a given alternative-activating sentence. In case of exhaustification of a proposition, the proposition is enriched via silent negation of its alternatives. In case of antiexhaustification, a proposition is enriched via silent affirmation of its alternatives, as is the case with (337).

We will posit that μ particles are specified with a feature bundle $[\pm\sigma, \pm D]$—we will define the two below—and that neither of the two features may receive a $[-]$ value. These two features dictate what kind of alternatives are activated: at least one kind must be active. (See Chierchia 2013b for details.)

We define our μ operators as inherently antiexhaustive: the LF of $[_{\mu P}\ \mu^0\ \text{XP}\ ]$ (compositionally $[\![\mu(\phi)]\!]$) will have a denotation of a conjunction of the assertion ϕ and the asserted entailment of its relevant (contextually salient) alternatives

THE PRESUPPOSITION/POSTSUPPOSITION SWITCH There is an implicit possibility of inconsistency that may have become apparent. Namely, we have set out with a *postsuppositional* definition of $[\![\mu]\!]$, as invoked in this subsection to account for a presupposition-like satisfaction of the additive components so as to obtain conjunction. Using presuppositions, this would not be able to work for reasons of directionality explored by Chemla and Schlenker (2012), among many others. In our account of the focal-additive incarnation of μ, we have maintained, however, a traditional account of additives in that they are presuppositional. How do we therefore reconcile this apparent hypocrisy of sometimes having a postsuppositional μ (like in the conjunction cases) and sometimes a presuppostional μ (like in the additive cases).

10 A slight modification of Chierchia (2006: ex. 62).

Brasoveanu and Szabolcsi (2013: 57, ex. 6) reconcile this switch:

(339) If at-issue updates in the sentence do not change the context in a way relevant to the postsupposition, the output and input contexts are identical in that respect. So a postsupposition expressing a definedness condition ends up being evaluated just like a presupposition: undefinedness results if the input context does not already satisfy it.

ROOT SCOPE & RELATED PROBLEMS Before we move on, I would like to clear one thing out of the way. So far, We have maintained a syntactic rigidity in our semantic analysis of μ. This meant our LFs for μPs were computed very locally. Too locally, to be precise.

Take a Hittite example, repeated from (299), as an example.

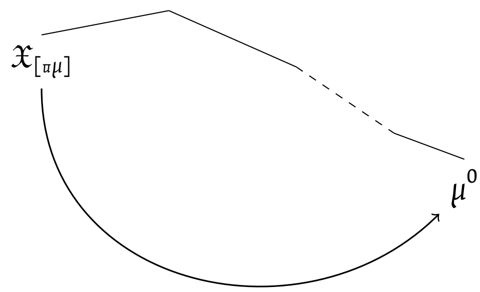
(340) nu-wa ÚL [kuit **ki**] sakti
and-QUOT NEG [who μ] know.2.SG.PRES
'You don't know **anything**' (KUB XXIV.8.I.36)

The μ has been treated as (scalar) alternative-invoking, turning a *wh*-existential into a *wh*-universal by virtue of overt μ, in form of *-ki* in the example above. Scalar—and all other kinds of—implicatures are, however, computed for propositions, not individuals. The semantic duty of μ must, therefore, be delayed until the entire proposition—a CP in syntactically equivalent terms (Fintel and Heim, 2011: 10)—has been derived. Scalar alternative reasoning has to be handled at root CP level, which we understand as the proposition-level. The solution I have in mind here concerns *indirect semantics* and is in fact not a cheap trick. I will start with a quick review of the motivations that have been invoked in the last years.

Szabolcsi (2014c) provides a very intriguing proposal, namely that our μ and κ particles do not really incarnate operators but postsuppositionally *point to* the obligatory presence of such operators. The treatment of our particles may thus be on a par with negative concord markers, which are not considered to be negations themselves but rather as *pointers towards* negations, which may well be phonetically null (Szabolcsi 2014c: 5, Ladusaw 1992: op. cit.). As Szabolcsi further notes, Beghelli and Stowell (1997) proposed a similar approach to *each* and *every*: they signal the presence of a distributive operator, but are not distributive operators themselves. Kusumoto (2005), theoretically on a par, proposed that past tense morphology on the verb merely contributes a time variable, to be quantified over by the operator PAST that sits much higher in the structure. The list of analyses in the spirit of silence and indirect semantics goes on. The original idea is attributable to Carlson (1983) who argues that functional elements often present a mismatch in form and interpretation. As Szabolcsi (2014c: 5) notes, multiple elements correspond to one bit of meaning, or an element occurs in a different place than where it is interpreted, or an element does not seem to make the same contribution everywhere it occurs, or an element seems to be meaningless or, conversely, a bit of meaning seems to be contributed by a null element.

Therefore, the spirit of the system we are adopting relies on a covert dependency between a μ particle and a covert exhaustifier:

(341) An AGREE-based system of exhaustification:



Under this view, we are obviating many obstacles while placing our idea in line with Chierchia's (2013) system, which relies on root-level placement of exhaustifiers since we are dealing with entire propositions, for which we are invoking alternatives, and not their subcomponents.

TAKING STOCK We have motivated a uniform treatment of additive, polar, and free-choice constructions (three signature environments) which are morphosyntactically marked in a uniform way in IE. We have assigned μ an antiexhaustive semantics. Exploiting Chierchia's (2013) innovative mechanism, we have left space for parametric variation between the three signature environments in the valuation of the feature bundle $[\sigma, D]$.

We are assuming that there is a lexical filter, as Chierchia mentions, that prevents $[-\sigma, -D]$ from undergoing spell-out. At least one member of the feature-pair must be valued. If the the μ host (in IE) is not a *wh*-phrase, then the construction is additive. In this case, I've posited that the only available set of alternatives available for recursive exhaustification is D-set. Additivity, combined with additional syntactic structure headed by J, yields coordination, as demonstrated in §3.2. On the other hand, if the host of μ is a *wh*-phrase, the resulting construction will be an NPI, FC or universal distributive.

4.4 $[\![\kappa]\!]$ as inquistive

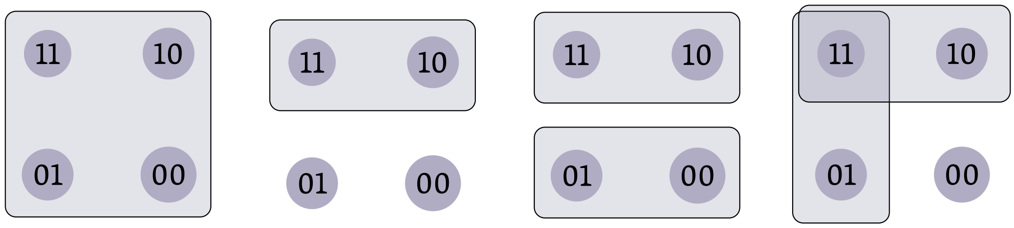
We now turn to the κ-series, which morphosyntactically covers disjunctive, existential and interrogative constructions, among some others (which we will not cover here, but see Veselinović 2013).

INQUISITIVE SEMANTIC PRELIMINARIES In Inquisitive Semantics (IqS), the notion of 'proposition' is different to its definition in standard semantics. Rather, a proposition is a set of downward closed possibilities. In turn, a possibility is defined as a set of worlds. Therefore a proposition like 'John runs' in (342) is interpreted as a powerset of worlds in which John runs.

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

The guiding intuition behind IqS is bidimensional insofar as it recognises two dimensions of semantic content: the informative and the inquisitive. From the perspective of IqS, classical truth-conditional semantics is generally considered monodimensional in that it embodies only the informative content of propositions. (Ciardelli and Groenendijk, 2012: 3) With an 'inquisitive turn', we are led to a notion of meaning that reflects not only its informative content but also its meaning exchange potential (raising/resolving issues). Provided in Fig. 4.1 are some core semantic categories and information states that IqS posits based on the two-dimensional system of *informativity* and *inquisitivity*.

While we adopt here the most basic IqS theory (a.k.a. InqB), not much at all will hinge on the choice of theoretical framework since we will only use a notion of inquisitiveness, which is readily translatable into a non-IqS framework—such as the classical Hamblinian alternative semantics.



(A) *Tautology:* $\begin{bmatrix}-\textsc{informative}\\-\textsc{inquistive}\end{bmatrix}$
(B) *Assertion:* $\begin{bmatrix}+\textsc{informative}\\-\textsc{inquistive}\end{bmatrix}$
(C) *Question:* $\begin{bmatrix}-\textsc{informative}\\+\textsc{inquistive}\end{bmatrix}$
(D) *Disjunction:* $\begin{bmatrix}+\textsc{informative}\\+\textsc{inquistive}\end{bmatrix}$

FIGURE 4.1.: *Categories and information states in Inquisitive semantics*

The main appeal of IqS is the deep-rooted and ontological differentiation between tautological (Fig. 4.1A) and non-tautological (Fig. 4.1D) information state of disjunction—we take the latter semantics to be the signature of κ particles.

The line of thought we will be pursuing in connection with κ particles will be that given in (343), where we assume κ to uniformly perform inquisitive closer of its host.

(343) $[\![\mathbf{?}]\!] = \lambda\Pi\lambda p\big[\Pi(p) \lor \neg\Pi(p)\big]$

Also note that while the Boolean take on the disjunction and existential quantification is preserved in IqS, and by symmetry the equivalence of conjunction and universal quantification, the theory has nothing to say about the μ particles.

4.4.1 FIRST INCARNATION: INTERROGATIVE

It was observed by Hamblin (1958, 1973) that a question can be neither true nor false—a signature property of propositions. Questions are therefore not propositions. Since their truth may be evaluated with respect to answerhood conditions, questions represent *sets* of propositions. Therefore, if a declarative sentence corresponds to a singleton set of propositions (344a), a question corresponds to a non-singleton set of propositions (344b). In the case of polar (yes/no) questions, questions denote doubleton sets of propositions, i.e. the two possible answers (informally, a *yes* and a *no* answer). Formally, as AnderBois (2012: 385) notes, the polar question consists of a disjunction which introduces a set consisting of two alternatives (the identity function and negation) and applies this set to the propositional content of the question (whether this is implemented in a point-wise fashion or not is not too relevant).

(344) a. $[\![\text{Bob is dancing.}]\!] = \{p\}$
b. $[\![\text{Is Bob dancing?}]\!] = \{p, \neg p\}$

We will almost entirely deal with *polar* questions and do not concern ourselves too much with *wh*-questions. For a recent account of the latter, see Kotek (2014) are the literature listed therein.

We begin this subsection with an overview from Lin (2014), who shows the empirical coverage of InqSem predictions in Mandarin.

We take the denotation of questions to be the set of propositions corresponding to possible answers (Hamblin 1958, 1973; Karttunen 1977). While *wh*-questions correspond to as many answers as there are, say, individuals in the universe (345), polar yes/no questions correspond to two possible answers: one in which the proposition is true and another in which it is not (346). The following notations is based on Szabolcsi (2014c: 19).

(345) $[\![\text{Who dances?}]\!]^{M,g,w} =$
$\{p = \{\textsc{dance}(\textsc{kate})(w)\} \vee p = \{\textsc{dance}(\textsc{mary})(w)\} \vee p = \{\textsc{dance}(\textsc{joe})(w)\}\}$
≈ 'the set of propositions that are identical to *Kate dances*, or to *Mary dances*, or to *Joe dances*')

(346) $[\![\text{Does Kate dance?}]\!]^{M,g,w} =$
$\{p = \{\textsc{dance}(\textsc{kate})(w)\} \vee p = \{\neg\textsc{dance}(\textsc{mary})(w)\}\}$
≈ 'the set of propositions that are identical to *Kate dances*, or to *Kate does not dance*'

Based on the idea of Alonso-Ovalle (2006) that disjunctions are alternative sets ($[p \vee q] = \{p, q\}$), (345) and (346) can be restated as in (347) and (348).

(347) $[\![\text{Who dances?}]\!]^{M,g,w} =$
$\Big\{\{p = \{\textsc{dance}(\textsc{kate})(w)\}\}, \{p = \{\textsc{dance}(\textsc{mary})(w)\}\}, \{p = \{\textsc{dance}(\textsc{joe})(w)\}\}\Big\}$
≈ 'the set of propositions that are identical to *Kate dances*, or to *Mary dances*, or to *Joe dances*')

(348) $[\![\text{Does Kate dance?}]\!]^{M,g,w} =$
$\Big\{\{p = \{\textsc{dance}(\textsc{kate})(w)\}\}, \{p = \{\neg\textsc{dance}(\textsc{mary})(w)\}\}\Big\}$

≈ 'the set of propositions that are identical to *Kate dances*, or to *Kate does not dance*'

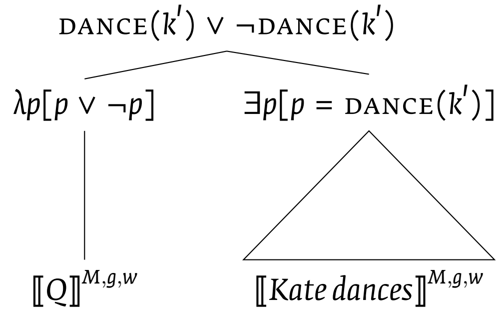
We are focussing on polar question (346/348), in which κ-particles feature. The set of two propositions $\{p, \neg p\}$, which polar questions denote, correspond to uncertainty. In inquisitive semantics (Ciardelli and Groenendijk 2012; Ciardelli et al. 2013, *int. al.*), this is formalised as a principle of inquisitivity—the central semantic and pragmatic property of questions—which I take to be the core denotation of κ.

(349) $[\![\kappa]\!]^{M,g,w}(\phi) = \phi \vee \neg\phi = \{\phi, \neg\phi\}$

The composition of polar questions, skeletally, is thus a double set containing the proposition and its negative alternative: 'Does Kate dance?' is taken present a choice between 'Kate dances' and 'Kate does not dance' (348).

(350) a. $[_{\kappa P}$ κ Kate dances $]$ ⇝ $[\![\text{Does Kate dance?}]\!]^{M,g,w}$
Q

b.



4.4.2 Second incarnation: disjunctive

Our analysis of disjunction will derive from a syntactic analysis, according to which we will treat disjunction as developing from junction of two questions, which is analogous to the analysis proposed by Uegaki's (2013) for Japanese. The general thrust of the proposal is also in line with Pruitt and Roelofsen (2011) who claim that English Alternative Questions (AQs) are also disjunctions of polar questions, which syntactically involve a disjunction of CPs. We depart in two ways: (i) one is the theoretical addition of the Junciton layer and the intricate morphosemantics of the κ particles (which could, however, simply represent an interrogative C^0 in English); (ii) the other point of departure is our not confining ourselves to the CP size of the disjuncts. In this respect we follow Han and Romero (2004) and the rendition of their theory in Uegaki (2013) in assuming disjunct materials smaller than CPs. An inverse, but methodologically very similar, approach to Sinhala was made by Slade (2011: Ch. 3, §6), who takes polar interrogatives as a subkind of AQs involving silent (covert) disjunctions.

Uegaki (2013) argues that AQs in Japanese are underlyingly disjunctions of polar questions. In the following paragraphs, we review Uegaki's (2013) proposal.

One theoretical question regarding AQs is whether they involve syntactic deletion and, if so, how extensive the deletion really is.

(351) a. Do you want [[$_{DP}$ coffee] or [$_{DP}$ tea]]?
b. Do [[$_{VP/TP}$ you want coffee] or [$_{VP/TP}$ ~~you want~~ tea]]?
c. [[$_{CP}$ Do you want coffee] or [$_{CP}$ ~~do you want~~ tea]]?

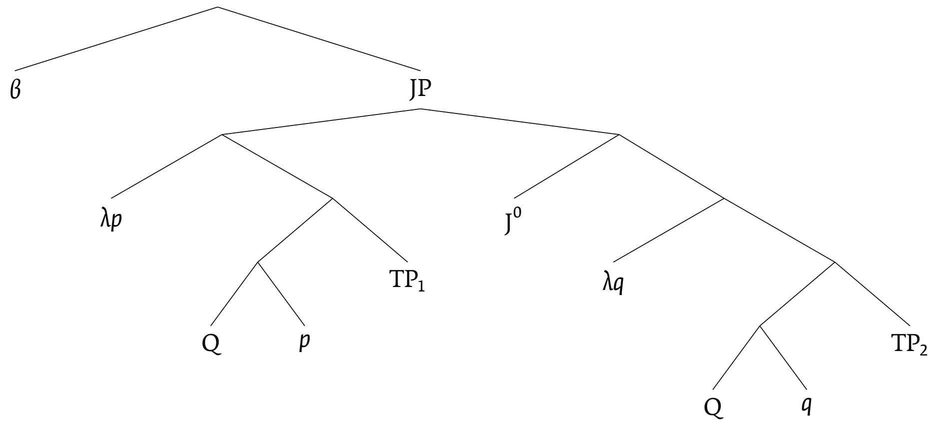
Under the assumption that AQs involve disjunction of as much syntactic material as surface form suggests, treating an AQ in (351) as involving disjunction of nominal arguments (DPs), then we must posit another operation, in place of deletion, so as to derive the correct scope of disjunction out-scoping the question. This is the line taken by Karttunen (1977) and Larson (1985), among others, who propose a Quantifying-in operation to derive the AQ effect. Similarly, Beck and Kim (2006) assume a structure as in (a) above and posit a Focus-associated operation to derive the correct scope. The structure in (b) above requires both syntactic deletion and semantic (covert) movement, which is taken up by Han and Romero (2004) in their analysis. The third structure in (c) above, on the other hand, posits ellipsis and requires no covert movement mechanics to deliver the scope effects since disjunction out-scopes the question.

Uegaki (2013: 5, ex. 11) proposes to treat AQs, at least in Japanese, as consistently being of the syntactic form in (352), obtaining an interpretation akin to something like 'is it the case that ϕ_{TP_1} or is it the case that ψ_{TP_2}?'

(352) [[$_{CP_1}$ TP_1] DISJ [$_{CP_2}$ TP_2]]

We modify Uegaki's (2013) analysis so as to ensure that the denotation of a polar question is a doubleton set, containing the denotation of the proposition (⟦TP⟧) and its negative alternative (¬⟦TP⟧). Our syntax of (dis)junction is also imported into the analysis so that a compositional skeleton we are proposing is the following:

(353) Composing AQs as disjunctions of polar Qs:



a. i. $[\![Q^0]\!] = \lambda p[\lambda q[p = q]]$ (Uegaki, 2013: 6, ex. 19)
   ii. $[\![Q^0]\!]_1 = \lambda p \in \mathfrak{A}[\lambda q[p = q]] \mid \mathfrak{A} = \{p, \neg p\}$ (our departure to non-singleton denotation of Qs)
   iii. $[\![Q^0]\!]_2 = \lambda \Pi \lambda p[\Pi(p) \vee \Pi(p)]$ (Lin's (2014) (p. 6, ex. 20) InqSem non-singleton denotation of Qs)

b. $[\![J]\!] = \lambda \phi \lambda \psi[\phi \bullet \psi] = \langle \phi, \psi \rangle$

c. $[\![\beta]\!] = \{\wedge, \vee\}$

The denotation of each of the two clausal disjuncts is therefore a doubleton set containing the denotation of the respective proposition and its negative alternative. After undergoing composition with J^0, they are converted into a tuple in the alternative form $\langle \{p, \neg p\}, \{q, \neg q\} \rangle$ or non-alternative form $\langle [\lambda p[p = q \vee p = \neg q]], [\lambda q[q = p \vee q = \neg p]] \rangle$, which is subsequently mapped onto Boolean join, given Agree relation holding between β^0 and Q (which is really our κ^0). This results in disjunction of two polar questions: $\Big[[\lambda p[p = q \vee p = \neg q]] \vee [\lambda q[q = p \vee q = \neg p]]\Big]$

Since a polar question has a single alternative, excluding the proposition denoted, being an alternative itself, then a question 'is ϕ the case?' is logically paraphrasable as 'ϕ is the case or ϕ is not the case'.

This is where our postsuppositional component of the lexical entry for κ kicks in. Working with a normal (inquisitive) form, the JP containing two κPs is therefore actually interpreted as a junction of two polar questions. We take the negative-alternative of a single κP as postsupposed, meaning its evaluation is delayed.

(354) Deriving disjunction from two polar questions:

$$\begin{aligned}
[\![[_{CP_1} Q\, \phi]]\!] &= \phi\underbrace{\vee\neg\phi} \\
[\![[_{CP_2} Q\, \psi]]\!] &= \psi\underbrace{\vee\neg\psi} \\
[\![[_{JP}\, [_{CP_1}\, Q\, \phi]\, J^0\, [_{CP_2}\, Q\, \psi]\,]]\!] &= \phi\underbrace{\vee\neg\phi} \bullet \psi\underbrace{\vee\neg\psi} \\
&= \left\langle \phi\underbrace{\vee\neg\phi}, \psi\underbrace{\vee\neg\psi} \right\rangle \\
[\![[\beta_{\vee} [_{JP}\, [_{CP_1}\, Q\, \phi]\, J^0\, [_{CP_2}\, Q\, \psi]\,]]]\!] &= \beta_{\vee}\Big(\left\langle \phi\underbrace{\vee\neg\phi}, \psi\underbrace{\vee\neg\psi} \right\rangle \Big) \\
&= \phi\underbrace{\vee\neg\phi} \vee \psi\underbrace{\vee\neg\psi} \\
&= \phi \vee \psi\underbrace{\vee\neg\phi}\underbrace{\vee\neg\psi} \\
&= \phi \vee \psi \vee \neg\phi \vee \neg\psi \\
&= \phi \vee \psi \vee \psi \vee \phi \ (\because \neg\phi \vdash \psi; \neg\psi \vdash \phi) \\
&= \phi \vee \psi
\end{aligned}$$

The negative alternatives to each of the disjuncts are additionally excludable on the grounds of an existential presupposition that we postulate. We will turn to this again in the next §4.4.4.

We will add a diachronic dimension to this analysis in Chap. 5, §5.3.2.

4.4.3 Third incarnation: existential

The existential constructions arise rather trivially, that is via disjunction over a discrete domain. In the case of *dare-ka* ('who'+κ), the *wh*-term provides a variable over which the κ operator quantifies existentially, forming an indefinite disjunction of individuals (in case of *dare*, 'who').

Recall our lexical entry in postsuppositional form as repeated in (355a). The κ formative informally carries an instruction to assert its host and a disjunction of the host with its alternatives, which we contextually index.

(355) a. $[\![\kappa]\!](p) = p \underbrace{\vee \neg p}$

b. $\mathfrak{A}(p) = \{p, \neg p\} = \{p_i, q_i, r_i, \ldots, x_i \mid i \in C\}$

In a trivial scenario featuring three individuals, 'Ann', 'Bill', and 'Chris', which constitutes a contextually restricted domain of alternatives, let the correspondingly lifted propositional variants of 'Ann read a book', 'Bill read a book', and 'Chris read a book' be a, b, and c, respectively. Therefore, an alternative to a is of the form $\neg a$ but in a given context, like our own mini-scenario with three individuals, $\mathfrak{A}(a) = \{a, b, c\}$.

The LF of (356) is thus a disjunction: $a \vee b \vee c$.

(356) 誰かが 本を 読んだ
Dare-**ka**-ga hon-o yonda
who-κ-NOM book-ACC read
'**Some**body read a/the book.' (from Yatsushiro 2009: 142, ex. 2b)

The sketch of the analysis above, where we apply our inquisitive κ to a *wh*-host, delivers an indefinite.[11]

4.4.4 Fourth incarnation: the exclusive component

The aim of this section is to show that natural language conjunction and disjunction markers do not (necessarily) correspond to logical terms like ∧ and ∨, respectively. Secondly, I demonstrate that disjunction markers are not only morpho-semantically more complex than conjunction markers, but that the latter are even contained in expressing the former.

Conjunction-signalling morphemes in many languages have a semantics unlike ∧ insofar as these morphemes (μ) may be unary, in which case they adopt an additive semantics if they combine with, say, *John*; or a universal quantification, free choice (FC), or polar semantics in combination with

11 Alonso-Ovalle and Menédez-Benito (2010) argued for an 'anti-singleton' indefinite analysis of Spanish *algún* and German *irgendein* and put forward a modal analysis so as to form a taxonomical class with English *-ever* ignorance-heavy FCIs. Alonso-Ovalle and Menédez-Benito (2010) convincingly show that the ignorance component of such epistemic indefinites cannot be reduced to a conventional implicature and that an intrinsic modal operator needs to project. For a similar account, see Fintel (2000) and Dayal (1997), among others. For reasons of space, we do not delve deeper into the modal reality of such indefinites here.

a *wh*-term. Likewise, disjunction-signalling morphemes (κ) may also be unary, in which case they generally have an interrogative, or question-forming, meaning. This has all been rather well documented by, among others, Kratzer and Shimoyama (2002) and, most recently and most exhaustively, by Szabolcsi (2014c).

This dissertation does not add much to the general picture sketched by either Kratzer and Shimoyama (2002) or Szabolcsi (2014c) but rather brings into focus a peculiar complexity regarding disjunction markers, which has, to the best of my knowledge, never been addressed and which may (or may not) require a recharacterisation of the μ/κ division of labour, specifically, and a radically different view of the the natural linguistic incarnation of logical constants like *and* and/or *or*. I will essentially defend the following two generalisations:

(357) a. GENERALISATION 1:
Disjunction markers (κ) tend to be morphologically more complex than the conjunction markers (μ).

b. GENERALISATION 2:
morphologically complex disjunction markers may include, at a sub-word level, the conjunction markers (μ).

The empirical coverage essentially points to the following paradigm, where μ/κ markers are represented as linearly initial, for convenience.

(358) Morphosyntax of conjunction markers:
μ XP μ YP

(359) Morphosyntax of disjunction markers:
$\kappa + \mu$ XP $\kappa + \mu$ YP

The polysyndeticity of complex disjunction markers seems empirically uniform in that the conveyed disjunctive meaning is strengthened, i.e. exclusive. This may constitute an interesting empirical point, especially in light of Singh and Katzir (2009) who argue that Natural Language does not lexicalise exclusive disjunction.

We will review evidence from Homeric Greek, OC Slavonic, Tocharian, Hittite and NE Caucasian.

Empirical evidence: so many particles in so many languages

HOMERIC One of the disjunction markers in Homeric—ἤτε—is moprhologically complex, comprising the disjunctive/interrogative particle ἤ and a conjunction-signalling particle τε. Interrogativity of ἤ is discussed in length in Denniston (1950: 282–284). The authoritative *Homeric dictionary* of Autenrieth (1895: 134) glosses ἤτε as '(either. . .) or', or 'whether . . . or'. As Denniston (1950: 532) notes, in his short entry on the combination of particles giving rise to disjunction, "[t]his combination [of particles ἤ and τε] presents peculiar difficulties on any theory of τε [and]."

(360) ἤ τ' ἐχέμεν παρὰ σοί
e **t**(**e**) ehemen para soi
κ+ *μ* keep with self
'. . . or to keep with yourself' (Il. T. 148)

Another Homeric particle combination is εἴτε, comprising of a conditional-signalling εἴ ('if') and the aforementioned conjunctive τε:

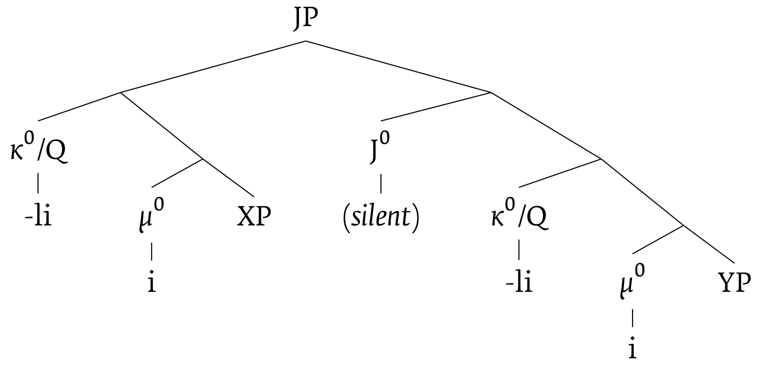
(361) εἴτε βούλεσθε πολεμεῖν ἡμῖν εἴτε φίλοι εἶναι
ei-te boulesthe polemein emin **ei-te** filoi einai
κ + *μ* wish to be at war for myself κ + *μ* friend be
'whether you wish to wage war upon us or to be our friends' (Cyrop. 3.2.13.)

OC SLAVONIC In Slavonic, the disjunction marker is composed of an additive/conjunction marker *i* and an interrogative marker *li*.

(362) ⰹ ⰾⰹ ⰶⰵⱀⱙ ⰹ ⰾⰹ ⰴⱑⱅⰹ
i -**li** ženjǫ **i** -**li** děti
μ -κ wife (J) *μ* -κ children
'. . . or wife or children' (CZ. Mt. 19:29)

(363) ⰹ ⰴⱎⱘ ⰹ ⱅⱑⰾⱁ
i dšǫ **i** tělo
μ soul (J) *μ* body
'(both) body and soul' (CM. Mt. 10:28)

(364)



	coordinand #1		J^0	*coordinand #2*		ex.
	κ^0	μ^0		κ^0	μ^0	
±♪	−	−	−	+	−	(365)
	+	−	−	+	−	(366)
	+	−	+	+	−	(367)
	+	+	−	+	+	(367)

TABLE 4.2.: *Parametrised silence/exponence of disjunctive markers in OCS*

(365) ne možeši vlasa edinogo běla **li** črŭna
NEG can.2.SG hair.GEN.SG single/one.GEN.SG white κ black
sŭtvoriti
create.INF
'(for) you cannot make a single hair white or black.' (CM. Mt. 5:36)

(366) **li** bratrijǫ **li** sestry
κ brothers (J) κ sisters
'(either) brothers or sisters' (CM. Mk. 10:29.1)

(367) a. darŭ **li** **i** **-li** oltarĭ
gift κ J κ altar
'gift or altar' (CM. Mt. 23:19)

b. ⱁⱅⱐⱌⰰ ⰾⰻ ⰿⰰⱅⰵⱃⱐ
otĭca **li** materĭ
father (J) κ mother
'father or mother' (CM. Mk. 7:10)

c. ⰴⰰⰿⱐ ⰾⰻ ⰻ ⰾⰻ ⱀⰵ ⰴⰰⰿⱐ
damĭ **li** **i** **-li** ne damĭ
give κ J κ not give
'(either/whether) I give or do not give' (CM. Mk. 12:14.3)

(368) ⱀⰵ ⱂⱌⱑⱅⰵ ⱄⱔ ⰽⰰⰽⱁ ⰻ ⰾⰻ ⱍⱅⱁ ⱁⱅⱏⰲⱑⱋⰰⰰⱅⰵ ⰻ ⰾⰻ ⱍⱅⱁ
ne pcěte sę kako **i** **-li** čto otŭvěštaate **i** **-li** čto
not worry REFL how *μ* κ what renounce (J) *μ* κ what
ⱃⰵⱍⰵⱅⰵ
rečete
say
'Do not worry about how you will defend yourselves or what you will say.' (CM. Lk. 12:11.1)

HITTITE In Hittite, too, the disjunction marker contains an additive morpheme. As Hoffner and Melchert (2008: 405) note, disjunction is regularly expressed in Hittite by *našma* 'or' or by *naššu ... našma* 'either ... or'. The marker *nasma* has clearly developed by syncope from *naššu+ma*, which defintiely contains the conjunction (and universal distributive) marker *-(m)a*. We do not really know what the role of the *našu* particle is.

(369) nu≈šši **naššu** adanna peškezzi **našma**≈šši akuwanna
now-him $\kappa^?$(+*μ*) =either eat give $\kappa^?$ + *μ* =or drink
peškezzi
give
'He either gives him to eat or he gives him to drink' (KUB 13.4 i 24)

Another pair of enclitic disjunctive markers, attested from the oldest written stage of the language, is *-(a)ku ... -(a)ku* translating as 'whether ... or'. While Hoffner and Melchert (2008) do not remark on the morphological composition of the expression, the *-ku* component reflects the PIE conjunctive particle $*k^we$, as per Kloekhorst (2008: 483).

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

TOCHARIAN B Tocharian B also shows a morphological asymmetry between additive and disjunctive markers:

(371) **pe** klośäm nāñi
μ ears.DU 1.GEN
'also my ears' (TA 5: 53, b3 / A58b3 in Zimmer 1976: 90)

(372) ckācar **e**-**pe** śäṃ **e**-**pe**
sister κ + μ wife κ + μ
'(either) sister or wife' (TA 428: A4B2; Carling 2009: 74)

NORTH-EASTERN CAUCASIAN The last languages we submit to our list of complex disjunction-marking languages is from NE Caucasian (non-IE). Take first a disjunction of two negative clauses:

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

Recall that conjunction obtains polysyndetically using an enclitic *ra μ* particle:

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

Recall from Chapter 2 that the expression exclusive disjunction in Dargi features both μ and κ particles, which we show in (375), repeated from (67).

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

The same compositional pattern is found in Avar, which expresses exclusive disjunction using a composed morpheme expression, containing a κ particle *ya*, the same one as in Dargi, and the by now familiar to us *gi* μ particle.

(376) **ya gi** Sasha **ya gi** Vanya
κ μ S κ μ V
'either Sasha or Vanya.'

Note also the coordination behaviour of ASL, where the meaning context-dependently oscillates between conjunction and disjunction, as explored by Davidson (2011), may possibly be classed along complex disjunction markers here.

The main theorem, therefore, is that exclusive disjunction is the (only available) result of a long-winded composition involving two pairs of κ particles, two pairs of μ particles, the J head and a β operator:

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

b. $\bigsqcup\Big(⟦\text{J}^0⟧\Big(⟦\kappa^0_1⟧\Big(⟦\mu^0_1⟧(⟦\text{XP}⟧)\Big)\Big)\Big(⟦\kappa^0_2⟧\Big(⟦\mu^0_2⟧(⟦\text{YP}⟧)\Big)\Big)\Big)$

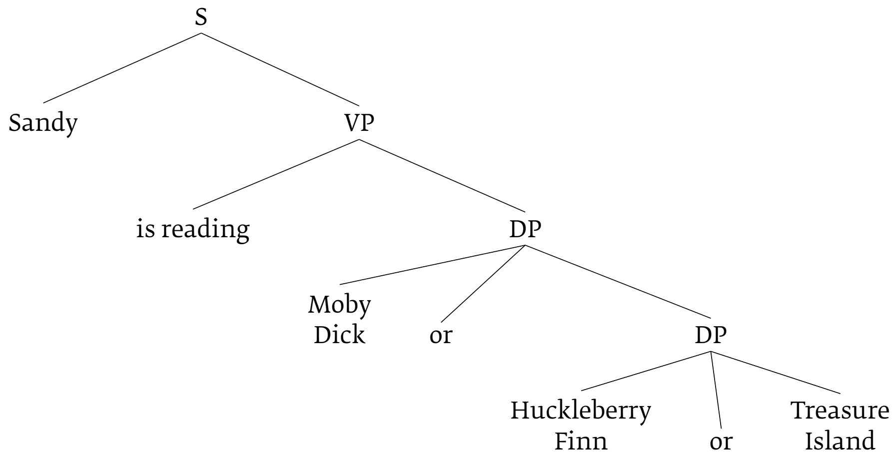
c. THEOREM. (b) $\vdash ⟦\text{XP}⟧ \lor ⟦\text{YP}⟧ \land \neg(⟦\text{XP}⟧ \land ⟦\text{YP}⟧)$

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

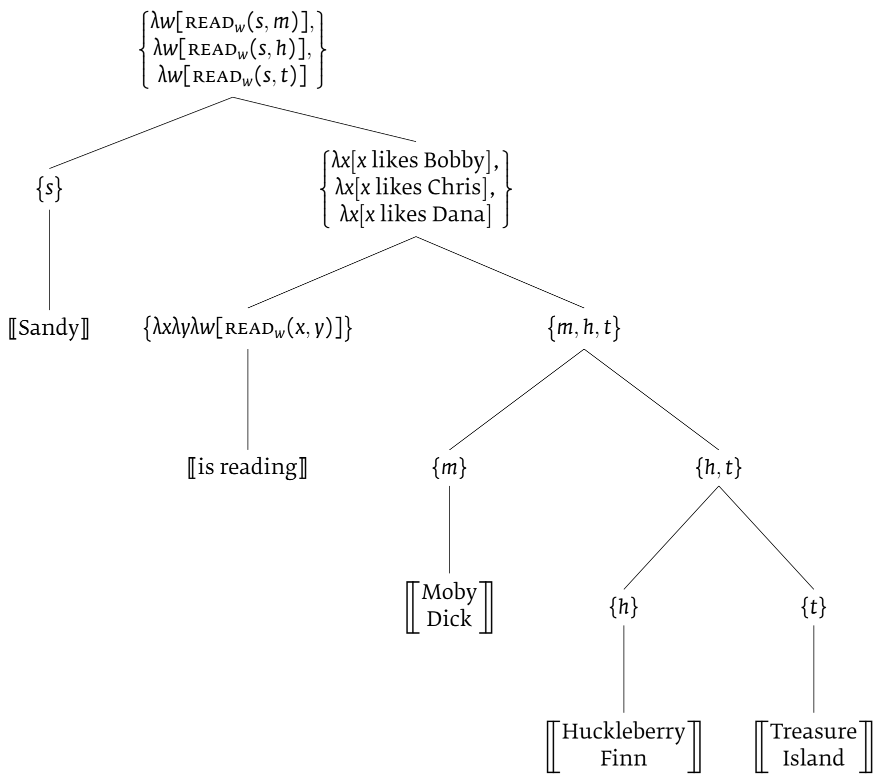
As a sample, of the programmatic thrust of such an approach, take a sketch of a a possible disjunction structure (378b) and Hamblinian interpretation taken from Alonso-Ovalle (2006: 80, ex. 63).

(378) "The denotation of the sentence in (378b) is the set containing the proposition that *Sandy is reading Moby Dick* (m), the proposition that *Sandy is reading Huckleberry Finn* (h), and the proposition that *Sandy is reading Treasure Island* (t)." (Alonso-Ovalle, 2006: 80, ex. 63)

a. A simplified structure for disjunction:



b. A denotation for disjunction:

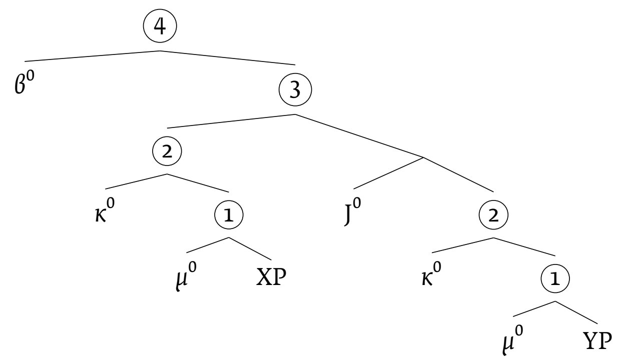


Our alternative tree with involve two alternative-triggering operators, μ and κ superparticles, and one alternative-insensitive Junction head which will pair coordinands and let a c-commanding β operator turn the tuple into a Boolean expression, as per (278) and (279).

The no-look-ahead principle will thus allow for 'embedded' alternatives, where a κ operator will function over a μ-triggered and exhaustified set of alternatives.[12]

We will therefore end up computing and composing the meaning of a complexly-marked disjunction in four steps, as the morpho-syntactic analysis from the previous section suggested. These compositional steps are shown in (379) and paraphrased in (380).

(379) The compositional steps in interpreting $[\![JP^+]\!]$:



(380) Paraphrasing the compositional steps in interpreting $[\![JP^+]\!]$:

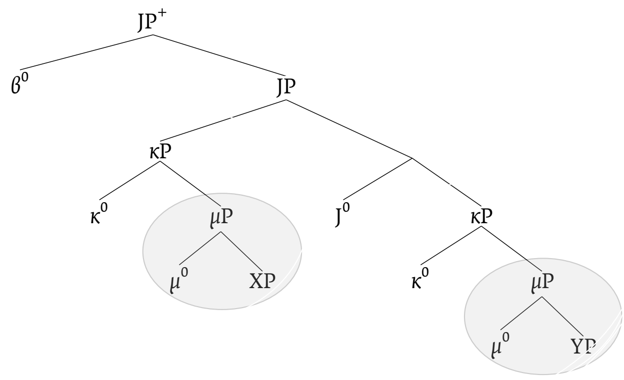
① $[\![\mu P]\!]$ as FA of $[\![\mu^0]\!]$ and its argument (coordinand)
② $[\![\kappa P]\!]$ as FA of $[\![\kappa^0]\!]$ and $[\![\mu P]\!]$
③ $[\![JP]\!]$ as tuple-forming FA of $[\![J^0]\!]$ and two $[\![\kappa P]\!]$s (structural coordinands)
④ $[\![JP^+]\!]$ as FA of $[\![\beta^0]\!]$ and $[\![JP]\!]$

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

STEP ① The first compositional step concerns the μP.

12 As a matter of methodological principle of theoretical stance, we will also assume that there are no semantically vacuous morphemes: therefore a derivation adds compositional meaning.

(381) Composing μP (a sketch):



Assume a standard additive μ expression, where μ combines with a DP, like *John*, which, once point-wise 'lifted' to propositional level, contains no negative or modal markers (cf. (289)). The presence of μ will activate alternatives of its host and, once active, alternatives need to undergo exhaustification.

$[\![\mu P]\!]$ has to be recursively exhaustified, since a single layer of exhaustification yields a contradiction in absence of a negative or a modal operator interpolating within the structure, as per (289). A single level of exhaustification yields a contradiction in absence of (very possibly structurally defined) alternatives, as shown in (382a), since the proposition in question is the only available alternative to itself. The speakers are therefore assumed to rerun the Gricean reasoning and add another layer of exhaustification, which, given the result of the first level of exhaustification, now contains the exhaustified proposition as an alternative (382b). Once this alternative is denied, under standard assumptions, antiexhaustivity obtains, as per Mitrović and Sauerland (2014) and Fox (2007).[13]

(382) a. First layer of exhaustification:

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

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

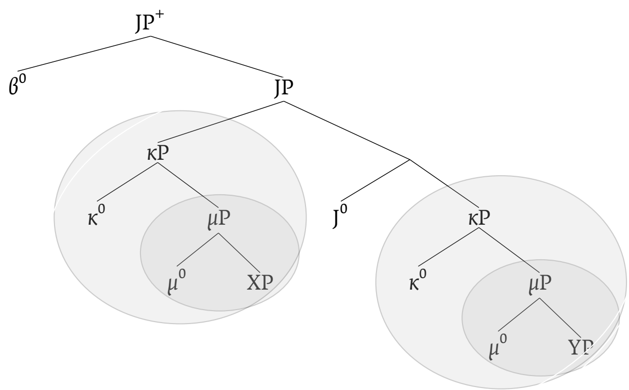
b. Second layer of exhaustification:

$$\mathfrak{X}(p)\Big(\{\mathfrak{X}(p)\}^{\mathfrak{A}}\Big) \;=\; p \wedge \neg\mathfrak{X}(p)$$
$$\nvdash \;\; \bot$$

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

STEP ②: INTERPRETING κP We now take a structural step higher, where the result of step 1, ⟦μP⟧, namely (382b), is fed into κ, assumed to be an incarnation of an Inquisitive operator.

(383) Composing κP (a sketch):



κ takes the μP with the denotation $[p \wedge \neg\mathfrak{X}(p)]$ as complement and perform inquisitive closure, i.e. a disjunction of ⟦μP⟧ and its negation. Via De Morgan equivalnce (DeM), we get the meanings of individual disjuncts, as shown in (386). We also invoke Alonso-Ovalle's (2006) principle of converting disjunction to sets.

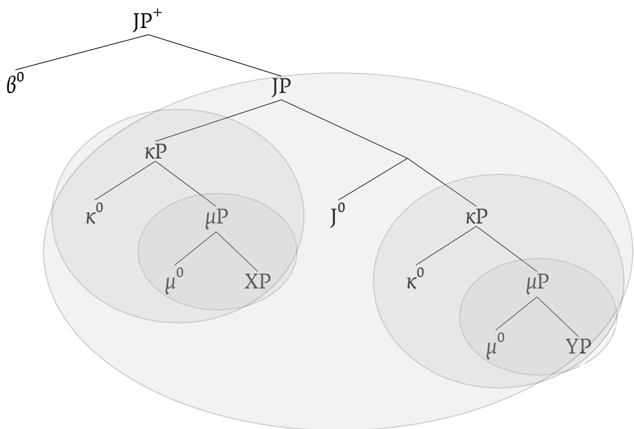
(384) Composing κP:

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

The result of (386) is true for both of the disjuncts, hence a pair of such sets is paired up by J^0.

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

(385) Composing JP (sketch):

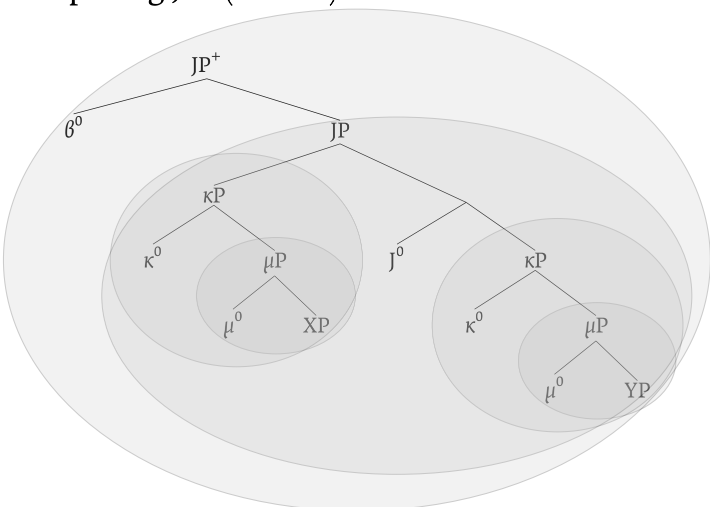


(386) Composing JP:

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

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

(387) Composing JP^+ (sketch):



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

(388) Composing JP^{+}:

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

The resulting denotation, however, is an inconsistent set. We simplify the denotation of the entire JP in (389), which contains two maximal consistent subsets, given in (389a) and (389b).

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

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

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

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

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

We assume that, since the entire set (389) is inconsistent, one of the two maximal consistent subsets is the resulting denotation. The first consistent set in (389a), however, is excludable for two reasons. For one, (389a) violates HC.[14] We sketch a proof of this in (390).

14 HC stands for Hurford's Constraint (Hurford, 1974), which we state:

(i) HURFORD'S CONSTRAINT (HC):
neither of the disjuncts should entail the other, or each other.

a. a disjunction of the form $X_1 \vee X_2$ is odd if X_1 entails X_2, or vice versa (Katzir and Singh, 2013: 202)

b. $p \vee q = \left\{\begin{array}{ll}\bot & \text{if } p \vdash q \text{ or } q \vdash p\\ \neg\bot & \text{otherwise}\end{array}\right.$

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

Another possible reason for exclusion of (389a) is, perhaps, the strengthening condition we stipulated in fn. 12, which amount to stipulating, on the grounds of possibly natural principles, that alternative-sensitive morphemes, like μ and κ, enrich (and not simply maintain) meaning structurally. A μP with an antiexhaustive meaning, once fed into κ, should not, then, yield a κP with the meaning of μP alone. Our resulting denotation, however, *contains* the μP meanings of each disjuncts and, may, be excluded for reasons of structural enrichment. Therefore, if the first maximal consistent subset (389b) is not the denotation of JP^{+}, then it has to be the other.

The other consistent subset in (389b) has a clear flavour of exclusivity: either *only* one disjunct is true ($\mathfrak{X}(p)$), or else that disjunct is not the case ($\neg p$). This, however, still allows for both disjuncts to be false ($\neg p \vee \neg q$) and we end up nothing (i.e., with the wrong meaning, paraphrasable as "neither…nor"). We assume an existential presupposition ($\exists C$) blocks this meaning.[15] The second subset of (389b-ii), however, contains a mutually-exclusive doubleton subset (389b-ii), which asymmetrically entails (389b-i). This is the desired result with the exclusive component.

This section has essentially tried making sense out of complex morphology for, what seems to be, a rather simple meaning of 'or' or '$\vee$'. I have not only shown that five operators (heads) are present in the morphosyntactic expression of exclusive disjunction, but have also presented a working analysis of deriving the exclusive component as a computational consequence of five-head/operator ($1 \times \text{J}^0, 2 \times \kappa^0, 2 \times \mu^0$) composition and alternative elimination via a ♡-like procedure (including HC) that handles inconsistencies in the generated alternative set. The calculation is schematised in derivation/interpretation parse in the Appendix C.

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

4.5 Chapter summary

This chapter set out to translate the syntactic analysis of fine-grained coordination structure, which we have motivated in the previous chapter, into compositional semantics. Assuming three core heads, J^0, μ^0 and κ^0, the core semantic classes featuring the two superparticles have been compositionally derived. Having introduced some novel data on morphologically complex disjunction markers, which contain the μ particles, a new composition of exclusive disjunction has been proposed, one that involves as many as five heads (operators), as signalled by the morphology. In this respect, a strongly decompositional, and successfully compositional, stance has been taken.

The following chapter addresses topics concerned with the semantic change within the superparticle system. To answer some historical questions related to the semantics of the IE superparticle inventory, we will draw from Japonic.

5

Semantic change

5.1 Introduction

This chapter picks up on a diachronic quirk we pointed out in passing in Chapter 3 on IE μ^0. We have established that IE $*k^we$ was a superparticle of μ^0 category, the interpretation of which falls into two main classes, depending on its structural context. As a complement to JP, μ^0 is conjunctive as per the compositional account proposed in previous chapter. If independent (i.e. not contained within a JP), IE μP has four core interpretations: as (i) a polarity, (ii) universal distributive, (iii) free-choice, or (iv) additive item, where the distribution between the second and third is regulated by the absence (ii) / presence (iii) of a modal. Recall that IE μ-kinds are different from the Japanese template we started with in (1) in the first chapter in that μ in the vast majority of old IE languages shows no signs of unrestricted universal quantification (a meaning like *all*), unlike Modern Japanese. In this chapter we turn to the exceptions within IE which are more like Japanese with regards to the purely universal character of quantification. The main question, that this chapter deals with, concerns the nature of the 'quantificational split' in IE: in simplest terms, why does *wh*-μ mean 'any-x' in some and 'each-x' in other IE languages? (Furthermore, is there a diachronic link?)

We first aim to explain the exceptions (§5.2). The aetiology of the any/each quantificational split in the semantics of IE μ^0 will be shown to be diachronic. We will entertain the idea that rather than a seeming oscillation from the system we are developing, the universal quantificational force of μ^0 is diachronically original in the earliest IE. The second desideratum (§5.3) is comparative-diachronic. We will look beyond IE to understand the diachronic processes underlying the semantic oscillations between the polar and universal meaning.

We first show that a subset of IE languages, including Old Irish, Hittite, Gothic, Tocharian and Latin, are exceptional, with regard to their IE brethren, in possessing a Japanese-style μ. We begin by meditating on the 'semantic split' in the quantificational force of μ particles and start with two logical premises: one of the two semantic properties of μ operators, i.e. the universal or the (DE-restricted) polar meanings, was historically original. To decide between the two, we navigate from IE to a genetically independent language (family), namely Japonic, and observe the properties of its μ-system so as to construct a cross-linguistically wide 'diachronic typology'. We then take the diachronic trends in Japonic to account for the changes in IE, arguing for a possibly homogenous, and potentially universal, patterns of directionality of semantic change, which we model using Chierchia's (2013b) theory of implicature-based derivation of polarity sensitivity.

Before we turn to the IE data and the discussion of the quantificational split, we devote the remainder of this opening section to a preliminary formal semantic theorisation on semantic change by reviewing von Fintel (1995), one of the rare formal semantic contributions to understanding the concept of grammaticalisation.

FORMALISING GRAMMATICALISATION: VON FINTEL (1995) Grammaticalisation is generally understood as the diachronic process of changing lexical material into functional material. The notion has, wrongly, been associated or indeed equated with the concept of 'semantic bleaching', i.e. *loss* of semantic content.[1] As von Fintel (1995) shows, this does not hold. In what follows, we mainly draw from his (1995) work.[2]

The notion of 'semantic bleaching', with respect to grammaticalisation, seems to have been invented by non-semanticists to account for the meaningless functional units such as case markers but their seeming 'meaninglessness', which is by no means as factual as is promoted to be, is an exception in the realm of functional items. Or, as von Fintel (1995: 177–178) writes, "[f]or most other functional morphemes, the view that they

1 See, for instance, Sweetser (1988) and the numerous references therein. I do, however, concede that this notion is also quite an outdated view within mainstream grammaticalisation. For a more recent rectification of grammaticalisation, see Eckardt (2006, 2007, 2011) and references therein.

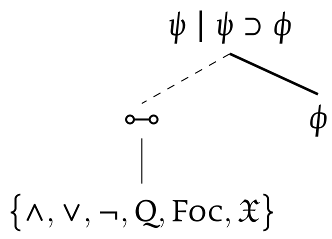
2 For a case-based account of semantic change, see Eckardt (2006) and references therein.

have no meaning is *entirely mistaken*. [emphasis his] The semantics of determiners, modals, tenses, aspects etc. is after all the bread and butter of working semanticists. If there is a semantic reflex of the functional/lexical distinction, it is not that functional items are vacuous."

Applying these reformalised ideas about grammaticalisation to our empirical set, we have to concede that we are dealing with a case of grammaticalisation which is not of the plain-vanilla variety, under which it is maintained that the semantic change is that from lexical to functional meaning, but rather that we are dealing with second-order gramamticalisation, since our attention is on inherently functional meanings of language—those meanings characterised by high types and permutation invariance—that change into other—more?—functional meanings. In literature, this form of grammaticalisation is also known as secondary grammaticalisation and has been recognised, at least, ever since Kuryłowicz (1965): "Grammaticalization consists in the increase of the range of a morpheme advancing from a lexical to a grammatical or from a less grammatical to a more grammatical status, e.g. from a derivative formant to an inflectional one." (Kuryłowicz, 1965: 69) For an overview of theoretical developments in the field of grammaticalisation, see Hopper (1996) and for recent advances in the area of secondary grammaticalisation, see Traugott (2002), Breban (2015) and references therein. We will not revolutionise much with respect to this question but will simply pick up on, and expand, the idea that functional, as opposed to lexical, meanings have high types, as most notably argued in Chierchia (1984) and Partee (1987), among others (see Fintel 1995 for further reference and discussion).

We follow von Fintel (1995) in assuming that permutation invariance and high types go hand in hand. Permutation invariance is elegantly situated within Carlson's (1983) theory, in which functional items—at least those that concern us in this thesis, namely logical words like coordinators, quantifiers, and possibly focus, (generalised/Chierchian) exhaustification and question markers—are endocentric. The notion of endocentricity entails two beneficial effects, both in syntax as well as semantics. Syntactically, a Carlsonian 'endocentric' functional element does not change the category of its argument(s) (we have also been using the term host(s), which is of equal status in this respect). Among such endocentric elements are sentence modifiers, such as negation markers, which, as von Fintel (1995: 182) notes, take sentences and return sentences, without changing the category of their arguments (hosts). We could add to this set of endocentric elements markers of coordination, quantification, and interrogativity—these can uniformly be identified as logical terms. We can conjecturally add to the list of endocentric logical markers also the focus-sensitive and exhaustification operators. We maintain that syntactically, endocentric elements do not change the categories of their hosts.[3]

(391)



Functional meanings therefore have the following properties as von Fintel (1995: 183) lists them, where we select from his list:

(392)
a. Functional meaning are permutation-invariant
b. Functional meanings have high types.
c. There are universal semantic constrains on possible functional meanings (conservativity).

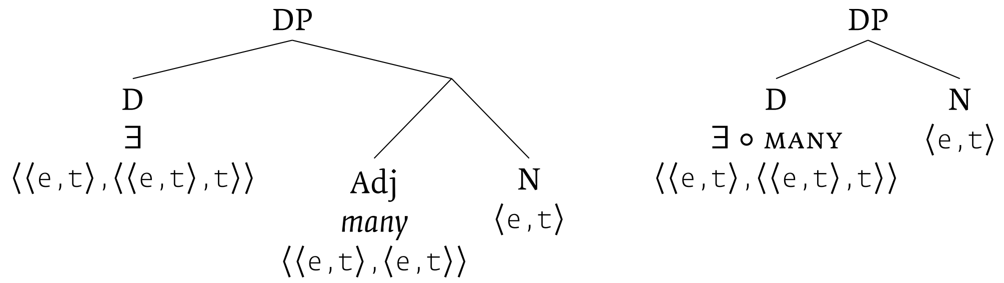
We will mostly concern ourselves with (392a–392b). Although von Fintel (1995) does not state it explicity but only states that "an item that becomes a functional morpheme has to assume a higher type", we take the following generalisation on the semantic change involved in grammaticalisation to hold:

(393) GRAMMATICALISATION GENERALISATION OF TYPES:
Grammaticalisation never results in type-lowering.

One instance to which (393) applies is the change from adjectival to determiner-like quantificational meaning that Fintel (1995: 185, ex. 14) reports, where the notion of function composition (∘) is employed as the central tool of grammaticalisation.

3 Fintel (1995) notices a caveat lurking behind the innocence of endocentricity, namely the fact that from a modern Minimalist point of view, the negative head is assumed to head its own projection, NEGP, which defeats the 'no tampering' notion of endocentric operators. Fintel (1995) also finds a way to resolve this problem by appealing to the model of 'extended projection' proposed by Grimshaw (2000, 2005), which allows us to maintain that functional morphemes are both endocentric and exocentric elements simultaneously, as explored by Cormack and Breheny (1994).

(394) Adjective$_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}$ $\longrightarrow$ Determiner$_{\langle\langle e,t\rangle,\langle\langle e,t\rangle,t\rangle\rangle}$ change:
a. Stage 1: $\gg$ b. Stage 2:



If grammaticalisation truly relies on function composition of the denotations of syntactic elements, then the generalisation in (393) follows straightforwardly.

STRUCTURAL CHANGE: ROBERTS & ROUSSOU (2003) We now revisit the syntactic and syntax-theoretic aspects of grammaticalisation by integrating into the picture the minimalist diachronic system of Roberts and Roussou (2003). After surveying a rich collection of cross-lingusitic constructions, Roberts and Roussou (2003: 212) find a signature common denominator in diachronic syntax in loss of movement and a new exponence of a structurally higher functional head. This head that is formed corresponds to the target slot of movement from a previous stage. In general terms, a formerly lexical head 'turns into' a functional head occupying a structurally superior position, as sketched in (395).

(395) $[_{XP}\ Y + X\ [_{YP} \ldots t_Y \ldots]] \gg [_{XP}\ Y = X\ [_{YP} \ldots Y \ldots]]$
(Roberts and Roussou, 2003: 212, ex. 19)

Note that this general diachronic state of affairs in syntax corresponds with the diachronic semantic type-raising restructuring indicated in (394).

5.2 The early quantificational split in IE

The vast majority of old IE languages, as we have already established in Chapter 3, possessed a superparticle of μ category, which in combination with an existential yielded a polarity sensitive term. Some IE languages, however, fall outside of this generalisation for reasons that are unknown from any previous literature that I am aware of. This section aims to explain this split.

To reiterate some core contrastive data, exemplifying this quantificational split, compare the meaning of a *wh-μ* expression in Sanskrit (396) and Gothic (397), where one is a polarity sensitive expression and another a (polarity 'insensitive') universal expression.

(396) न यस्य कश् च तितिर्ति 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)

(397) 𐌾𐌰𐌷 𐍈𐌰𐌶 𐌿𐌷 𐍃𐌰𐌹 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)

There are two possible answers to the question of the diachronically original meaning *μ* in such expressions and the ways in which the development of early μ^0 proceeded in (P)IE.

(398) i. The (Gothic-type) universal quantificational (∀) character of μ^0 is diachronically primary (i.e. the reconstructable form) and the polarity sensitive (POL) character is secondary (Sanskrit-type). Under this hypothesis, PIE had universal terms, which diachronically shifted into polar terms through parametric syntactic-semantic change. The Anatolian, Celtic, Italic and Germanic branches of IE, which show (at their earliest stages) the ∀ character of μ^0, had split before the change took place.

ii. The POL character of μ^0 is diachronically primary (i.e. the reconstructable form) and the ∀ character is secondary. Under this hypothesis, PIE had POL terms, which diachronically shifted into ∀ through parametric syntactic-semantic change, which took place in the Anatolian, Celtic, Italic and Germanic branches only; Sanskrit, Slavonic, and the rest of the IE group did not undergo such a change.

Both hypothetical options above presuppose a split between the Anatolian, Celtic, Italic and Germanic branches, on the one hand, and the rest of the IE branches, on the other hand. In the remainder of this section, we focus on the connection between two such branches, Anatolian and Celtic, in order to elucidate some further and independent reasons to consider a semantic split in early (P)IE. We consider three independent arguments for the closer (parametric) 'affinity' of Anatolian (Hittite) and Celtic (OIr.) branches:

(399)
i. a SYNTACTIC argument (Watkins, 1963): Hit. and OIr. exhibit some particular particle sequences that we do not readily come across in other branches.
ii. a SEMANTIC argument: Hit. and OIr. exhibit the same semantic property of μ, namely its unrestricted universal force.
iii. an INDEPENDENT argument: independent work on IE phylogenetic cladistics is in line with the idea that Anatolian and Celtic were among the first branches to split from its IE core.

What is additionally interesting with respect to (399i) is the correlation between the unrestricted universal term and the corresponding pattern within the POL group. Both Hit. and OIr. universal *wh*-μ terms pattern with FC terms, while not patterning with other (polar and additive) terms. We now take each of the three arguments in (399) in turn.

SYNTAX Our syntactic argument draws from Watkins (1963), who notes a very close similarity of particle/clitic sequences in OIr. and Hit.

The preverbs in OIr. clearly reflect a lexicon inherited from PIE. Table 5.1 below lists the particle correspondences in OIr. and Lat.

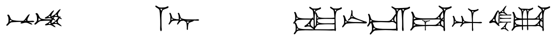
However, no plausible particle in a cognate language can be suggested for the OIr. particle *no.*, which serves to infix pronouns and has no semantic content at all, as Watkins (1963: 15) shows. The same applies to OIr. *se*, which hosts the enclitic conjunctive (super)particle *-ch* and serves to infix the copula *is*. Note that the equation of the clitic sequence of the preverbal particle (*no/se*), the conjunctive *ch* and the verb *is*.

It is in Hittite where we find strikingly similar, if not identical, forms of particle sequences, which was originally noticed by Dillon (1947). Hittite possessed particle *nu* (𒉡) corresponding to OIr. *no*, both of which reflect

OIr.	Lat.	particle sequence in OIr.
ad	*ad*	
com	*cum*	
di	*dē*	
no	–	*no≠ch≠is*
se	–	*se≠ch≠is*
to	–	*to≠ch≠is*

TABLE 5.1.: *PIE particle correspondences in OIr. and Lat.*

PIE ∗*nu*. These two particles were rather devoid of semantic content[4] and were uniformly restricted to initial syntactic positions, serving as hosts to other clitics and particles. In our system, *nu* appears to sit in J^0. What puts us in a position to appreciate Watkins's (1963) observation is not only the phonological equation of OIr. and Hit. *no* and *nu*, respectively, but also his syntactic equation:

(400) a. 

nu≠mu	^{d}IŠTAR . . .	kaniššan	ḫarta
J^0-me.ACC	Ištar	favour	held

'and (as) my lady Ištar held me in favour' [#J^0 . . . V^0#] (Ḫatt. I. 66–67)

b. nom Ċoimmdiu coīma

no≠m	Choimmdiu	coīma
J^0-me.ACC	Lord	cherish

'The Lord cherishes me' [#J^0 . . . V^0#] (EIL, 2.2)

Hit. possessed two additional sentence-initial particles, *ta* (𒋫) and *šu* (𒋗), which also serve as clitic hosts. Similarly, particle *to* in OIr. is devoid of semantic content[5] and attaches to verbs so as to host clitics, as Dillon (1947: 22) originally proposed. Both the OIr. *to* and Hit. *ta* are reflexes of the PIE ∗*to*, as already noted in passing in Chapter 3. Additionally, Hit. *šu* is

4 As Watkins (1963: 15) notes, Hit. *nu* sometimes corresponds to conjunctive meaning but in other cases, it is devoid of any meaning or semantic contribution to the rest of the structure.

5 For evidence and elaboration on the null semantic content of OIr. *to*, see Dillon (1962).

cognate with OIr. *se*, noted in Tab. 5.1.[6] The set of three PIE connective particles are fully reflected in OIr. and Hit.

(401)

PIE
{∗*no*, ∗*to*, ∗?}
Oir. → {*no*, *to*, *se*}
Hit. → {*nu*, *ta*, *šu*}

The equation of the clitic sequence is also borne out. Take for instance a pronominal clitic *⸗an* ('him') which directly corresponds to OIr clitic forms with *-ch* ('and').

(402) Watkins's (1963) clitic sequence equation:

a.	Hit.	**n**⸗*an*	**t**⸗*an*	**š**⸗*an*
b.	OIr.	**no**⸗*ch*	**to**⸗*ch*	**se**⸗*ch*

Watkins's (1963) insight into the Celto-Anatolian particle and particle sequence identity is of tremendous value as it finds its theoretical and explanatory version in the system we have been developing in this thesis. The sentence-initial particles {*nu/no*, *ta/to*, *šu/se*} in Hit./OIr. respectively, are J^0 elements. Following Dunkel (1982), we could add to (402) the pair OIr. *to-ch* :: Hit. *ta-kku* ('if').[7]. Conversely, Hit. *nu-kku* 'and now' (< ∗*nu-k*^{w}*e*, Kloekhorst (2008: 608)) further fits the bimorphemic frame.

(403) Expanded clitic sequence equation:

a.	Hit.	**n**⸗*an*	**t**⸗*an*	**š**⸗*an*
		nu⸗*kku*	**ta**⸗*kku*	∅
b.	OIr.	**no**⸗*ch*	**to**⸗*ch*	**se**⸗*ch*

We now move on to the semantic equation of the OIr. and Hit. universal terms.

i. THE RETENTION ANALYSIS: Anatolian and Celtic have retained the archaic form of indefinite quantification, i.e. the syntactic and semantic patterns are inherited from PIE.

6 It is unclear what the PIE etymon for OIr. *se* and Hit. *šu* is.

7 See Melchert (1994: 184) who interprets *ta-kku* as /tak^{w}u/ < /tak^{w}ə/ < ∗*to-k*^{w}*e*

ii. THE 'CONVERGENT EVOLUTION' (HOMOPLASY) ANALYSIS: Anatolian and Celtic shows shared innovation patterns, i.e. the two branches developed analogous syntactic and semantic structures which were not present in PIE.

As John Whitman correctly notes, the question that arises under the second homoplasy hypothesis is whether this form of homoplastic diachronic change involved single or multiple innovations away from the PIE form. As we will see as we turn to the semantic equation of Anatolian and Celtic below, it is rather difficult to model a single innovative diachronic change that would reflect both the clitic sequences and the unrestricted universal-quantificational character of μ particles.

SEMANTICS In Hit., as Hoffner and Melchert (2008: 149) note, the universal distributive expressions like '*each*(one), *every*(one)' quantificational expressions correspond to *kuiššša* (𒆪𒅖𒊭), comprising of an inflected *wh*-component *kui-* (𒆪𒄿) and the conjunctive (super)particle *-a* (𒀀) / *-ya* (𒅀), corresponding to our μ category.[8] The following two examples show μP universals as animate ('who') subjects and inanimate ('what') objects:

(404) 𒉡 𒌉𒈨𒌍𒋗 𒆪𒅖𒊭 𒆪𒉿𒀜𒋫 𒌑𒌅𒉈 𒉺𒄿𒍣𒍣
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)

(405) 𒉡 𒆪𒄿𒀜𒋫 𒅈𒄩𒅀𒀭 𒆠𒈾𒀀𒄿𒍣
nu kuitt-**a** arhayan kinaizz[i
J what-μ = ∀ seperately sifts
'She sifts **everything** seperately.' (KUB XXIV.11.III.18)

Following Karttunen (1977), *int. al.*, we maintain an indefinite and inherently existential semantics for *wh*-terms, like *kui-* 'who' or *kuit-* 'what' in (404) and (405), respectively. In the derivation we have developed, *wh*-words are hosts (complements) to μ^0 operators (heads), which have, as a semantic signature, alternative triggering. Given the potentially silent presence of a boolean operator ⊓, all activated alternatives are asserted to hold. This

8 The free-choice 'who*ever*' type expressions are analogous but not identical to universal distributives *kuiššša* (𒆪𒅖𒊭). As Hoffner and Melchert (2008: 150) show, while universal distributive *kuiššša* (<*ku-iš-ša*) 'each, every(one)' shows geminate -šš-, the free-choice *kuiša* (<*ku-i-ša*) 'whoever' features the non-geminating conjunction *-a* (𒀀) / *-ma* (𒈠).

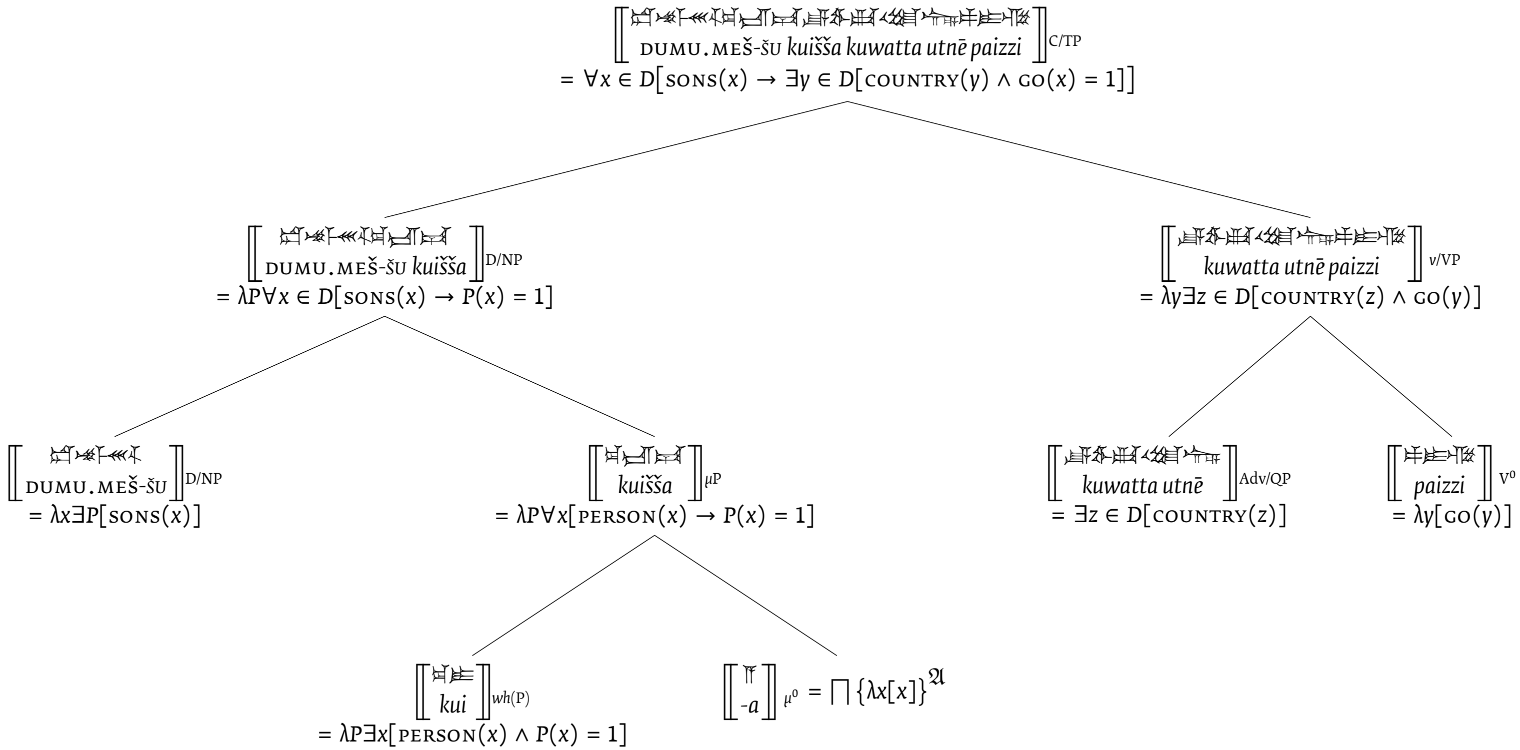
yields a universal term such as *kuišš-a* 'every/each (son)' in (404) and *kuitt-a* 'everything' in (405) confirm. More formally and schematically, the compositional details of (404) containing a *who-μ* universal *kuišš-a* are shown in (406).

We are also employing a very simplified take on the event semantics and verb transitivity: we take the verbal predicate *paizzi* 'go' as being an intransitive predicate, stripped of past-tense meaning with the existential-locative *kuwatta utnē* 'somewhere to a country' adjoining at the *v*(V)P level.

Note the structural ambiguity of the *μ*-quantificational subject 'each of his sons'. We ignore the internal type-complexity of the expression DUMU.MEŠ-*ŠU* kuišš 'which/ who + his sons', and simply assume that the expression denotes a set of properties shared by 'his sons'.

In the composition we are assuming, the *μ* operator combines with the scope element first and only then with the restrictor, making it structurally (syntactically and compositionally) analogous to indeterminate universal quantification in Japanese, as Shimoyama (2006) proposed. The latter in (404) is DUMU.MEŠ-*ŠU* '(his$_i$) sons', which we are syntactically placing in some [Spec,*μ*P] position.

(406) A compositional sketch of (404):



The same compositional mechanics extends to other *wh*+μ constructions in non-subject positions, like (405).

The morpho-semantic generalisation on unrestricted universal terms comprising a *wh* and a μ component extends across the Anatolian branch. In Palaic, we also find *kui*+⸗a_{μ^0}.[9]

Equally distributive and universal are the unrestricted universal expressions *cách* (cá́ċ) 'every, each' in OIr., also comprising of an inflected *wh*-component *cá* and the conjunctive (super)particle *-ch* (ċ), corresponding to our μ category. The distributive universal semantics of *cách* is additionally reinforced by a datum equating *all* and *each*:[10]

(407)	á	huili	duini	.i.	a	ca-**ch**	duini
	voc	all	man	i.e.	voc	wh-μ=every	man

'O, all men i.e. O, every man' (Wb. 10c20)

CLADISTICS The syntactic aspects of the inherited J^0-level particles and their particular sequencing, combined with the semantic aspects of the unrestrictiveness of universal distributive terms in OIr. and Hit. suggest a particular affinity between these languages, or branches.

Ringe et al.'s (2002) phylogenetic-cladistic work on IE grouping provides independent evidence for a diachronic picture of (P)IE, which allows for the Celto-Anatolian similarities. While their work focuses solely on lexical / phonological evidence, it has bearing on syntactic taxonomy. Figure 5.1 shows a semantically relevant phylogenetic cladistics of the character 'one' in IE from Ringe et al. (2002: 75, fig. 2). The numerical values, which represent Ringe et al.'s (2002) cladistic state values, have been ignored in the rendition of their cladistics.

As Dillon (1947: 24) notes, "[i]t [. . .] appears that Hittite and Irish, east and west, have preserved, in the use of verbal particles, or connectives, in the infixation of pronouns, and in the expression of the relative, an ancient common system. Here, too, it seems probable that the peripheral languages have been conservative and that they may reveal what was once the normal Indo-European structure. Without questioning Pedersen's assumption of a post-Indo-European unity, including Hittite, Tocharian, Phrygian, Italic and Celtic, we must combine with it the notion of peripheral

9 An exhaustive list of occurrences can be found in Kloekhorst (2008: 488–491) and Puhvel (1997: 218–231).

10 An exhaustive list of occurrences is given in O'Mahony and Hennessy (1865: 115).

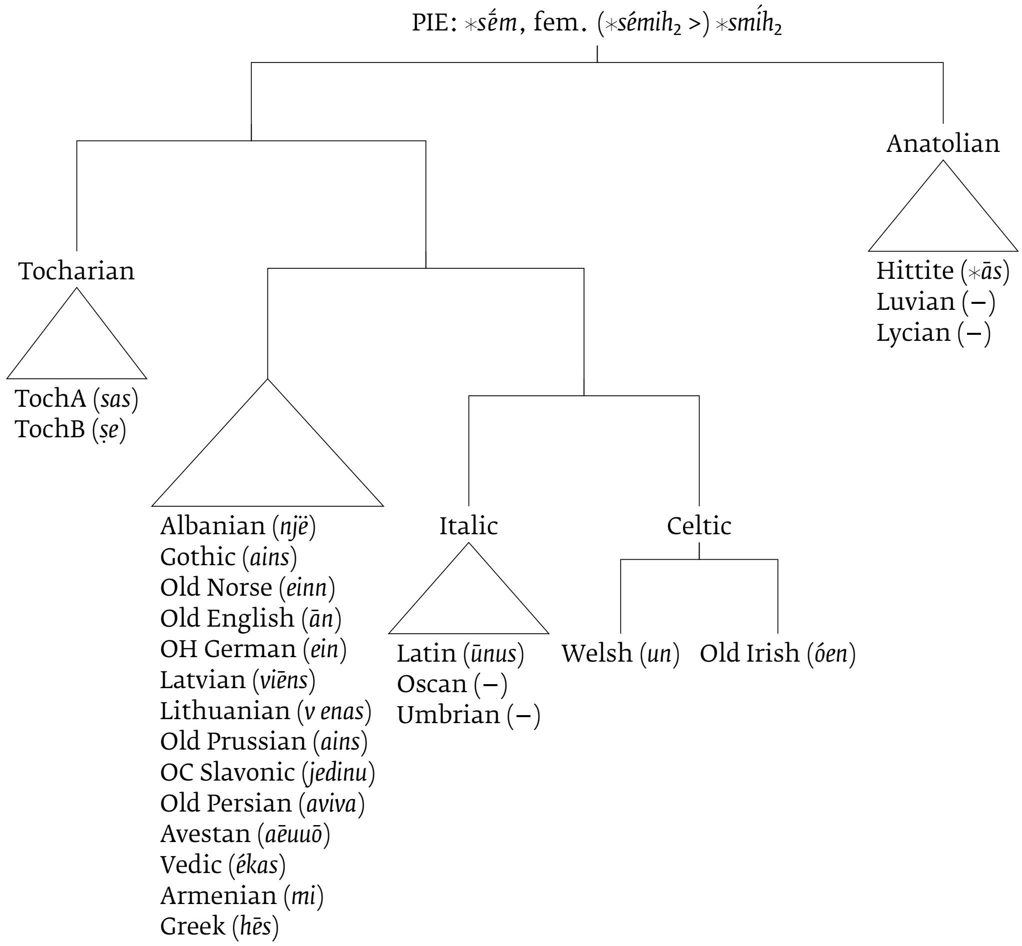


FIGURE 5.1.: *A simplified phylogenetic cladistics of the character 'one' in IE (Ringe et al., 2002)*

survival which the results of linguistic geography have established. Then the special correspondences between Hittite and Irish, on the one hand, and Italo-Celtic and Indo-Iranian, on the other, find their explanation."

The cladistic tree in Fig. 5.1 gives independent room for thought on peripherality and conservativity of IE that Dillon (1947) alludes to. Ringe et al.'s (2002) cladistics suggests that OIr. was not only geographically but also diachronically peripheral. If we are on the right track insofar as Ringe et al.'s (2002) grouping goes, two problems remain.

The first concern the Italo-Celtic super-group in Fig. 5.1. It is expected that, say, Latin, among the Italic group, would show the semantic property of unrestricted universals if our diachronic hypothesis is viable. Latin in fact shows clear signs of possessing unrestricted universals, as Bortolussi (2013) reports. Recall the relevant data, which we repeat:

(408) a. Sic singillatim nostrum unus quis-**que** mouetur
so individually we one wh-μ moved
'So each of us is individually moved' (Lucil. *sat.* 563)

b. Morbus est habitus cuius-**que** corporis contra naturam
sickness is reside wh-μ body contrary nature
'The sickness is the situation of any/every/each body contrary to nature' (Gell. 4,2,3)

c. 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)

The second problem is the cladistic position of Tocharian. To maintain a hypothesis of the inherited property of unrestricted universals, we would expect, *ceteris paribus*, Tocharian to show semantic similarities with Anatolian and Celtic—and indeed Latin, in light of (408). Tocharian, also, possessed a productive universal-forming particle *ra*. We repeat the relevant datum:

(409) taiknesa **ket ra** kartses paspārtau poyśi [i]nāṣle
thus who μ good turned Buddha honored
'in this way the Buddha [is] to be honored [who has] worked for the good of **everyone**' (TB, 30b8)

So far in this chapter, we have shown that not only Hittite and Old Irish but also Gothic, Latin and Tocharian represent a homogenous group within the IE family insofar as the syntax and semantics of particles is concerned. By alluding to the cladistic model, we have found independent cladistic support for the view that the grouping may be diachronically archaic. Turning back to our initial logic of hypotheses in (398), we now take a step further (back) and consider what gave rise to the semantic system that operated in languages like Hit. and OIr. To understand this, we would need access to linguistic sources diachronically preceding the Celtic and Anatolian groups. Since there is no such evidence, we adopt a comparative stance and look at the diachronic mechanisms of the same type, i.e. the development of unrestricted universal terms elsewhere. The only other language which synchronically operates a particle-quantificational system and for which there are older linguistic attestations is Japanese.

In the following section, we therefore depart from IE in order to look at the diachrony of *μ* and κ particles in Japonic, starting with Old Japanese.

5.3 Diachronic typology: the Japanese superparticle system

Modern Japanese has a very harmonic semantic system of quantificational/logical expression, as we have shown in (1) and (2). We repeat the core patterns in (410) and (411).

(410) 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*
'**any**/**every** student'

(411) 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'

The construction of universal, or indeed polar, terms follow the standard pattern of combining a *wh*-word and the particle *mo* (*μ*) and extend to other types of *wh*-terms. Just as in the previous section, we continue to focus on the *μ*-series. Compositionally, the semantic role of the *μ* particle gives rise to a universal reading roughly along the following lines as we have explored in the previous chapter: in the structure $[_{\mu P}\ \mu^0\ wh\ ]$, *μ* obligatorily activates the alternatives ($\mathfrak{A}$) of its complement, i.e., the *wh*-abstract with an existential presupposition, and asserts that all alternatives be true, via a silent meet ($\sqcap$) operation, following Szabolcsi (2014c), which is also analogous to quantificational closure in the system of Kratzer and Shimoyama (2002). The generalised lexical entry for μ we have been proposing is the following:

(412) $[\![\mu]\!](\phi) = \prod\{\phi\}^{\mathfrak{A}}$

What remains unexplored, however, is the historical dimension of this compositional behaviour in light of the absence of the modern pattern in the earliest stage of the language, which has to the best of knowledge remained unexplored formally.

The neat and linear morpho-semantic behaviour of the two series of superparticles μ and κ in (410) and (411) resulted though language change. The original functions of the two particles was not as serial as it is in Modern Japanese.

5.3.1 Old Japanese

This section is devoted to history of Japanese μ (*mo*) and κ (*ka*) superparticles. The role of diachronic Japanese in this chapter is to gain comparative-diachronic insight into the nature of change of superparticles. We have established a 'quantificational split' in the beginning of this chapter, whereby a subset of IE languages shows universal quantificational semantics of [*wh*+μ] expressions, whereas the rest of the IE group shows polarity sensitivity of the same expression. We had no way of answering which came first. By seeing and understanding what happened in Japonic, we may have independent motivation to reinvestigate the questions we have been asking in the first section of this chapter. A working assumption, however, is that superparticles undergo common changes, regardless of linguistic genetics.

In this section, we will first review the particle system of OJ and then focus on three construction types: one featuring the *ka*-particle, another featuring the *mo*-particle, and the third featuring both *ka* and *mo* particles, with an aim of accounting for the simultaneous realisation of the two superparticle classes. Note, however, that the 'super' attribute was rather absent in OJ since the two kinds of particles, κ and μ, did not feature in cross-categorially and semantically harmonious ways.

We will first look into the semantics of the *mo* (*μ*) particle, showing that it was an inherently scalar operator. We will then move on to look into the *ka* (*κ*) particle, showing that the interrogative/disjunctive signature property, visible in modern Japanese, was absent—instead, *ka* was a focus marker, which will lend itself to a diachronic syntactic/semantic analysis of how the interrogativity developed in the language. In the last paragraph, we will remark on the syntactic positions of the two particles so as to account for the third type of particle construction, namely the co-occurrence of *mo-ka*.

Before we engage with any particle in detail, let us make a brief and general remark on the taxonomy of particles in Japanese. Particles are traditionally divided into six types, excluding inflectional endings (Frellesvig, 2010: 125):

(413) a. case particles—*kaku-joshi* (格助詞)
b. topic and focus particles—*kakari-joshi* (係助詞)
c. restrictive particles—*fuku-joshi* (副助詞)
d. conjunctional particles—*setsuzoku-joshi* (接続助詞)
e. final particles—*shū-joshi* (終助詞)
f. interjectional particles—*kantō-joshi* (間投助詞)

Our quest for the diachronic origins of the *μ* (*mo*) and *κ* (*ka*) superparticles will revolve mostly around the 'topic and focus' (413c) and final (413e) classes of particles, although we will make reference to conjunctional and restrictive particles as we proceed to propose a syntax/semantics for the two superparticles.

SCALAR *MO* We look into two types of *μ*-hosts: *wh*-terms and propositions with degree probabilities. Let us turn to the first of these. Compare first the facts from modern Japanese in (410c), repeated below as (414)

(414) 誰 も
dare **mo**
who *μ*
'**every**one'

In the earliest OJ corpus (*Man'yōshū* MYS, 8th c.), the [*wh*+*μ*] quantificational expressions were confined to inherently scalar (*σ*) complements, i.e. either numeral nominals or inherently scalar *wh*-terms (e.g. how-many/when), as Whitman (2010) first noticed. The combination of a numeral ($n \in \mathbb{N}$) and μ, $[_{\mu P}\ n\ \mu^0]$, yielded '*even n*'.

We now consider the scalar *wh*-hosts. The only two kinds of *wh*-terms which can serve as μ-hosts we find in OJ are temporal- and quantity-*wh*-terms, as we shall see, that is, those *wh*-abstracts with only a σ-domain of alternatives, as shown in Tab. 5.2, where the *Man'yoshu* (Frellesvig et al., 2014) corpus has been used. The scale of alternatives, activated by μ, are truncated in the fashion of Chierchia (2013b: 159), since the relevant scale is $\langle$*all, much, ..., few*$\rangle$. One of the ideas central to the proposal is that the original μ^0 associated with scalar hosts, i.e. those elements endowed with [$i\sigma$] feature, and that activated scalar alternatives were originally existential. In Early Middle Japanese (EMJ), we witness the rise of polarity-sensitivity, which we show below.

	# 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 5.2.: *Distribution of ±scalar μ-hosts in OJ*

(415) 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)

(416) 相見而者 [幾 日 毛] 不経乎
apimi-te-pa [**iku** ka **mo** pe-nu-wo
meet-CONJ-TOP [**how many** day μ] pass-NEG-CONJ
'Though **few** days have passed since we met, ...' (MYS 4.751, ll. 1–2)

Let's start with the first example in (415), where we focus on the μ-containing constituent to see its contribution to overall meaning of the proposition. We assume, syntactically, that [*ywo-no ikuda mo*$_\mu$] is a μP. Following Scontras (2013: 548), we take cardinal numerals to be restrictive modifiers in that they compose with predicates and restrict their denotation to those elements with the appropriate cardinality as indicated in (417a).[11] Conversely, the appropriate *wh*-term, corresponding to a cardinal numeral, should be a type-equivalent variant with an open cardinality slot (n), as per (417b).

(417) a. $[\![\text{one}]\!]_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle} = \lambda P\lambda x[P(x) \wedge |x| = 1]$

b. $[\![\text{how many}]\!]_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle} = \lambda P\lambda x\lambda n[P(x) \wedge |x| = n]$

The LF of a *wh*-abstract like *how many*, then, is inherently scalar insofar as the extension in the answerhood of, say, question containing such a *wh*-term (Q: 'how many x ϕ?) is a discretely infinite domain of natural numbers, $n \in \mathbb{N}$, from which an answer takes its value (A_1: 'three'). Hence, the only kind of alternatives such a *wh*-term has is scalar, which leads us to stipulate, in Chierchia's (2013b) system of grammaticised implicatures we have been assuming, that there is a single available possibility for the feature specification of *how many*, in English, or *ikuda*, in OJ for that matter, namely $[\pm\sigma]$. An answer to a *how many/much* question can also be proportional (A_2: 'most/many/...'), which we take to be getting its values from a cardinal relationship among subsets of $\mathbb{N}$, i.e. $\mathfrak{D}_{\langle\mathbb{N}\times\mathbb{N}\rangle}$.

Let us then assume two, ontologically interdependent, subkinds of scalar sets, also known as Horn Scales, where the scalar strength (informative prominence) is arranged by height, where higher$\propto$stronger.

(418) Scales for 'how many' with (a) discrete and (b) proportional granularity:

a. $\begin{bmatrix} \infty \\ \vdots \\ 3 \\ 2 \\ 1 \end{bmatrix}$ b. $\begin{bmatrix} \text{all} \\ \text{most} \\ \text{much/many} \\ \text{few} \\ \text{some} \end{bmatrix}$

11 For further discussion, see Scontras (2013), Link (1987), Verkyul (1993), Carpenter (1995), Landman (2003), *inter alia*.

In (415), the *wh*-complex *ywono ikuda* 'nights-how-many' has the denotation paraphrasable as '*n*(-many) nights', which serves as a host to μ. We maintain an anti-exhaustive semantics for μ, whereby the compositional presence of μ^0 activates the alternatives of its (*wh*-)host. Technically, this is implemented Agree-wise, resulting in positive specification $[+\sigma]$ of the scalar feature on the *wh*-term *ikuda*. Furthermore, μ asserts that all the alternatives be true. As per the Horn Scale in (418b), the strongest scalar alternative member *all* obtains. The strongest scalar alternative thus entails all the weaker members since 'Mary saw John on *all* nights' entails that 'Mary saw John on *some* nights', or using actual numbers, if 'Mary saw John on *three* occasions', then it is logically true that 'Mary saw John on *two* occasions'. Therefore the entire μP *ywodo ikuda mo* is predicted to mean something along the lines '$\forall n$-many-nights ϕ', where ϕ is a shorthand notation for the rest of the sentence; or in more natural terms, 'for all, or very many, counts (or amounts) of nights (i.e. all nights), ϕ'. The presence of negation, seen as the sentence-final existential inflection *(ara)-neba* [(阿羅) 袮婆][12] obtains a SI via negation of the strongest scalar alternative member. This delivers a denotation 'not for all counts of nights ϕ', which infers 'for some counts of nights ϕ', naturally translating into 'few (counts of) nights', being on a par with 'not (very) many nights'. Such SI also obtains in English, where (419b-i) and (419b-ii) go hand in hand.

(419) a. Mary saw John on **many** occasions.
b. i. Mary did **not** see John on **all/many** occasions.
ii. Mary saw John on **some/few** occasions.

This brings us to another matter: we have assumed that the role μ is twofold: to activate the alternatives of its host and asserts that they all be true. For (415) and (416), we have assumed that in absence of negation, the μP would be universal ('for all night'). If we were on the right track, then the negation of a universal term would yield an existential term as a SI:

(420) $\neg\forall \vdash \exists$

In (415) and (416), however, the resulting quantificational interpretation is not 'some' but 'few', which obtains under negation of 'many':

(421) $\neg$many $\vdash$ few

12 We are ignoring the conditional semantic import of the negative-conditional inflection *neba* (袮婆) and limit our analysis to the negative component alone.

Now assume all scales are binary and assume there are two kinds of Horn Scales:

(422) a. $\Xi_1^{\sigma} = \langle \text{all}, \text{some} \rangle$
b. $\Xi_2^{\sigma} = \langle \text{many}, \text{few} \rangle$

Now we also recognise a scale, where the existential term is the strongest and its scalar alternative is the anti-existential term (∅).

(423) $\Xi_3^{\sigma} = \langle \text{some}, \text{no(ne)} \rangle$

The strongest member of the scale is contextually determined and as long as the binarity condition on Ξ^{σ}s is upheld, the resulting SI is predictable straightforwardly. We integrate the three Horn Scales ($\Xi_{1,2,3}^{\sigma}$) below (*pace* Matsumoto 1995):

(424) $$\underbrace{\langle \text{all}, \overbrace{\text{many}, \text{few}}^{\Xi_2^{\sigma}}, \overbrace{\text{some}, \text{no}}^{\Xi_3^{\sigma}} \rangle}_{\text{total } \Xi^{\sigma} \text{ scale}}$$

This notion of variability in size (truncatability) of the scale is analogous to a solution of Abrusán (2014: 127), who adopts scalar truncation to derive the correct interpretation for degree interrogatives. In Abrusán (2014), a truncated scale is taken to be a "scale from which an initial segment of the lexically determined scale [...] has been removed." She follows and minimally revises the proposal by Rett (2007), who proposes an operator EVAL, whose meaning is essentially a function from sets of degrees to sets of degrees. Once applied to a degree d, EVAL returns D', where $D' \subset d$ and which consists of all and only those members of d, which are higher than a certain contextually determined degree. As Abrusán (2014) notes, the EVAL operator is essentially a *truncation* operator. Abrusán (2014) upgrades the proposal by assuming that the truncation operator, essentially Rett's (2007) EVAL at its core, is presuppositional. This truncation operator, $\mathfrak{T}(\lambda d[\phi(d)])$, which we adopt from Abrusán (2014), is defined so that the resulting denotation after applying $\mathfrak{T}$ to a degree, which is below the threshold s, is undefined, making $\mathfrak{T}$ a *partialisation* of ϕ, which is not a propositional formula in Abrusán's (2014) terms. $\mathfrak{T}$ therefore turns a function that is defined for a given scale into a function that is defined only for a proper subpart of the same scale (the segment above s), and is otherwise identical. (Abrusán, 2014: 127) In formal terms, we define $\mathfrak{T}$ below as a two-place operator that combines with a scale (Ξ^{σ}) supplied by the proposition (ϕ) and a scalar threshold (s), which demarcates the truncation.

(425) $\mathfrak{T}$(runcation) operator (Abrusán, 2014: 128, ex. 83):
$[\![\mathfrak{T}]\!] = \lambda P_{\langle d,\langle e,t\rangle\rangle}\lambda x_{\langle d\rangle} : x > s\Big[\lambda y_{\langle e\rangle}\big[P(x)(y)\big]\Big]$

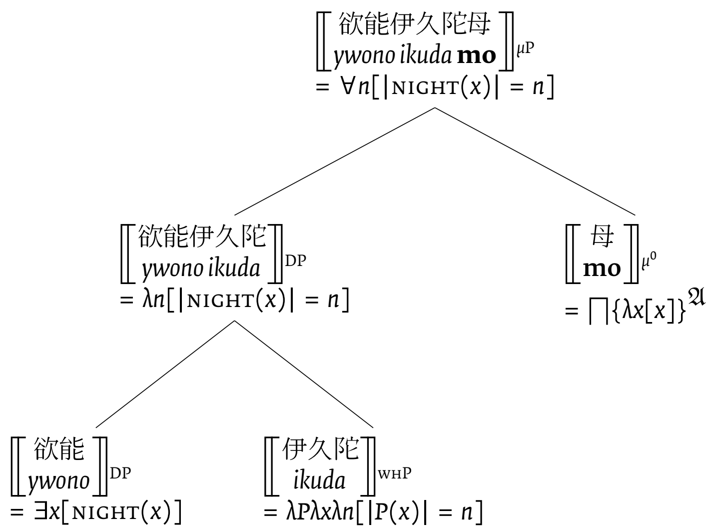
The purpose of having $\mathfrak{T}$ is to get us from a total Horn Scale (424) to its subsets Ξ^{σ}_{1} (422a), Ξ^{σ}_{2} (422b) and Ξ^{σ}_{3} (423).

The scalar semantic form of a *wh*-abstract like *how many* provides a scale of *n*-many nights, i.e. scalar variables provided by the denotation of the complement. If we maintain our semantics for μ, we assume that the compositional presence of μ activates and asserts the truth of all scalar alternatives to '*n*-many-nights'.

In (427), we give a partial composition of (415), repeated below as (426).

(426) 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)

(427) The composition of non-negative μP in (426):



The presence of negation negates the universal-scalar term with the denotation 'for all *n*, *n*-many nights ϕ' (where ϕ denotes the rest of the sentence so as to allow for proposition-level alternatives), yielding a denotation 'not for all n, n-many nights ϕ', which carries a scalar implicature and delivers the correct interpretation 'few nights', i.e. not very many. The same inferential process applies to (416).

Scalar [wh+μ] constructions are analysed as universals since they give rise to a scalar implicature under negation (in (416), 'not all nights' $\rightsquigarrow$ 'few days', delivering as the denotation the weakest member of the scale ⟨*all, many,* **few**⟩.

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

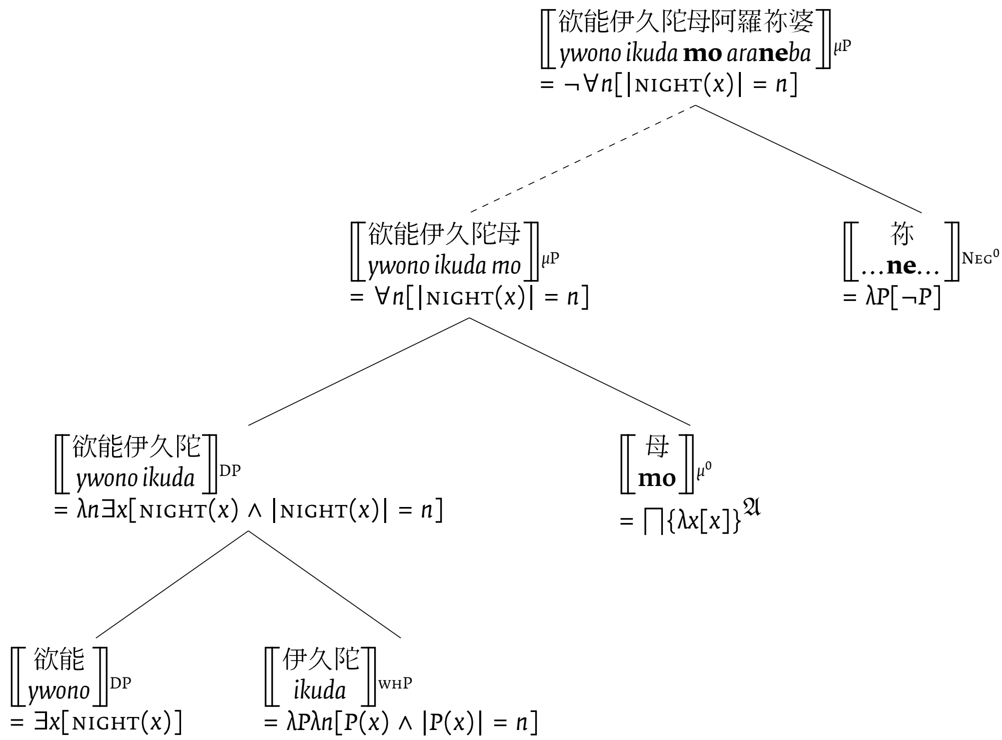
In (430), we give the full composition of (426). We assume that the noun *ywono* 'nights' simply denotes a predicate, which is the argument of the cardinal *wh*-word *ikuda* 'how many', itself assumed to be a function from (sets of) properties to cardinalities (of those sets). The resulting phrase, containing *ywono ikuda* 'how many nights', is assumed to deliver a property- or set-denoting λ-abstract (Groenendijk and Stokhof, 1983) over the cardinality of set, whose extension is a scalar domain of natural numbers or quantity expressions, i.e. $[\![\textit{ywono ikuda} \text{ 'how many nights'}]\!]^{\sigma\mathfrak{A}} = \mathbb{N}$. The *wh*-phrase now combines with the μ particle, whose semantic role it is to activate scalar alternatives and induce exhaustification. The resulting set, *ywono ikuda mo* 'how many nights μ' denotes an entire set of scalar alternatives (429a). Given the universal force behind OJ *mo*, we take the alternative set to be part of the assertion (cf. Kratzer and Shimoyama 2002), which amounts to μP denoting (429b).

(429) a. $[\![\textit{ywono ikuda mo} \text{ 'how many nights } \mu\text{'}]\!]^{\sigma\mathfrak{A}} =$
$\{\exists x \in \mathfrak{D}_D[\textsc{night}(x) \wedge |\textsc{night}(x)| = n] : n \in \mathbb{N}\}$

b. $[\![\textit{ywono ikuda mo} \text{ 'how many nights } \mu\text{'}]\!]^{\sigma\mathfrak{A}} =$
$\forall n \in \mathbb{N}\ \exists x \in \mathfrak{D}_D[\textsc{night}(x) \wedge |\textsc{night}(x)| = n]$

The remaining part of the sentence in (426) which is relevant for our computation is the negative (verbal) morpheme *ne*. The contribution of negation is assumed to negate the denotation of the μP, i.e., the universal expression, paraphrasable as 'for all n, n-many nights'. The resulting denotation carries a scalar implicature, namely 'not for all n, n-many nights . . . ', which delivers the weakest member of the Horn scale, i.e., 'some nights' or 'few nights.' This procedure is given in (430).

(430) The composition and SI computation of in (426):



Note the analogy of the OJ type with English SIs as in 'not all night' ⤳ 'some nights' but, crucially, 'no nights' does not obtain. The universal quantification is additionally borne out in positive contexts (431) when, in absence of negation, a universal temporal term ('always') obtains, i.e. the strongest member of the scale ⟨*always, sometimes, rarely*⟩ with an existential scale (cf. English 'not always' ⤳̸ 'never' but ⤳ 'sometimes/rarely'). Note that the polarity system associated with [wh_{σ}+μ] expressions is absent in the earliest stage of recorded Japonic, as are other *wh*-universal terms we find in MdJ.

When not embedded under negation, the scalar μ+wh_{σ} terms are universal, as shown in (431).

(431) 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)

As John Whitman (p.c.) informs me, the repetition of phrases may bring about pluralisation or quantification, hence we must investigate the distribution of universal quantificational labour between the *μ* particle and the repetition/doubling of the *μ*P. Vovin (2005: 107) shows that reduplication is not a productive means of expressing universal quantification since not all nouns can have a reduplicated form. In fact, the list of reduplicative nouns is rather short and includes the following:[13]

(432) Reduplicative nouns in OJ (Vovin, 2005: 107):

a. *ka-*N*ka* ‘(**all**) day**s**’ (<*ka* ‘day’) [KK 26]

b. *pito-*N*pito* ‘(**all**) people’ (<*pito* ‘person’) [KK 26]

c. *koto-*N*koto* ‘(**all**) thing**s** / **all** things’ (<*koto* ‘thing’) [MYS 5.797]

d. *kuni-*N*kuni* ‘(**all**) province**s**’ (<*kuni* ‘province’) [SM 1]

e. *ipye-ipye* ‘(**all**) house**s**’ (<*ipye* ‘house’) [SM 16]

f. *ka*N*two-ka*N*two* ‘(**all**) gate**s**’ (<*ka*N*two* ‘gate’) [SM 16]

Below in Tab. 5.3 we list the number of *wh-μ* occurences with respect to whether *μ*P double or not.

	+doubled	−doubled	Σ
itu (...) mo ‘when *μ*’	5	7	12
iku (...) mo ‘how much/many *μ*’	0	11	11
Σ	5	18	23

TABLE 5.3.: *Distribution of ±doubled scalar μPs in OJ (MYS)*

As shown in (433), the universal reading of *itu-mo* ‘when-*μ*’ obtains without reduplication, which confirms our analysis.

(433)
河		上	乃	伊	都	藻	之花	乃	何	時	々
kapa	<u>no</u>	pe	no	**itu**	**mo**$_2$	no	pana	no	**itu**	**mo**$_1$	**itu**
river	GEN	above	GEN	**when**	*μ*	COP	flower	COP	**when**	*μ*	**when**

々
mo$_1$
μ

13 I list references to examples in [brackets] in (432) so as to avoid empirical overload on the reader.

'Come to me **always**$_1$, like the flower of the **always**$_2$-plant'
(MYS 4.491; transl. by Cranston 1993: 181)

The selection of *μ*-hosts is, as we have seen, restricted to those elements carrying [*iσ*] features. Beyond the *wh-σ* expressions, *mo* in OJ combines with numerals, as Whitman (2010) first observed, and other temporal expressions like *ima* (伊莽) 'now', which we assume has an inherent *σ*-feautre, being a temporal term, which in combination with *mo* obtain an anti-exhaustive *even*-reading as (434) shows.

(434)

伊莽	波	予	\\...	伊莽	褰而	毛
ima	pa	yo		ima	dani	**mo**
now	TOP	INTRJ		now	RESTR	*μ*

'Ho! Now is the time! ... **Even** now!
(NKS 10, ll. 1&4; transl. by Aston 1972)

The same combination of a temporal-scalar host and *mo* is found in MYS:

(435)

吾	背子	奥裳	何如	荒海藻
wa-ga	sekwo	oku-**mo**	ika-ni	*ara-me*
I-GEN	husband.NOM	future-*μ*	how-DAT	become-SUPP

'What will become of my husband [even/FOC] in the future?'
(MYS 4.659, ll. 4–5; Aldridge 2009: 555)

(436)

之麻思久	母	比等利安	里宇流	毛能	爾
simasi-ku	**mo**	pito-ri	ar-i-uru	mono	n-i
be for a while-INF	*μ*	one-CL	exist-INF-get.ATTR	person	DV-INF

安礼	也
are	ya
exist-EVID	Q.PRT

Am [I a] person who could be alone **even** for a little while?'
(MYS 15.3601; transl. by Vovin 2009: 58)

(437)

我	衣手乃	干時		毛	名寸
wa-ga	koromode-no	puru	**toki**	**mo**	naki
I-GEN	sleeve-GEN	dry.ADN	time	*μ*	not exist.ADN

'my sleeves never dry!' (MYS 10.1994, ll. 4–5; from Wrona 2007: 6)

We also find at least two examples in the MYS, where the scalar *even*-type additive *μ* combines with non-scalar nominal arguments to yield, as Vovin (2011) and Whitman (2010: 154) assume, a conjunction structure, as shown in (438) and (439). We are therefore led to assume that the *μ* marker in these two cases obviates its restriction to scalar complements and yields the conjunctive inference via additive (anti-exhaustive) inference.

(438) 父 母 毛 \\ 表 者 奈佐我利
titi papa **mo** upe pa *na*-sagari
father mother *μ* above TOP PROH-go down
'Father and mother, do not leave [me]!'
(MYS 5.904, ll. 21-22; trans. by Vovin 2011)

(439) 波波 母 都未良 母 安佐都由爾 毛能
papa **mo** tuma-ra **mo** asa-tuyu-ni mo-no
mother *μ* spouse-PL *μ* morning-dew-LOC skirt-GEN
須蘇 比都知
suswo pid-ut-i
hem drench.INF-hit-INF
'**both** [my] mother **and** wives drenched hems of [their] skirts in morning dew' (MYS 15.3691; Vovin 2005: 94)

The loss of scalarity in additives is, as we will see in the next section, a signature of Classical Japanese (CJ, 10th c.), where the 'progressive' construction of the kind in (438) takes off and conjunction is born in the language.

***KAKARI MUSUBI* AND FOCUS/QUESTION** We now turn to the κ meanings. The most exotic and interesting gramamtical structures in OJ is the *kakari-musubi* ('hanging-tying') which, as Frellesvig (2010: 247) describes it, is a Japanese grammatical term for a specific focus construction, in which some constituent is marked by one of the '*kakari* particles' and the core predicate it relates to is in a specific form, rather than in the conclusive form generally used to conclude sentences. Given below is a simple, yet representative, example of KM, taken from Watanabe (2002: 181), where we underline the two crucial components: the occurrence of the *ka* (κ) particle and the adnominal inflection on the verb.[14]

14 We limit our analysis to *ka*-type *kakari-musubi* only. For empirical descriptions of the phenomenon and recent syntactic analyses, see Whitman (1997); Serafim and Shinzato (2000); Wrona (2007), and the work cited therein.

(440) 敵見有 虎 可 吼登
atami-taru twora **ka** poyuru
irritated.STAT tiger <u>κ</u> roar.<u>ADN</u>
'Is it [an irritated tiger]^{F} that is roaring?' (MYS 2.199)

Frellesvig (2010: 249) elegantly equates *kakari-musubi* and the *theme-rheme* construction, which we show in Tab. 5.4, where topic and focus are seen as forming subtypes of *kakari-musubi* (*theme-rheme*).

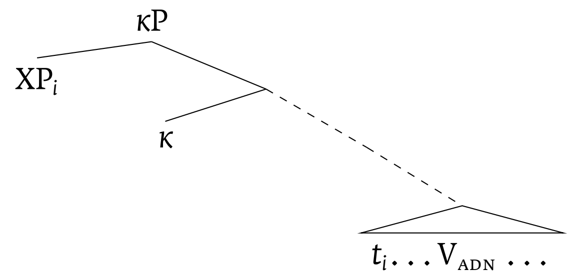
Kakari (*theme*)	**Musubi** (*rheme*)
	
FOCUS	PRESUPPOSITION
↳ particle: *ka*	↳ form: adnominal

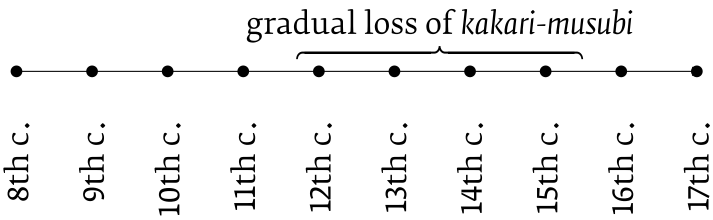
TABLE 5.4.: *Kakari-musubi as a theme-rheme super-construction*

While prevalent in both OJ and CJ, the *kakari-musubi* construction disappears from the language by the Edo period, i.e. by the beginning of the 17th century (Serafim and Shinzato 2000: 82; Okimori 1989: 95–98).

CJ prose, as Vovin (2003: 431) observes, boasted two interrogative particles: *ya* and (what will interest us) *ka*. Ikeda (1975) notes that the *ka* particle expresses a question aimed at the speaker himself, while the particle *ya* expresses a question directed at the addressee. Vovin (2003) shows that recent investigations of CJ grammar invalidate the rigidity of Ikeda's (1975) claim. While *ka* may express self-addressing, in fact, rhetorical, questions, it also expresses questions aimed at the addressee. Same goes for *ya*. On a more morphosyntactic level, *ya* occurs exclusively in polar questions, while *ka* tends to be used (not exclusively, however) in *wh*-interrogatives, so that it linearly follows the *wh*-term.[15]

15 This usage of *ka* in combination with *wh*-phrases, has been observed by Tokieda (1954) and has subsequently received further formal diachronic treatments by Watanabe (2002) and, especially, Aldridge (2009).

(441) Traditional view on the time course of the change (Watanabe, 2002: 182):



The particle *ka*, all up until the 17th century, is an exclusive feature of the *kakari musubi* construction, which has an inherently focal semantics. We plot in (441) the time of loss of the *kakari musubi* construction, borrowed from Watanabe's (2002) work. The synchronic affinity between focus and interrogativity has been recognised since, at least, Erteschik-Shir (1986), who argued for the idea that the *wh*-phrase in a *wh*-question functions as the focus of the question. This idea, in light of *kakari musubi*, lends itself to a diachronic analysis of Old and Classical Japanese *ka*, which underwent a change from being a focus operator, combining with *wh*-terms, to a question operator. In formal terms:

(442) OJ/CJ: *ka* [*i*FOC] ≫ Post-CJ/MdJ: *ka* [*i*Q]

A possibly simple way of showing that OJ *ka* was not originally a question particle is listing an example of an OJ question without *ka*:

(443) 伊麻 波伊可爾 世母
ima-fa **ikani** se-mo
now-TOP how do-SUPP.ADN
'What should we do now?'
(MYS 14.3418, l. 5; from Aldridge 2009: 550)

The focus particle *ka*, Watanabe (2002: 183) notes, had no restriction to host *wh*-terms in the OJ period (8th c.) since *ka* can host a non-*wh*-phrase. It was Nomura (1993b,a) who first examined the ordering restriction on the placement of *ka* within a clause in OJ (MYS), showing some clear results on the fixed position of *ka*, relative to other grammatical markers for topichood and subjecthood. The core conclusion being that *ka* and its host are restricted to a position following the topic marker *fa* but preceding the subject. We list in Tab. 5.5 Nomura's results as refined by Wrona (2007:

3), who shows several problems with the statistical analysis that Nomura (1993b,a) made and Watanabe (2002) adopted.

				N
GENITIVE SUBJECT	XP-**ka**	⟩	SUBJ-**no/ga**	15
	SUBJ-**no/ga**	⟩	XP-**ka**	1
TOPICALISED SUBJECT	XP-**ka**	⟩	SUBJ-**fa**	1
	SUBJ-**fa**	⟩	XP-**ka**	18

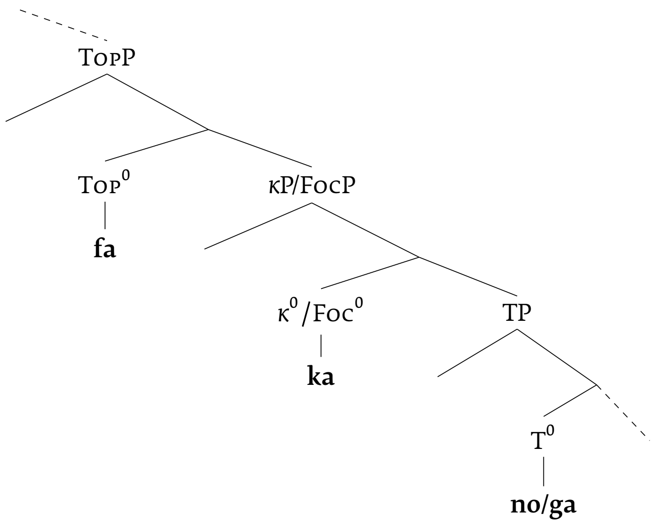
TABLE 5.5.: *The relative order of ka-phrases in MYS ($p < 0.005$) as per Nomura (1993b,a) and Wrona (2007)*

The data in Tab. 5.5, stemming from Nomura (1993b,a), motivate a generalisation according to which *ka*-marked constituents generally follow *fa*-marked topics and precede genitive subjects.

(444) NOMURA'S GENERALISATION (Aldridge, 2009: 557):
$XP_{fa} \ldots YP_{ka} \ldots DP_{\text{GEN}} \ldots V_{\text{ADN}}$

Watanabe (2002) thus proposed, and reiterated in Watanabe (2005), an analysis of high *wh*-movement to [Spec, FocP], where Foc^0 may well stand for our κ head, where he located the κ head in the left-peripheral position of the clause. Given the evidence in Tab. 5.5, the partial syntax of OJ CP is the one in (451). In line with Whitman (2001), and indeed Kayne (1994: 143, fn. 3), we take the OJ genitive *no/ga* markers to be exponents of T^0 and the topic marker *fa* to be the realisation of Top^0.

(445) Clausal left periphery in OJ:



Aldridge (2009) proposes, instead, to treat the *wh*-movement as targeting a low focus position (446b), instead of a high focus position above TP (446a), which originally Watanabe (2002) proposed. The Foc head in (446a) and (446b) corresponds to our κ^0.

(446) a. HIGH FOCUS MOVEMENT
[$_{\text{TopP}}$ XP Top^0 [$_{\text{FocP}}$ YP$_{wh}$ Foc^0 [$_{\text{TP}}$ DP$_{\text{GEN}}$ ...]]]

b. LOW FOCUS MOVEMENT
[$_{\text{TopP}}$ XP Top^0 [$_{\text{TP}}$ DP$_{\text{NOM}}$ [$_{\text{FocP}}$ YP$_{wh}$ Foc^0 [$_{vP}$ DP$_{\text{GEN}}$ ...]]]]

Aldridge (2009: 551) shows that genitive subjects, unlike nominative subjects residing in [Spec, TP], are rather better analysed as residing in their base-generated position in [Spec, *v*P], which additionally allows for a TP-internal landing site for *wh*-movement. Aldridge (2009: sec. 3) additionally shows that other than the topic-marked (*fa*) syntactic material may precede the *wh*-elements, which a high-movement analysis (Watanabe, 2002, 2005) does not predict and which, in fact, severley compromises the analysis according to which *wh*-movement is to a high left-peripheral position. Consider (447) taken from Aldridge (2009: 555).

(447) 保登等芸須 [都奇 多都 麻泥爾] 奈仁 加 吉奈可奴
pototogisu [tukwi tatu made-ni] **nani ka** ki-naka-nu
cuckoo.NOM [moon rise before-DAT] **why** κ come-sing-NEG
'Why does the cuckoo not come to sing [before the moon rises]?'
(MYS 17.3983, ll. 3–5; from Aldridge 2009: 555)

Even scrambled objects, assumed to target the edge of TP (McGinnis, 1999; Miyagawa, 2001, 2003, 2005) appear in a position preceding the κ-*wh*-phrase, as Aldridge further demonstrates. In (448), the *wh*-phrase is shown to follow both the scrambled object, residing in [Spec,TP], and an adverb, also located in a position higher than the high *wh*-movement analysis would predict.

(448) 都祢 斯良農 道 乃 長手 袁 久礼久礼等 伊可爾
[tune sira-nu miti no nagate] wo kurekure-to **ika**-ni
[normally know-NEG road GEN journey] ACC in dark **how**-DAT
可 由迦牟
ka yuka-mu
κ go-SUPP

'How should I proceed in the dark on a journey on a road I normally do not know?' (MYS 5.888a, ll. 1–4; from Aldridge 2009: 555)

Regarding the question that intrigues us most here, namely the synchronic and diachronic status of morphosyntactically encoded interrogativity, Aldridge (2009: 561) recognises that the κ particle had no interrogative force whatsoever, since (semantically) its function seems to have operated a focus-sensitivity role alone and (syntactically) its position, as Aldridge (2009) convincingly shows, is far lower for it to attain interrogative scope. Instead, she proposes that the mechanism of interrogative scope-taking is unselective binding for, at least, two reasons: (a) *wh*-items can appear inside islands, as Whitman (2001) first observed; and (b) *wh*-words function as indefinite variables as we have already seen in the SI construction in §5.3.1.

What we do know, however, is that κ developed its interrogative semantics and high syntactic position in the later periods, after the 14th century. Takamiya (2005) first observed the constant diachronic rise of the indirectly interrogative function of the *ka* particle as reported, which we list in Tab. 5.6 and plot in Fig. 5.2.[16]

The change is therefore twofold: syntactically, the κ particle diachronically moved to C^0-level position so as to attain sentential scope; semantically, the focus-sensitive meaning changed into interrogative meaning. Let us now take each of the two steps of change in turn.

Syntactically, the κ particle changed its position via an upward reanalysis from a TP-internal focus position, located below TP and above *v*P, as identi-

16 See also Kinuhata and Iwata. (2009) for a diachronic analysis.

	century						
	14th	15th	17th	18th	18-19th	19th	20th
# tokens	1	9	31	23	34	40	121

TABLE 5.6.: *Diachrony of questions with ka (か) in Japanese (Takamiya, 2005)*

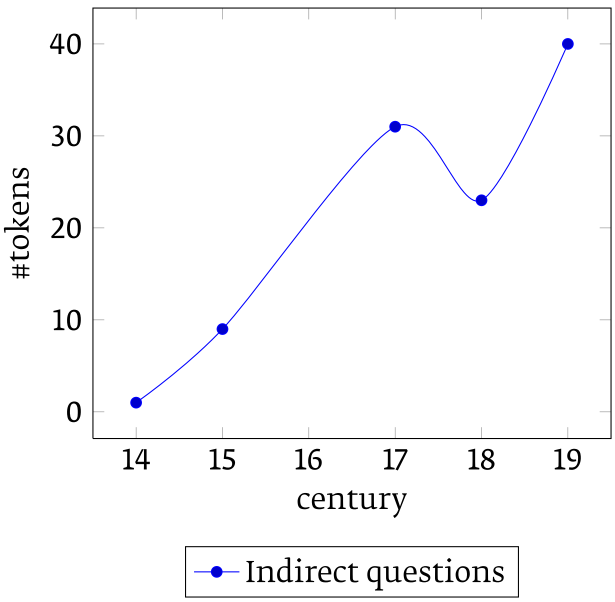


FIGURE 5.2.: *Diachrony of κ-marked questions in Japanese*

fied by Aldridge (2009), to a functional clausal position, which we identify as FORCE^0 in line with Rizzi's (1997) model.

PARTICLE COMPOSITES: *KA+MO* Also note that both *mo* (μ) and *ka* (κ) may co-occur simultaneously, which obtains a *kakari-musubi*-like construction featuring both an interrogative and a focus meaning. Since κ did not encode interrogativity, we assume this is done by a silent Q-operator. The following two examples show the co-occurrence of *mo* (μ) and *ka* (κ) particles.

(449) 何物鴨 御狩 人之 折而
Nani-wo-**ka**-**mo** mikari=no fito-no ori-te
what-ACC-κ + μ hunt-GEN person-gen pick-conj
将挿頭
kazasa-mu
wear.on.hair-MOD.ADNOM

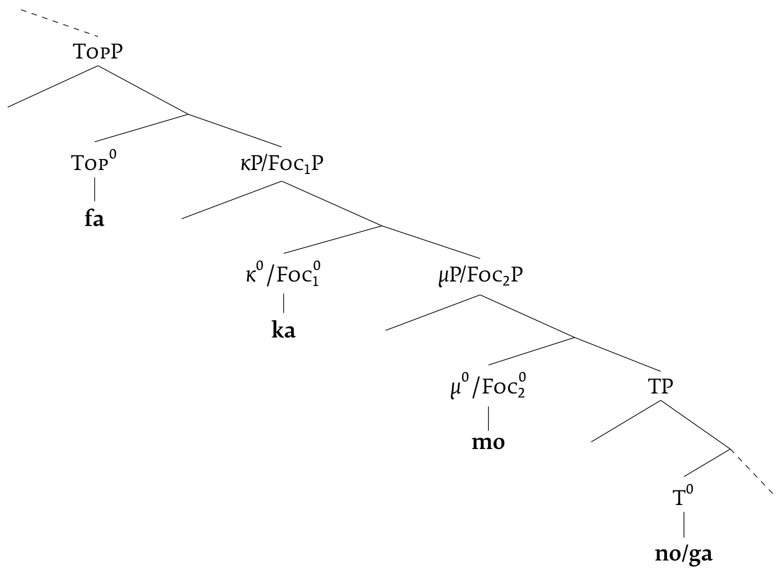
'What should the hunters pick and wear on their hair?'
(MSY 10.1974, ll. 3–5; Aldridge 2009: 550)

(450) 伊可爾 安良武 日能 等伎爾 可母 許恵 之良武
ika-ni ara-mu pi-no toki-ni **ka**-**mo** kowe sira-mu
how-DAT be.mod day-GEN time-DAT κ + μ voice know-Mod
比等能 比射乃 倍 和我 麻久良可武
pito-no piza-no pe wa-ga makuraka-mu
person.GEN knee.GEN on 1s-nom rest.head-SUPP

'On the day which will be like what will I rest my head on the knee of someone who understands me?' (MYS 5.810; Aldridge 2009: 560)

We therefore slightly rearticulate Nomura's generalisation so as to include the particle *mo* as being in a fixed position

(451) Clausal left periphery in OJ (articulated):



In Tab. 5.7, we list occurrences and types of particle composites in OJ as found in MYS. The fact that *mo* and *ka* occur in rather fixed positions is in line with our conjecture of rearticulating Nomura's generalisation as stated in (444).

PARTICLE SEQUENCE	# of tokens
ka mo ka mo	2
mo ka mo ka	0
mo ka mo	9
mo ka	60
mo ga	1
ga mo	3
ka mo	154
ga mo ga	0
ga mo ga mo	0
mo ga mo ga	0

TABLE 5.7.: *Particle composites in OJ (MYS)*

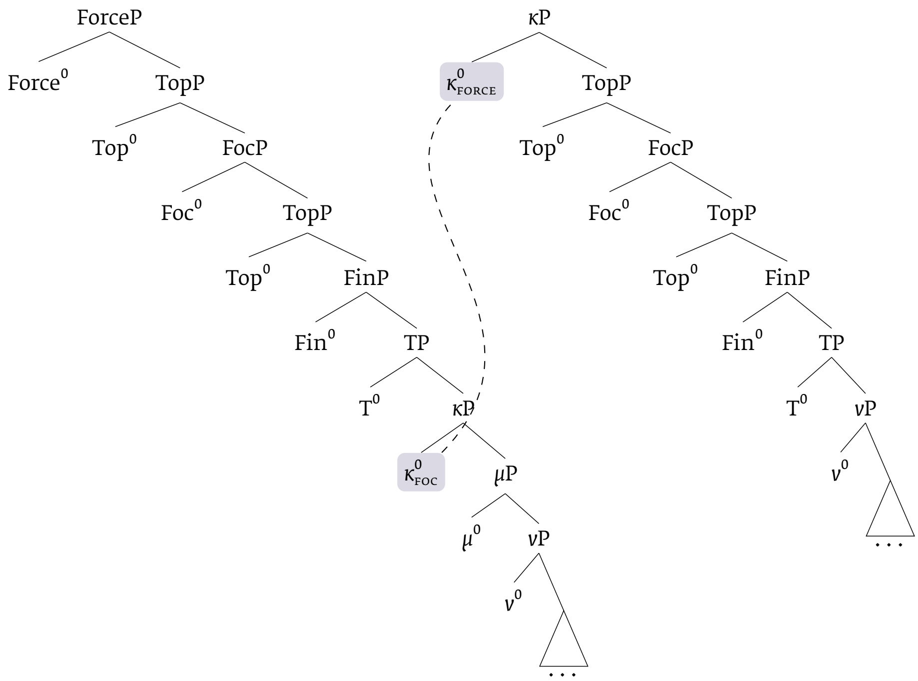
Given Aldridge's (2009) evidence of the low position of κP, we simply relocate the κP-*μ*P phrase couple to a lower position, along the lines of Aldridge's (2009) original proposal.

(452) LOW FOCUS MOVEMENT (REARTICULATED)

$$\left[_{\text{TopP}}\ \text{Top}^0\ \left[_{\text{TP}}\ \text{DP}_{\text{NOM}}\ \left[_{\text{Foc}_1\text{P}}\ \text{Foc}^0_1{=}\mathbf{ka}\ \left[_{\text{Foc}_2\text{P}}\ \text{Foc}^0_2{=}\mathbf{mo}\ \left[_{v\text{P}}\ \text{DP}_{\text{GEN}}\right]\right]\right]\right]\right]$$

In CJ, the *ka-mo* particle (composite) was lost (Frellesvig, 2010: 241), which is in line with out analysis, stated in (453), that κ underwent eventual structural reanalysis from TP- to CP-internal position.

(453) a. OJ/CJ: ≫ b. post-CJ/MdJ



Semantically, the change is from a focus-sensitive to an interrogative operator. Conceptually, both focus and interrogative share an alternative-semantic core in that they both raise alternatives. Technically, the focus hosts of OJ/CJ κ are generally DPs—predominantly, *wh*-words, as we have been exploring. The interrogative κ in the post-classical period is confined to propositional hosts. While focus-alternatives are type-ambivalent and contextually determined, i.e., different things can be focalised, polar question alternatives are type-fixed, i.e. confined to propositional types ⟨s,t⟩ and inherently binary. Thus, the alternative set of a polar question ($?p^{\pm}$) contains only two values: the proposition expressed by the question and its negative counterpart.

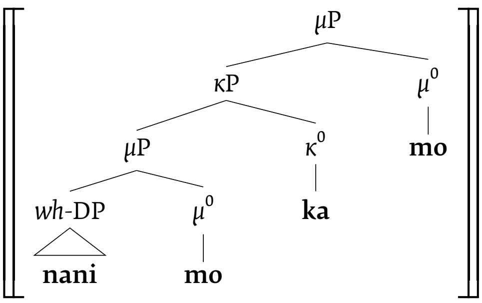
There is also an interesting residue of particle composites in Modern Japanese. In the following paragraphs, we turn to one such 'composite' construction, arguing for a coordinate reanalysis.

EXCURSUS: PARTICLE COMPOSITES IN MODERN JAPANESE The expression *nanimokamo* (何もかも), 'everything and anything', has, to the best of my knowledge, never been treated individually. In passing, Japanese linguists (Suzuki, 1996; Deguchi and Kitagawa, 2002) gloss is as a single lexical item corresponding to a universal 'everything'.

Resuming our investigation in a strongly decompositional spirit, I propose to decompose the expression as involving a *wh*-component (*nani*, 'what') and three particles: *mo*, *ka*, and *mo*:

(454) $\Big[_{\mu P} \Big[_{\kappa P} [_{\mu P} [_{whP}\ nani\ ]\ [_{\mu^0}\ \textbf{mo}\ ]]\ [_{\kappa^0}\ \textbf{ka}\ ] \Big]\ [_{\mu^0}\ \textbf{mo}\ ] \Big]$

The morphemic decomposition in (454), however, does not represent the full constituency. If it did, we would have to assume a syntax and, consequently, a compositional semantics of the kind in (455)

(455) 

$= \mu\Big(\kappa\Big(\mu([\![nani]\!])\Big)\Big)$

Even if we assume a very minimal semantic import of μ and κ particles, such as alternative activation and closure under conjunction and/or disjunction respectively, a structure like the one in (455) is nonsensical.

(456) a. $[\![nani]\!] \approx \lambda x[P(x)]$ ['**what**']

b. $\mu([\![nani]\!]) = \bigcap \{\lambda x[P(x)]\}$ ['**every**thing']

c. $\kappa([\![nani]\!]) = \bigcup \{\lambda x[P(x)]\}$ ['**some**thing']

d. $\mu\Big(\kappa\Big(\mu([\![nani]\!])\Big)\Big) = \bigcap\Big\{\bigcup\Big\{\bigcap\{\lambda x[P(x)]\}\Big\}\Big\}$
['**every**thing, which is **some**thing, which is **every**thing'?]

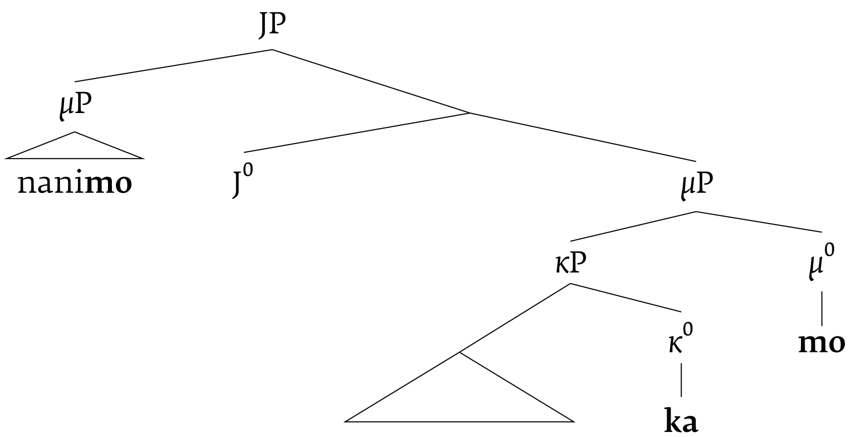
On intuitive grounds, it seems rather unreasonable for a natural language to go through such $\bigcup / \bigcap$-alternating and fractal gymnastics to express a universal quantificational or domain-widening notion like 'everything and anything'.

Instead of a direct mapping from overt markers to morphosyntactic constituency and compositional interpretation, I propose we add a silent J(unctional) component to (454). We will additionally assume argument ellipsis in one of the coordinands.

If [[*nani-mo*] *ka*] were a coordinand, the coordinate JP structure would not coordinate constituents of the same category, unless the internal coordinand, of which only (the rightmost) *mo* is assumed to be overt, is in fact headed by a silend *ka*. Since asymmetric coordination obtains only when coordinands are of propositional type, this kind of coordination is by no means clausal (i.e., propositional), not able to 'widen' to a clause type. Even if that were the case, the resulting JP would disjunctive in meaning, which is counterintuitive since the translation of the expression we are relying on is conjunctive. If anything, the external conjunct should contain a silent additive (conjunctive) *mo* marker to be categorially on a par with the internal coordinand headed by an overt *mo*. Then again, there already is a *mo* in the external coordinand.

With regard to (457), one *μ*P is sufficient since as Mitrović and Sauerland (2014) have shown, coordination of two *μ*Ps simultaneously brings about quantification and conjunction (same would apply for κPs).

(457)



5.3.2 Classical Japanese

In this section, we move on from Old to Classical Japanese (CJ), with the ultimate aim of modelling the semantic change in the particle system, focussing predominantly on the *μ*-system. We have established that OJ *μ* particle *mo* was confined to scalar hosts: numeral or scalar *wh*-hosts (i.e., 'when' and 'how much/many'), or degree-denoting (inherently scalar) propositions, obtaining an *even*-reading that *μ* derives. In this section, we show that the scalar confines disappear in CJ. In the following paragraphs, we examine the role of CJ *mo* in non/scalar additives, *wh*-*μ* quantificational terms and the rise of the polarity sensitivity. Finally, we will remark on the rise of the coordinate semantics behind *mo*, which we will formalise as a postsuppositional junction of two *μ*-headed additive constructions.

ADDITIVITY, LOSS OF SCALARITY AND THE RISE OF CONJUNCTION Just as in OJ, the *μ* marker *mo* in CJ features in scalar additive constructions, akin to English *even*. Take the following examples:

(458) 昼 の 明さ に も 過て
hiru no akasa ni **mo** sugi-te
noon GEN brightness LOC **even** surpassing
'Surpassing **even** the brightness of noon' (TM, NKBT 9:63)

(459) 御し に も や し給ひけん
go-si n-i **mo** ya s-i-tamaf-ik-en
HON-death DV-NML *μ* PRT do-INF-HON-RETR-TENT/ATTR
'Maybe [he] did **even** [meet] [his] death?' (TM 41.8; Vovin 2003: 39)

We have been adopting Chierchia's (2013b) system of covert exhaustification, assuming a silent syntactic presence of 𝔛, to derive the SIs and polarity sensitivity. There is, however, another focus-sensitive operator, namely *even* and its covert counterpart 𝔈, which acts as a scalar minimiser. Take the following dialogue example in (460) taken from Chierchia (2013b: 147, ex. 7).

(460) A: So how did the party go? Did many people show up?
B: Yes. Imagine that $[\text{my ex}]_{\text{FOC}}$ came.

B's response with focus stress can be understood as communicating a silent alternative-sensitive operator. So far, we have mostly been making use of 𝔛, which does not work for (460), since it yields a contradiction since B's response contains two assertions: (i) that many people showed up ('yes') and (ii) that, under 𝔛-analysis, that 'only my ex showed up'—these two clearly lead to a contradiction. Intuitively, the paraphrase of B's response is that '*even* my ex showed up,' which is in line with the semantics of *even* that asserts the 'least likelihood' meaning. The full paraphrase under a covert *even*-reading of B's response is therefore that 'my ex showed up *and* that my ex was the least likely person to show up at the party.' This leads Chierchia (2013b: ch. 3) to motivate a covert equivalent of *even*, namely $\mathfrak{E}$, which he defines as stated in (461), where '$<_\pi$' is a probability measurement so that '$p <_\pi q$' states p as less likely than q with respect to some contextually relevant probability measure π.

(461) *even*-exhaustification (Chierchia, 2013b: 148, ex. 8)
$\mathfrak{E}_{\mathfrak{A}}(p) = p \wedge \forall q \in \mathfrak{A}(p)[p <_\pi q]$

As he states, Chierchia (2013b: 148, fn. 6) treats the scalar component of $\mathfrak{E}$ in (461) as part of the assertion rather than part of the presupposition. A technically fully-fledged out lexical entry for $\mathfrak{E}$ is thus in (462), which demarcates the presuppositional and assertional components.

(462) *even*-exhaustification (Chierchia, 2013b: 148, fn. 6, ex. a)
$\mathfrak{E} = \lambda p : \forall q \in \mathfrak{A}(p)[p <_\pi q][p]$

Chierchia (2013b) thus posits two covert exhaustification operators: $\mathfrak{X}$ and $\mathfrak{E}$. Recall, however, that we are pursuing a semantics for additives, which derives from double exhaustification, which we try to modify here to handle the scalar expressions, relegated to $\mathfrak{E}$ in Chierchia (2013b). Returning back to (460), which delivers a contradiction in B's response under the assumption that $\mathfrak{X}$ is at work. Note, however, that recursive $\mathfrak{X}$-exhaustification not only obviates the contradiction but gets pretty close to the desired effect.

(463) $\left[\mathfrak{X}_{\mathfrak{A}}[\mathfrak{X}_{\mathfrak{A}} \quad p]\right] = \left[\mathfrak{X}^2_{\mathfrak{A}} \quad p\right] = \left[\textsc{anti-}\mathfrak{X}_{\mathfrak{A}} \quad p\right] \neq \bot \mid p = [\![(460b)]\!]$

The second-order exhaustification via $\mathfrak{X}$ yields anti-exhaustivity[17] so that the derived reading is 'Not only my ex showed up', or 'My ex showed up and not only my ex showed up.' The missing ingredient is obvious: the likelihood inference, which comes with the presence of the probability measure function ($<_\pi$).

A desideratum we are after is to unify, in some form, the two focus-sensitive exhaustification operators, the *even*-type ($\mathfrak{E}$) and the recursive (second order) *only*-type ($\mathfrak{X}^2$). A core motivation for unification is diachronic, and

17 See Appendix B for proof.

also synchronic, accountability. We thus translate the *even*-type ($\mathfrak{E}$) exhaustifier as an anti-additive *only*-type exhaustifier with a probability measure ($\mathfrak{X}^2_\pi$). The two lexical entries for non/scalar additives, i.e. 'also' and 'even', in presuppositional (i) and non-presuppositional (ii) form are given in (464).

(464) a. i. $\mathfrak{X}^2 = \lambda p : \forall q \in \mathfrak{A}(p)[[p \vdash q] \rightarrow q][p]$

ii. $\mathfrak{X}^2 = \lambda p[p \wedge \forall q \in \mathfrak{A}(p)[p \vdash q] \rightarrow q]$

b. i. $\mathfrak{E} = \mathfrak{X}^2_\pi = \lambda p : \forall q \in \mathfrak{A}(p)[[p \vdash q] \rightarrow q \wedge [p <_\pi q]][p]$

ii. $\mathfrak{E} = \mathfrak{X}^2_\pi = \lambda p[p \wedge \forall q \in \mathfrak{A}(p)[p \vdash q] \rightarrow q \wedge [p <_\pi q]]$

We encode the probability measure component as a conjunct ('third' conjunct below) to the presupposition/assertion that all entailed alternatives q to p hold. It is clear that scalar additivity ('even') entails non-scalar additivity ('also'):

(465) *even* John showed up ⇝ *also* John showed up ($+\pi$)

In more formal terms, we can define (the range of) the two exhaustifiers, $\mathfrak{E}$ and $\mathfrak{X}^2$, with a subset relation since the former always entails the latter.

(466) $\mathfrak{X}^2 \subset \mathfrak{E}$

The motivation for unifying $\mathfrak{X}^{(2)}$- and $\mathfrak{E}$-based exhaustification is two-fold. (i) Theoretically, it is more desirable from an optimisation perspective of Language to an economical inventory of operations deriving interpretations. (ii) Empirically, evidence from, say, SerBo-Croatian suggest that a single μ particle may yield a scalar additive ('even' via $\mathfrak{E}$) and a non-scalar additive ('also' via $\mathfrak{X}^{(2)}$) interpretation. Rather than assuming two different operators, the choice between which would solely dependent on context, we assume a recursive $\mathfrak{X}$-based exhaustification, which can incorporate a context-supplied probability degree measure via an input context assignment and yield the 'third' conjunct.

A rather trivial generalisation, then, is that scalar-additivity is just additivity with a scalar component, i.e a language cannot express 'even' without expressing 'also'. A less trivial conjecture is that diachronically scalar additives turn into non-scalar additives, not vice versa. This follows from the subset-principle straightforwardly since the relation in (466) makes the non-scalar additivity a default. We will see such change taking place in CJ.

Let us repeat in (467) one of the scalar-additive uses of *mo* in CJ.

(467) 御し　　に　　も　や　し給ひけん
go-si　n-i　**mo** ya　s-i-tamaf-ik-en
HON-death DV-NML *μ*　PRT do-INF-HON-RETR-TENT/ATTR
'Maybe [he] did **even** [meet] [his] death?' (TM 41.8; Vovin 2003: 39)

In the following examples, we list some scalar uses in negative contexts.

(468) けうら　なり　と おぼしける　　人の　　かれに
keura　nar-i　to obos-iker-u　fito-no　kare-ni
beutiful be-FIN DV think.HON-RETR-ATTR person-GEN she-LOC
おぼしあはすれば　　人　に　も　あらず
obos-i-afas-ure-ba　fito　n-i　**mo** ar-**az**-u
think.HON-INF-compare-EV-CON person DV-INF *μ*　be-NEG-FIN
'When [the Emperor] compared her with ladies whom he used to consider beautiful, they did **not even** seem human [to him]'
(TM 58.2–3; Vovin 2003: 122)

(469) あれ も　たたかはで
are　**mo** tatakaf-**ade**
they *μ*　fight-NEG
'they did **not even** fight / they did **not** fight **either**'
(TM 63.7; Vovin 2003: 125)

(470) わが　　御家へ　　も　より給ず　　して
wa-ga　mi-ife-fe　**mo** yor-i-tamaf-azu　s-ite
his own-GEN HON-house *μ*　stop-by-INF-HON-NEG.INF do-SUB
おはしましたり
ofasimas-itar-i
come.HON-PERF-PROG.FIN
'[he] came **without even** stopping at his own house'
(TM 36.15–16; Vovin 2003: 31)

(471) 死なぬ　薬　　も　何にか　　は　せむ
shina-nu　kusuri　mo　nani-ka　wa　se-mu
death-PRT medicine **even** what-Q/FOC TOP do-INT.AUX

‘What would I do [even] with with medicine that prevents death?’
(T, NKBT 9:66)

De-scalarised or plain additivity of *mo* is found in as early as 10th century Japanese as the following example shows.

(472) 翁の 命 けふ あす と も しらぬを
okina-no inoti kefu asu to mo sir-an-u-wo
old man-gen life today tomorrow dv μ know-neg-attr-acc
かく のたまふ 君だちに も よく おもひ
ka-ku notamaf-u kin-dati-ni mo yo-ku omof-i
thus-inf say.hon-attr lord-plur-loc μ good-inf inf
さだめて つかうまつれ と 申 も ことはり 也
sadame-te tukaumatur-e to mawos-u mo kotofari nar-i
decide-sub serve.hum-imp dv say.hum-attr prt essence be-fin

‘I was telling her, **too**: Because I [=old man] d not whether [my] life [ends] today or tomorrow, choose well [someone] among the lords who are thus requesting [your hand], and marry [him]’
(TM 33.4–5; Vovin 2003: 69)

The following data from 11th c. also suggests that *mo* had additionally shifted its meaning from scalar-additive (‘even’) to plain additive (‘also’):

(473) と おほやけに も きこしめして
to ofoyake-ni **mo** kikosimes-ite
dv emperor-dat μ hear.hon-sub

‘the Emperor **also** heard that . . . and’
(HM II:22.9; Vovin 2003: 64)

Additive uses under negation obtain ‘also not / either’”

(474) かどより も えいらで
kado-yori **mo** ye-ir-ade
gate-abl μ prev-enter-neg

‘[he] could **not** enter from the gate, **either**’ (TM 38.8; Vovin 2003: 72)

With the loss of the scalar component in *even*-type additives, we additionally witness the rise of distributive conjunction in CJ.[18]

(475) 月 なく 雪 も 降らず
tsuki naku **yuki** **mo** fura-zu
moon not-exist **snow** *μ* fall-NEG
'There is no moon (and) the snow **also** does not fall'
(SN, NKBT 20:515)

(476) まこと に かの 人を みれば やまひ も やみ
makoto n-i kano fito-wo mi-re-ba **yamafi** **mo** yam-i
truth DV-INF that person-ACC see-EV-CON **illness** *μ* stop-INF
いのち も のびぬべき
inati **mo** nobi-i-ube-ki
life *μ* strech-PERF-DEB-ATTR
'Really, when [you] see that person, **both the illness** will surely cease **and** [**your**] **life** will be prolonged . . . ' (HM I:170.16; Vovin 2003: 426)

(477) この よ も かの よ も 思 さま
kono yo **mo** **kano yo** **mo** omof-u sama
this world *μ* **that world** *μ* think-ATTR view
'[his] appearance as [he] thought about [life in] **both in this world and that world**' (HM II: 254.9; Vovin 2003: 426)

In CJ, we also found conjunction in negative contexts, which the previous stages of Japanese lacked.

(478) 御年 廿 ばかり や おはすらむ と おぼえて
mi-tosi fatati bakari ya ofas-uram-u to oboye-te
HON-years twenty PRT PRT be.HON-TENT-ATTR DV think-SUB
御かほの やうたい ほそく も あらず ふくら に
mi-kafo-no yautai foso-ku **mo** ar-azu fukura n-i
HON-face-GEN appearance thin-INF *μ* be-NEG/INF plump DV-INF
も あらず
mo ar-azu
μ be-NEG/INF

18 Recall that OJ also showed a small collection of distributive nominal conjunctions with *mo*, which were very rare.

'[he] thought that [the consort] was probably about twenty, and (the appearance of) [her] face was **neither** thin **nor** plump, and . . . ' (HM I:159.7–8; Vovin 2003: 175)

THE RISE OF *WH-KA* QUANTIFICATIONAL TERMS In the κ-system, *wh*-quantificational terms arise in CJ. Recall that the *wh*-κ quantificational expressions were absent in OJ. Also note the morpho-syntactic difference in construing the complex *wh*-quantificational term 'some people' using *nani* 'what' instead of a modern Japanese indeterminate pronoun *dono* 'which'[19]. Note also the fact that the κ morpheme *ka* is not the interrogative particle in CJ. As Vovin (2003: 129) notes, "like *tare*, *nani* followed by the particles *ka* [κ] and *mo* [μ] functions as an indefinite [existential] and a collective [universal] pronoun respectively." The quantificational expressions *nani mo* and *nani ka* may also feature i constructions where modifiers or even clauses intervene between the *wh*-term and the particle.

(479) 我 子を なに 人 か むかへきこえん
wa-ga ko-wo **nani** fito **ka** mukafe-kikoye-n
I-GEN child-ACC **what** person κ meet.INF-HUM-TENT/ATTR
'Will **some people** come to take my child?' (TM 60.4; Vovin 2003: 130)

(480) なにの あた に か おもひけん
nani-no ata n-i **ka** omof-ik-en
what-GEN enemy DV-INF κ think-RETR-TENT/ATTR
'[the lady], who thought [of him as of] **some** [**kind of**] **enemy**' (IM XXXI:130.11-12; Vovin 2003: 130)

Consider also the κ-combining *wh*-phrase *ika nar-u* 'what [like/kind]', which is always used as a modifier. In combination with the κ particle *ka*, it denotes 'some kind':

(481) いか なる こと か ありん
ika nar-u koto **ka** ar-ik-en
how become-ATTR thing κ be-RETR-TENT/ATTR
'**some kind** of thing happened' (IM XXI: 124.4–5; Vovin 2003: 134–135)

19 For details on the semantics of indeterminate quantification, see Shimoyama (2006).

(482) いか なる 事 か いでこん
ika **nar-u** koto **ka** ide-ko-n
how become-ATTR thing K go out.INF-come-TENT/FIN
'**something** will come out' (HM I: 207.3; Vovin 2003: 135)

The CJ novelty is also, as we have already observed, the extension of *wh*-quantificational expressions to the K-paradigm. With a temporal host, *itu-ka* 'when-K' takes an expected existential function 'sometime'.

(483) いつ か ききけん
itu **ka** kik-ik-en
when K hear-RETR-TENT/ATTR
'as **some time** [they] heard' (TM 36.5; Vovin 2003: 138)

(484) この よに は 又 いつ か は
kono yo-ni fa mata **itu** **ka** fa
this country-ALL TOP again **when** K TOP
'[Maybe he will come] again to this country **sometimes**'
(HM I.193.12; Vovin 2003: 138)

While the nature of *wh*-K constructions was not quantificational in OJ, the quantificational system arises in CJ or whether such constructions existed in OJ, Kinuhata and Whitman (2011) provide an excellent report on the diachronic development of the quantificational function of Japanese K particle *ka* (か) as functioning in the *wh*-constructions. Just as $\mu + wh_\sigma$, the $\mu + wh$ originally featured in adverbial positions, most prominently as temporal adverbs or any other adverbs with an inherently scalar domain.

	century				
	14th	15th	17th	18th	19th
ADVERBIAL	1	1	2	13	8
ARGUMENTAL	0	0	0	2	12

TABLE 5.8.: *Diachrony of wh+ka constructions in Japanese (Kinuhata and Whitman, 2011)*

Kinuhata and Whitman's (2011) observation, with results in Tab. 5.8, is very intriguing since it does not only show the development of argumental *wh* + K indefinites but its overriding adverbial indefinites in the second half of 19th century. Kinuhata and Whitman's (2011) results are graphically plotted in Fig. 5.3.

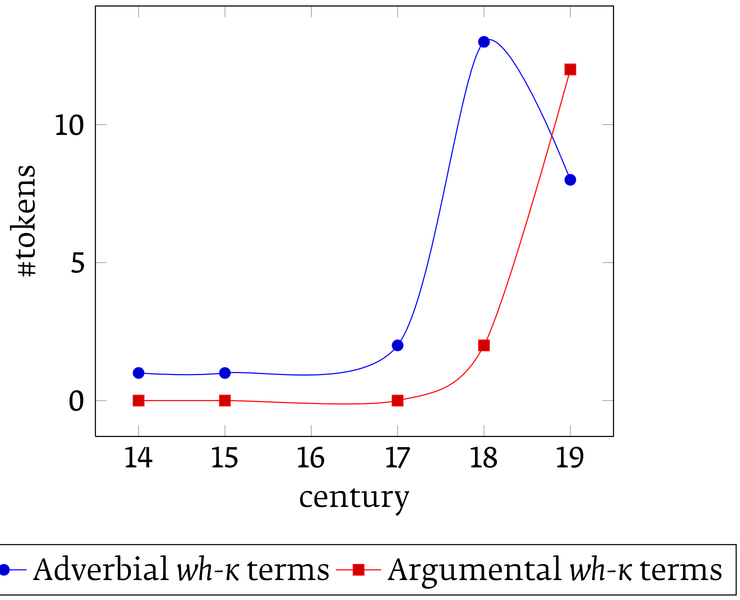


FIGURE 5.3.: *Diachrony of adverbial/argumental wh+ᴋ terms in Japanese (Kinuhata and Whitman, 2011)*

THE RISE OF POLARITY SENSITIVITY Recall the facts from OJ, where *μ* combined with scalar hosts, i.e. those XPs with [*iσ*]. The alternative-activating component of *μ* and closure under conjunction obtained a universal construction, or rather, it delivered the maximal scale-mate from the scale provided by the host—take (431), repeated below as (485).

(485) 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)

Under negation, *μ*Ps of *wh*-kind delivered a SI since what was negated was the strongest scale-mate, yielding the weaker member. We repeat (416) in (486), which shows this as we have already discussed.

(486) 相見而者 [幾 日 毛] 不経乎
apimi-te-pa [**iku** ka **mo**] pe-nu-wo
meet-CONJ-TOP [**how many** day *μ*] pass-NEG-CONJ
'Though **few** days have passed since we met, . . . '
(MYS 4.751, ll. 1–2)

Two changes occur in CJ. The first is the decline of the scalar restriction on *μ* so that non-scalar hosts end up combining with the *μ* particle.

(487) OJ *mo*: $\mu[u\sigma] \gg$ CJ *mo*: $\mu[u\alpha]$ where $\alpha = \{\sigma, D\}$

Just as in OJ, the temporal *wh*-term *itu* 'when' in combination with *mo* yields a universal expression 'always'.

(488) いつ も いつ も たづねしらせたまへ と
itu **mo** **itu** **mo** tadune-sir-ase-tamaf-e to
when *μ* **when** *μ* look for.INF-know-CAUS.INF-HON-IMP DV
ばかり に なん
bakari n-i nan
PRT DV-INF PRT
'[I] am just [asking you]: "Please **always** look for and find [it in your heart]"' (HM I;174.1; Vovin 2003: 138)

Since we do not have empirical evidence of temporal *wh-μ* embedded under negation, we do not know what semantically happens to *itu-mo* 'when-*μ*' under negation. Given the evidence from non-scalar *wh-μ* expressions, as we show below, we suppose that CJ 'when-*μ*' should be a polar construct, not one delivering an existential SI, as was the case in OJ, as we have already seen in the previous section.

The decline of the scalar-restriction to complementation is seen in the following examples, where the *μ* freely combines with *who*-type indefinites (489).

(489) たれ も たれ も なげきみだれて
tare mo tare mo nagek-i-midare-te
who *μ* **who** *μ* lament-INF-be in confusion-SUB
'**everybody** was lamenting in confusion, and . . . '
(HM II: 232.9; Vovin 2003: 128)

The idea that reduplication of *wh-μ* elements in (489) might be responsible for universal quantification is banished by the following piece of data in (490), which contains a non-reduplicative *wh-μ*P with clearly universal quantificational force.

(490) 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)

The non-scalar selection of *μ*-hosts is also exhibited in *what*-type indefinites:

(491) そこに なに事 も いまより
soko-ni **nani**-^{n}goto **mo** ima-yori
there-LOC **what**.GEN-matter *μ* now-ABL
おぼしはぐくめ
obos-i-fagukum-e
think.HON-INF-raise with care-IMP
'Please think over there about **everything** from now on and raise [her] with care' (HM II:249.6–7; Vovin 2003: 130)

The *wh*-quantificational expressions also extend to non-scalar *where*-type, which rounds up the *wh*-domain, showing that CJ *μ* was indeed no longer restricted to scalar hosts, unlike in OJ.

(492) いづくに も 人の 物いひ かはらねば
iduku-ni **mo** fito-no mono-ifi kafar-an-e-ba
where-LOC *μ* person-GEN thing-saying change-NEG-EV-CON
'because people's gossip is the same **everywhere**'
(HM II:232.1; Vovin 2003: 136)

Also note that in the presence of a modal, the universal *μ*-term becomes a FCI, as shown in (493).

(493) いづくに も あれ しばし 旅だちたる こそ
izuku-ni **mo** are shibashi tabi-dachi-taru koso
where-LOC *μ*.**even** may-be for-a-while when-you-travel PRT

‘**Wherever** it may be, when you travel for a while.’
(T, §15; NKBT 30:102)

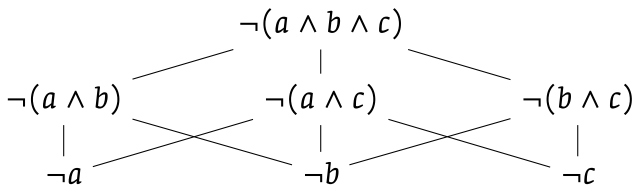
The second type of semantic change concerns the appearance of the Polarity system in CJ. Take the following evidence in (494–495), which shows the rise of the polarity system from the 10th century onwards.

(494) 御あそびなど も なかりけり
mi-asobi-nado **mo** **na**-k-ar-iker-i
HON-pleasure-REPR μ NEG-INF-be-RETR-FIN
‘[The emperor] did **not** have **any** pleasures’ (TM 66.11; Vovin 2003: 35)

(495) 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)

Let us take (494) and see how we can derive the inference behind the NPI. For ease, let’s assume a finite domain of three ‘pleasures’, or instances thereof, namely a, b, c. We further abbreviate in (496d), as we have already done, propositions of the predicate form $[\text{P}(a) \wedge \text{Q}(x, a)]$ as a.

(496)
a. The emperor did **not** have **any** pleasures.
b. $\neg\exists x \in \mathfrak{D}[\text{PLEASURE}_w(x) \wedge \text{HAVE}_w(e, x)]$
c. $\neg\big(\text{PLEASURE}_w(a) \wedge \text{HAD}_w(e, a)\big) \wedge \neg\big(\text{PLEASURE}_w(b) \wedge \text{HAD}_w(e, b)\big) \wedge \neg\big(\text{PLEASURE}_w(c) \wedge \text{HAD}_w(e, c)\big)$
d. $\neg(a \wedge b \wedge c)$
e. Corresponding lattice:



Exhaustification via $\mathfrak{X}$ does not yield a contradiction since the environment is DE. Recall that exhaustification comes with two requirements:

(i) the assertion must be true, and (ii) all non-entailed alternatives must be false. In positive contexts this leads to contradiction since an assertion like *The emperor had any pleasures* would have to be true, given (i); but since none of the alternatives is entailed by the proposition, they would all have to be false, yielding something of the kind in (497), written in the form of (496d).

(497) $(a \wedge b \wedge c) \wedge \neg a \wedge \neg b \wedge \neg c$

Under negation, however, all the alternatives are entailed, hence none of them may be denied, returning not only a non-contradictory but also an enriched result.[20] Note that while Chierchia's (2013b) system is set up for negated existentials, which is what NPIs in DE context are, we need to negate the universal, which is what *mo* is.

(498) a. $\mathfrak{X}_{D\mathfrak{A}}$[The emperor did **not** have **mo/any**$_{[+\sigma,+D]}$ pleasures]
b. $\mathfrak{X}_{D\mathfrak{A}}\Big(\forall x \in \mathfrak{D}[\textsc{pleasure}_w(x) \rightarrow \neg\textsc{have}_w(e,x)]\Big)$
$= \forall x \in \mathfrak{D}[\textsc{pleasure}_w(x) \rightarrow \neg\textsc{have}_w(e,x)]$
c. $D\mathfrak{A} = \Big\{\forall x \in \mathfrak{D}'[\textsc{pleasure}_w(x) \rightarrow \neg\textsc{have}_w(e,x)] \mid \mathfrak{D}' \subseteq \mathfrak{D}\Big\}$

The universal character of NPIs in CJ, such as our emperor-example, could best be paraphrased as 'for all the pleasures, the emperor did not have any'.

The polar-sensitive *mo* in CJ also extended, as we would expect *ceteris paribus*, to other *wh-μ* terms:

(499) なにの しるし あるべく も みえず
nani-no sirusi ar-ube-ku **mo** mi-ye-z-u
what-GEN sign be-DEB-INF *μ* see-PASS-NEG-FIN
'[They] can**not** see that there might be **any** sign [at all]'
(TM 30.14; Vovin 2003: 129)

20 I follow Chierchia (2013b: 164, fn. 16) in ignoring, for the most part, *σ*-alternatives since under negation an NPI like *any-x* in English or *x-mo* in OJ will entail all its scale-mates, hence no scalar alternatives come about.

(500) なにごと も いささか なる こと も えせで
nani-ⁿgoto **mo** isasaka nar-u koto **mo** ye-se-**de**
what.GEN-thing μ trifling be-ATTR thing μ PREV-do-NEG
'**not** being able to do **anything**, [not] even a trifling thing' (IM XVI: 121.11–12; Vovin 2003: 130)

(501) いづれ も をとり まさり おはしませねば
idure **mo** wotor-i masar-i ofasimas-**an**-eba
which μ be inferior-NML be superior-NML be.HON-NEG-EV-CON
御心ざしの 程 は 見ゆべし
mi-kokorozasi-no fodo fa mi-y-ube-si
HON-feelin-GEN extent TOP see-PASS-DEB-FIN
'Since **neither** [of you] is superior or inferior, [she] must see the depth of [your] feelings' (TM 33.5–6; Vovin 2003: 137)

The polarity of *wh*-terms under negation extends also to the K-paradigm, which is the main prediction that Chierchia (2013b: 169–173) makes since NPIs have an indefinite core:

(502) かかる 人をば いかで か
kakar-u fito-woba **ikade** **ka**
be such-ATTR person-ACC.EMPH **how** K
おもひよらぬ 人のあるべき
omof-i-yor-**an**-u fito n-o ar-ube-ki
think-INF-approach-NEG-ATTR person DV-ATTR be-DEB-ATTR
'Such a person is someone about whom [you] cannot [even] think in **any way**' (HM II:235.8; Vovin 2003: 133–134)

THE RISE OF DISJUNCTION While we do not have pre-modern evidence on the evolution of disjunction, we provide in this section a conjectural diachronic analysis of the development of disjunction from questions, which we are basing on Uegaki's (2013) synchronic analysis of Japanese, which we already introduced and preliminarily adopted in Chapter 4.

Recall the core proposal, according to which we treat disjunctions as Alternative Questions (AQs), assumed to be underlyingly disjunctions of polar questions. Repeated below is the relevant idea.

(503) a. Do you want $\Big[[_{DP}$ coffee $]$ or $[_{DP}$ tea $] \Big]$?

b. Do $\Big[[_{\text{VP/TP}}$ you want coffee] or $[_{\text{VP/TP}}$ ~~you want~~ tea $] \Big]$?

c. $\Big[[_{\text{CP}}$ Do you want coffee] or $[_{\text{CP}}$ ~~do you want~~ tea $] \Big]$?

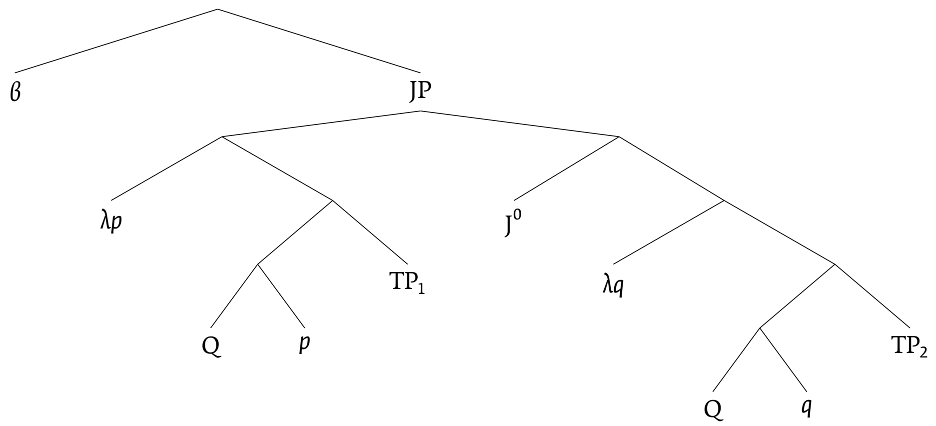
Under the assumption that AQs involve disjunction of as much syntactic material as surface form suggests, treating an AQ in (351) as involving disjunction of nominal arguments (DPs) as per (503a), then we must posit another operation, in place of deletion, so as to derive the correct scope of disjunction out-scoping the question. This is the line taken by Karttunen (1977) and Larson (1985), among others, who propose a Quantifying-in operation (*qua* QR) to derive the AQ effect. Similarly, Beck and Kim (2006) assume a structure as in (503a) and posit a Focus-associated operation to derive the correct scope. The structure in (503b) requires both syntactic deletion and semantic (covert) movement, which is taken up by Han and Romero (2004) in their analysis. The third structure in (503c), on the other hand, posits ellipsis and requires no covert movement mechanics to deliver the scope effects since disjunction out-scopes the question.

Uegaki (2013: 5, ex. 11) proposes to treat AQs, at least in Japanese, as consistently being of the syntactic form in (504), obtaining an interpretation akin to something like 'is it the case that ϕ_{TP_1} or is it the case that ψ_{TP_2}?'

(504) $\Big[[_{\text{CP}_1} \text{TP}_1] \; \text{DISJ} \; [_{\text{CP}_2} \text{TP}_2] \Big]$

We modify Uegaki's (2013) analysis so as to ensure that the denotation of a polar question is a doubleton set, containg the denotation of the proposition ($[\![\text{TP}]\!]$) and its negative alternative ($\neg[\![\text{TP}]\!]$). Our syntax of (dis)junction is also imported into the analysis so that a compositional skeleton we are proposing is given in (505), which we repeat from Chapter 4.

(505) Composing AQs as disjunctions of polar Qs:



a. i. $[\![Q^0]\!] = \lambda p[\lambda q[p = q]]$ (Uegaki, 2013: 6, ex. 19)

ii. $[\![Q^0]\!]_1 = \lambda p \in \mathfrak{A}[\lambda q[p = q]] \mid \mathfrak{A} = \{p, \neg p\}$ (our twist non-singleton denotation of Qs)

iii. $[\![Q^0]\!]_2 = \lambda\Pi\lambda p[\Pi(p) \vee \Pi(p)]$ (Lin's (2014) (p. 6, ex. 20) InqSem non-singleton denotation of Qs)

b. $[\![J]\!] = \lambda\phi\lambda\psi[\phi \bullet \psi] = \langle\phi, \psi\rangle$

c. $[\![\beta]\!] = \{\wedge, \vee\}$

The denotation of each of the two clausal disjuncts is therefore a doubleton set containing the denotation of the respective proposition and its negative alternative. After undergoing composition with J^0, they are converted into a tuple in the alternative form $\langle\{p, \neg p\}, \{q, \neg q\}\rangle$, which is subsequently mapped onto Boolean join, given Agree relation holding between β^0 and Q (which is really our κ^0). This results in disjunction of two polar questions: $\big[[\lambda p[p = q \vee p = \neg q]] \vee [\lambda q[q = p \vee q = \neg p]]\big]$

We now end up with a double disjunction, one originating as a consequence of the Boolean transformation of the tuple ($[\![JP]\!]$), the other stemming from an inherently disjoint denotation of the polar question ($q = p \vee q = \neg p$). We adopt Alonso-Ovalle (2006) in treating a disjunction of p and q as a set constituted by the disjuncts, i.e. $[p \vee q] = \{p, q\}$. Since a polar question has a single alternative, excluding the proposition denoted, being an alternative itself, then a question 'is ϕ the case?' is logically paraphrasable as 'ϕ is the case or ϕ is not the case. We further adopt a postsuppositional analysis according to which the disjunct containing the negative-alternative is postsupposed and whose evaluation is delayed.

(506) Deriving disjunction from two polar questions:

$$
\begin{aligned}
[\![[_{CP_1} Q\,\phi]]\!] &= \phi\underbrace{\vee\neg\phi} \\
[\![[_{CP_2} Q\,\psi]]\!] &= \psi\underbrace{\vee\neg\psi} \\
[\![[_{JP}\,[_{CP_1}\,Q\,\phi]\,J^0\,[_{CP_2}\,Q\,\psi]\,]]\!] &= \phi\underbrace{\vee\neg\phi} \bullet \psi\underbrace{\vee\neg\psi} \\
&= \left\langle \phi\underbrace{\vee\neg\phi}, \psi\underbrace{\vee\neg\psi} \right\rangle \\
[\![[\beta_\vee[_{JP}\,[_{CP_1}\,Q\,\phi]\,J^0\,[_{CP_2}\,Q\,\psi]\,]]]\!] &= \beta_\vee\left(\left\langle \phi\underbrace{\vee\neg\phi}, \psi\underbrace{\vee\neg\psi} \right\rangle \right) \\
&= \phi\underbrace{\vee\neg\phi} \vee \psi\underbrace{\vee\neg\psi} \\
&= \phi \vee \neg\phi \vee \psi \vee \neg\psi \\
&= \phi \vee \psi \vee \neg\phi \vee \neg\psi \\
&= \phi \vee \psi \vee \psi \vee \phi\ (\because \neg\phi \vdash \psi, \neg\psi \vdash \phi) \\
&= \phi \vee \psi
\end{aligned}
$$

We therefore propose to treat the diachronic rise of grammaticised disjunction (GD) as a grammaticised disjunctive inference that (joined up) polar questions give rise to. Let's now turn to the historical aspects and translating our synchronic analysis into a diachronic one.

The core prediction of our conjecture is that grammaticisation of disjunction did not precede grammaticisation (GD) of interrogativity. It is also clear from Fig. 5.4 that the development of quantificational *wh*-κ expressions followed the developments of questions, and the development of argumental *wh*-κ expressions was superseded by adverbial *wh*-κ. Concerning the latter change, from adverbial to argumental quantificational expressions, we propose to understand this diachronic phenomenon by appealing to the head-preference principle (van Geldern 2004, 2009) which we state (507) and understand as a principle of economy.

(507) HEADS-OVER-PHRASES PREFERENCE (van Gelderen 2004: 61)
Be a Head rather than a Phrase (if possible).

According to our plot in Fig. 5.4, the economy principle for preferring to be in argument slots rather than an adverbial element, kicks in in the 18th century, along with a simultaneous significant rise in morphosyntactic encoding of indirect questions.

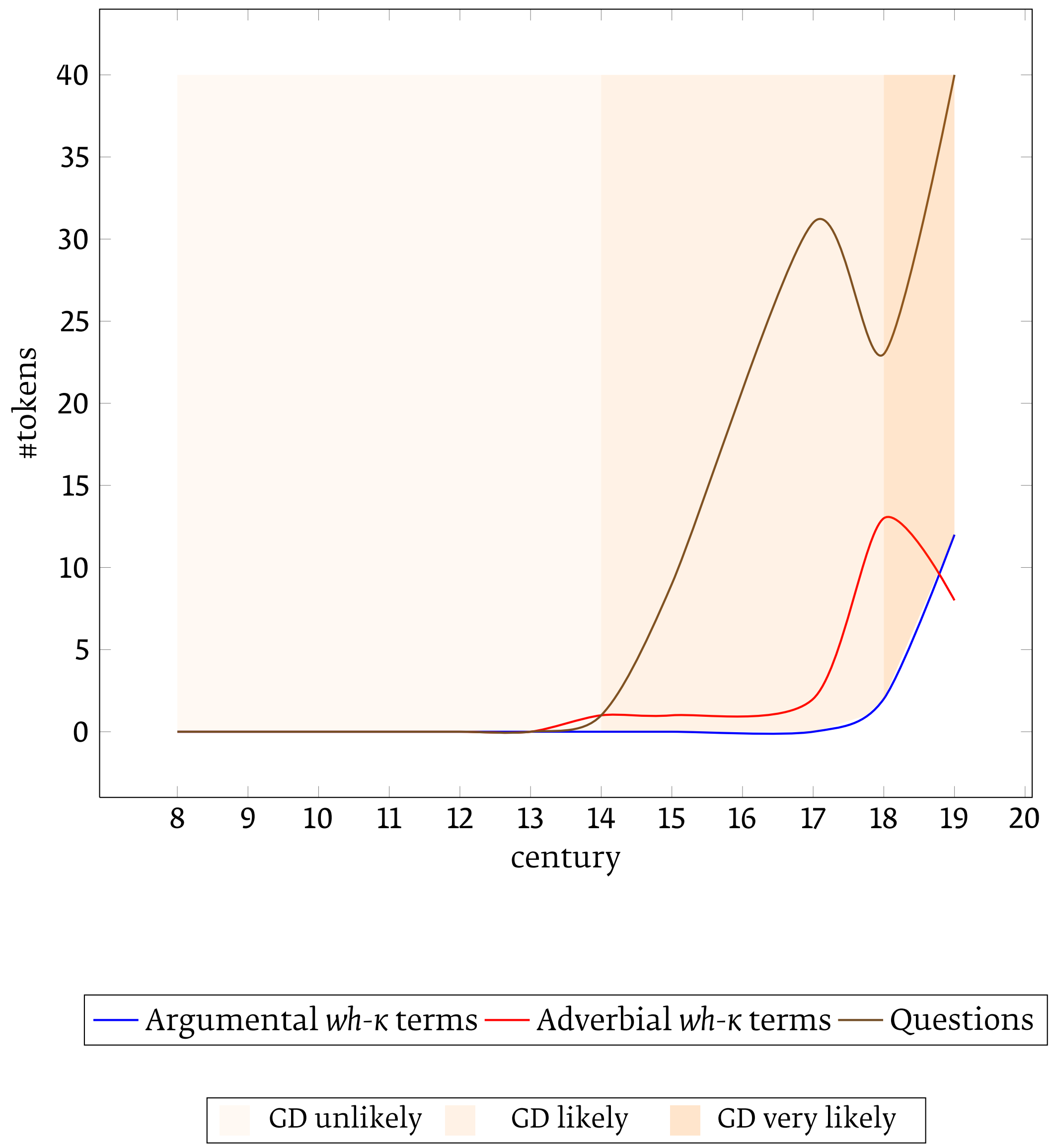


FIGURE 5.4.: *Conjecturing the temporal-logical space of grammaticised disjunction (GD) in the history of Japanese*

(508)

	8th–14th c.	14th–17th c.	17th–18th c.	18th c.
status of κ^0	$\text{Foc}^0_{\text{LOW}} \gg$ NO DISJ	$\text{Force}^0 \gg$ MAYBE DISJ	adv. $\exists \gg$	arg. $\exists$ PROBABLY DISJ

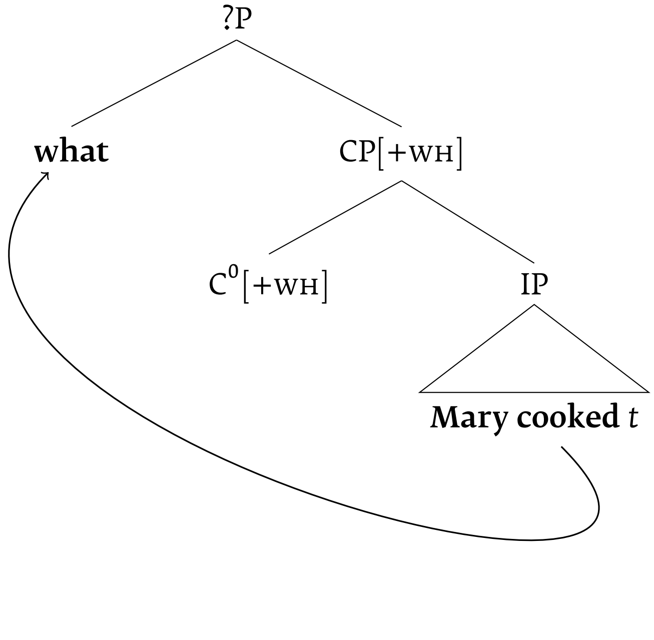
5.4 Relatives and the μ/κ system

In this section, we review and adopt the recent proposal by Chierchia and Caponigro (2013) according to which free relatives (FRs) are derived from questions (Qs). We do two things with this proposal: show that it lends itself to an analysis of *kakari musubi*, which we have already overviewed. Before moving on, let us first review Chierchia and Caponigro's (2013) derivation.

The idea that relative and question expressions share a interrogative core is backed up by Chierchia and Caponigro (2013), whom we follow to fledge out the synchronic and diachronic facts of μ and κ markers in Japonic.

Chierchia and Caponigro (2013) adopt a loose variant of Cecchetto and Donati's (2010) approach to free relatives and labelling, according to which interrogative and relative constructions share a common syntax, *modulo* the label of the root, on which the final semantics hinges. Take (509), taken from Cecchetto and Donati (2010), where the labelling algorithm at the root of the tree cannot readily determine a label (Λ) since the tree is essentially a set containing two subsets: $\left\{_{\Lambda:?}\{_{\Lambda:D}\ \text{what}\}, \{_{\Lambda:C}\ \text{CP}\}\right\}$.

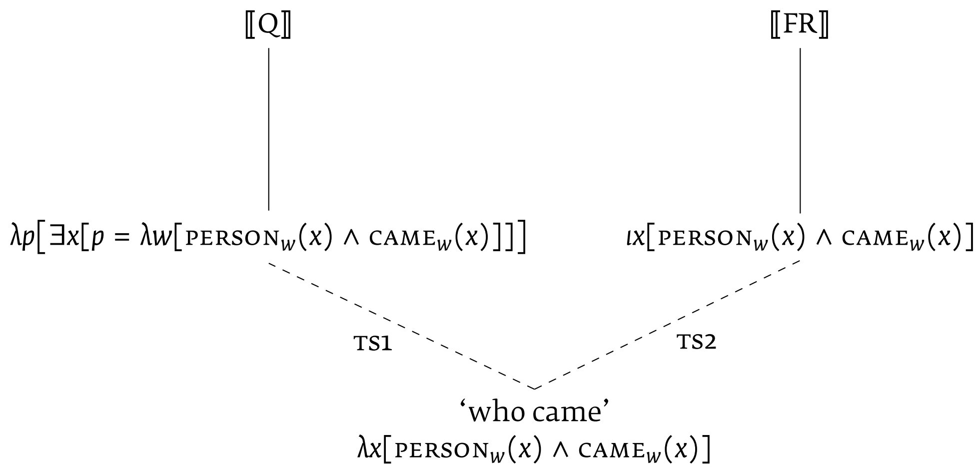
(509) Cecchetto and Donati's (2010) labellability of Qs *v* FRs:



There is a theoretically presupposed idea to treating the Q/FR distinction, namely that they share a derivationally identical structure, *modulo* the final label, which is determined structure-externally, i.e. c-selectionally. In broad terms, if a head α merges above and combines with ?P in (509), ?P projects/labels as [C] if α subcategorises for [*u*C]; alternatively, if α subcategorises for [*u*D], ?P projects the [D] label as provided by *what* in [Spec,?P].

Chierchia and Caponigro (2013) thus push the idea that relatives, such as *Mary ate what John cooked*, are structurally—and thus interpretationally—embedded interrogatives. Note that this departs from traditional analyses, both syntactically, where relativisation is completely independent from interrogativity, as well as semantically, where the traditional view maintains that clauses with *wh*-terms are traditionally seen as property- or set-denoting λ-abstracts, as per Groenendijk and Stokhof (1983) and that there exist two distinct semantic shift of the (presumably homophonous) the denotation of the *wh*-term. One type shit—TS1 in (510)—lifts the *wh*-term to the level of propositions, yielding a question. The other type shifting operation—TS2 in (510)—lowers the type of the *wh*-term to the ⟨e⟩ via an ι-operator, yielding a FR. The following scheme in (510), taken from Chierchia and Caponigro (2013: 2, ex. 4), shows the traditional semantic split in the denotation of *wh*-terms.

(510) The traditional approach to the denotation of *wh*-abstracts:



We will follow their work and apply it to the Japonic construction of *kakarimusubi*. To do so, we expand the syntactic inventory of Chierchia and Caponigro's (2013) theory and attempt a derivation and interpretation of the syntax/semantics of partially interrogative focus in pre-modern Japonic.

Before proceeding to the two sets of data and analyses, let us briefly expound on Chierchia and Caponigro's (2013) theory so as to understand the core motivations and technical building blocks of their system. Empirically, Chierchia and Caponigro (2013) draw their motivation from an empirical generalisation, dubbed Caponigro's generalisation, taken from Chierchia and Caponigro (2013: 2, ex. 3)

(511) CAPONIGRO'S GENERALISATION (Caponigro, 2003, 2004)
If a language uses the *wh*-strategy to form both Qs and FRs, the *wh*-words found in FRs are always a subset of those found in Qs. Never the other way around. Never some other arbitrary relation between the two sets of *wh*-words.

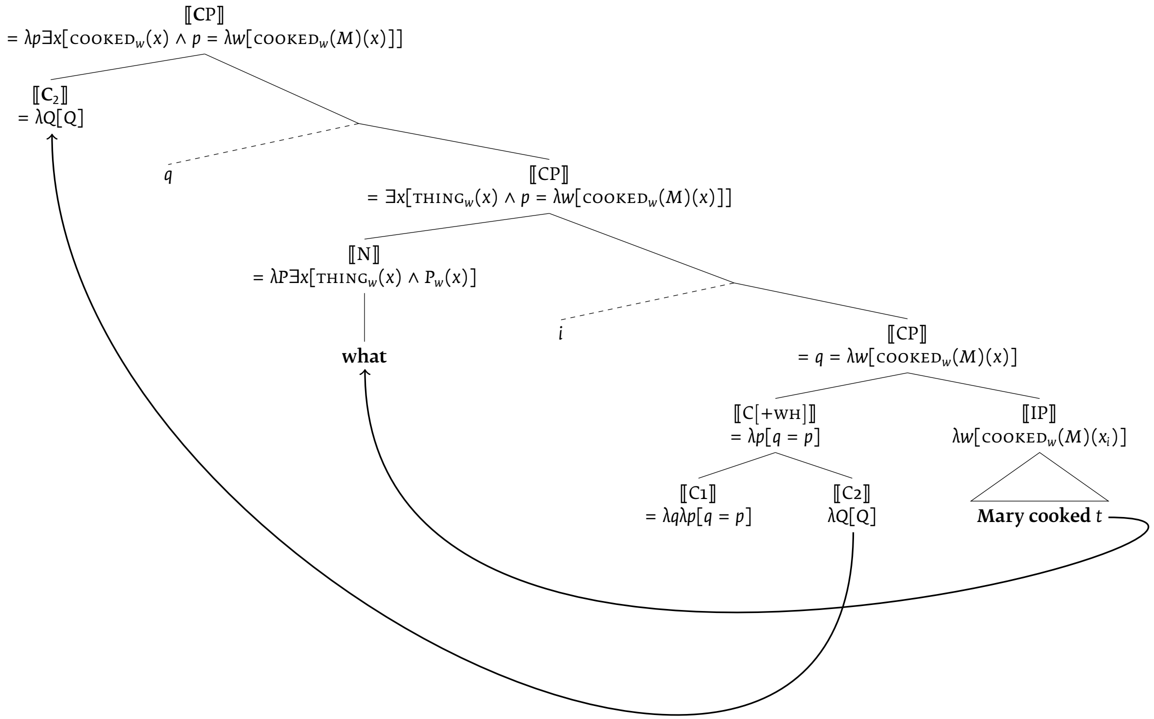
Chierchia and Caponigro (2013) list three languages, English, Italian and Nieves Mixtec, which confirm (511), which we restate in Tab. 5.9 (their Tab.1, p. 2).

Let us now turn to Chierchia and Caponigro's (2013) derivation of questions, which we list in (512). The composition and interpretation is standard, *modulo* the excorporation of the question-forming head—C_2^0—from a clause head-complex. With respect to this mechanical move, Chierchia and Caponigro's (2013) adopt Shimada's (2007) head-unfolding model, which we have introduced in §2.5. While C_1 creates a protoquestion, as assumed by Karttunen (1977), and many others subsequently, C_2 is the element that derives the actual interrogative meaning. The common assumption is that C_2 cannot be interpreted *in situ* and so it must be merged at the root of the CP. Recall also, as we stated in (108) that semantics independently requires excorporation of the question operator to the root, which Shimada's (2007) model provides for free.

		who	what	where	when	how	how much	why	what/which + NP	how much + Adj/Adv
English	*wh*-Qs	✓	✓	✓	✓	✓	✓	✓	✓	✓
	FRs	✓/⋆	✓	✓	✓	✓	⋆	⋆	⋆	⋆
Italian	*wh*-Qs	✓	✓	✓	✓	✓	✓	✓	✓	✓
	FRs	✓	%	✓	✓	✓	%	⋆	⋆	⋆
Nieves Mixtec	*wh*-Qs	✓	✓	✓	✓	✓	N/A	✓	✓	✓
	FRs	✓	✓	✓	✓	✓	N/A	⋆	⋆	✓

TABLE 5.9.: *Use of wh-words in wh-questions (wh-Qs) and free relatives (FRs) in English, Italian and Nieves Mixtec (Chierchia and Caponigro, 2013)*

(512) The composition of *wh*-interrogatives (Chierchia and Caponigro, 2013: 4, ex. 6d):



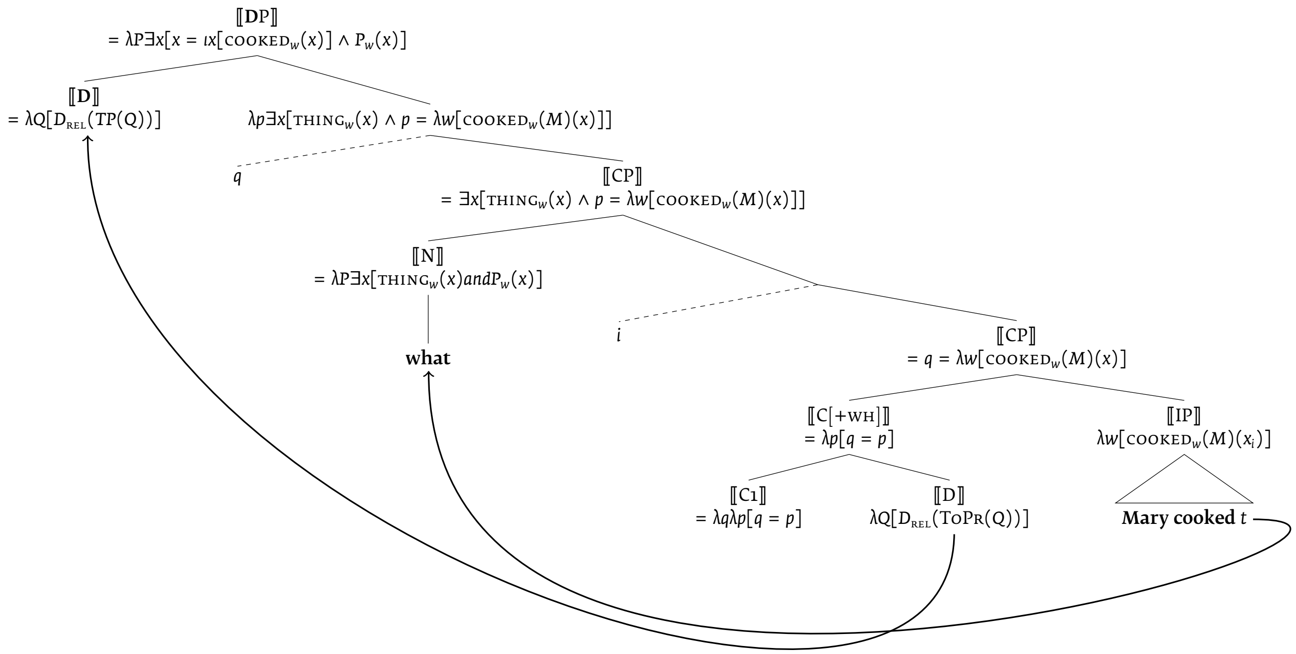
The derivation and interpretation of FR relies on the same building blocks, namely the excorporation of an operator from within the clause-head complex. The derivational difference between Qs and FRs, as we have observed in (509), following Cecchetto and Donati (2010), lies in the label of the CP (or ?P). Under Shimada's (2007) assumptions, the label is not determined CP-externally but rather CP-internally, by virtue of head-unfolding. For Chierchia and Caponigro (2013), the difference between Qs and FRs lies in the probing mechanism, i.e. whether a Q-forming or a FR-forming operator excorporates from the clause-head complex. Their derivation is given in (514), where the excorporating head is a nominal operator, which Chierchia and Caponigro (2013) dub D_{REL}.

D_{REL} in the system functions as a nominal operator that extracts the Topical Property (ToPr) out a clause. TP is, in turn, defined as a singleton property of a question. This latter definition of TP, which underlies the notion of D_{REL}, thus relies on answerhood conditions, for which Chierchia and Caponigro (2013) adopt a Dayal-style Answerhood operator. In (513), we provide the definitions of the three interdependent operators. Additionally definable is the short-answerhood operator (Ans^{s}), since all questions have short answers, which Chierchia and Caponigro (2013) take to be the very extractable property that D_{REL} is all about. Hence, D_{REL} denotes a (or rather the$_{w}$) short answer to a question (513d-i) or a type-lifted variant thereof in form of a generalised quantifier (GQ), as per (513d-ii).

(513) a. $[\![\text{Ans}]\!]^{w}(Q) = \iota p \in Q[p_w \wedge \forall q \in Q[q_q \rightarrow p \subset q]]$
b. $[\![\text{Ans}^{s}]\!]^{w}(Q) = \iota x[[\text{ToPr}]_w(x)]$
c. i. $[\![\text{ToPr}]\!] = \lambda P_{\langle s,\langle e,t\rangle\rangle} \forall w \forall x[P_w(x) \leftrightarrow \lambda w'[P_{w'}(x) = \text{Ans}_w(Q)]]$
ii. $[\![\text{ToPr}]\!](Q) = \iota P \forall w \forall x[P_w(x) \leftrightarrow \lambda w'[P_{w'}(x) = \text{Ans}_w(Q)]]$
d. i. $[\![D_{\text{REL}}]\!]^{w}(Q) = [\![\text{Ans}^{s}]\!]^{w}(Q)$
ii. $[\![D_{\text{REL}}]\!]^{w}(Q) = \lambda P \exists x[[\text{ToPr}(Q)]_w \wedge P_w(x)]$

For (513d-ii), however, the definition of Ans as it currently stands in (513c-i) will not suffice, hence a type-lowered variant of (513c-i) is given in (513c-ii). In (514), the building blocks we defined above plugged in derivationally and compositionally, yielding the structure in (514)

(514) The composition of free relatives (Chierchia and Caponigro, 2013: 4, ex. 6e):



While Chierchia and Caponigro (2013) do not discuss the syntactic nature of the input to semantic interpretation, which obtains the two differential LFs for questions and free relatives, we now turn to the syntactic input of such LFs.

While the syntactic origin of $D_{(\textsc{rel})}$ as head-sister of C^0 is stipulation in Chierchia and Caponigro's (2013) system, we reconcile this by fine-graining the nature of C^0. We do so by adopting Rizzi's (1997) left-peripheral microscopy of the clause. Recall from (513) that both the $\textsc{Ans}^s$ and the $D_{\textsc{rel}}$ operators are ontologically rest on and are built from ToPr.

It is my proposal here to locate the structural locus of ToPr in one of the two of Rizzi's (1997) Topic heads.

I propose we treat the C-complex, the structure of which, and indeed movement from which, yields the differential interpretation, in the following way. Assuming a rich micro-structure of the C head, following Rizzi (1997), we locate the different heads within the left periphery and assign them the semantic potential, which will give (512) and (514) as calculated meanings. Given below is Rizzi's original fine-grained view of the left periphery (LP) in (515a), which we translate into Shimada's (2007) model in (515b). Upon 'head unfolding' (515b), the LP takes the shape of (515a).

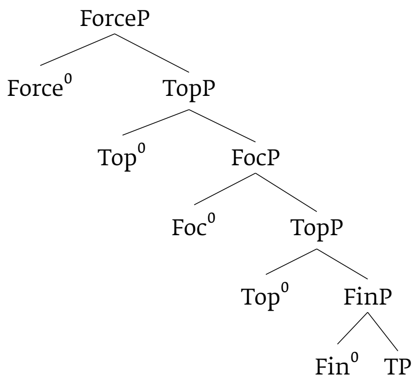
In this case, we assume the full head-set unfolds but should, say, one of Top heads or the Foc head be 'inactive' in a structure, e.g. the sentence does not contain and thus does not express a topic or a focus meaning, then two options seem available.

Under the assumption that the richness of the LP is universally present, in one form or another, then *conceptually*, an inactive head may simply make no contribution. The inactivity can be stated in terms of F-valuation: non locally through long-distance probing of a LP head within the clausal interior (e.g. *in situ* focus association, or topic); or, locally via [epp]-like driven movement to specifiers of LP heads. If a LP head does not enter into any checking relation with an element within the clausal interior, a head can be said to be inactive.

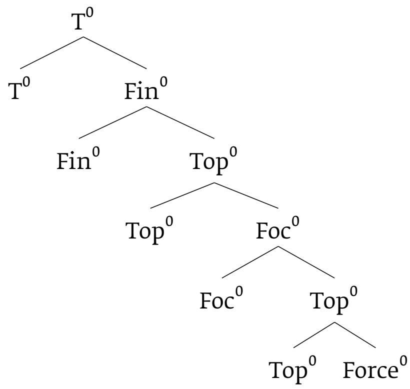
Semantically, inactive heads are ignored at LF, or are assigned identity function meaning so as to not make any meaningful contribution. We ignore the specifier slots and the recursivity notation of Topic projections for convenience, and translate IP into TP (not that it matters much for our purposes).

Given our adoption of Shimada's (2007) model, then another options makes itself available *technically*, i.e, the availability of inconsistent excorporation.

(515) a. Rizzi's (1997) take on the fine-grained LP:



b. Rizzi's (1997) LP with a Shimadaean twist:



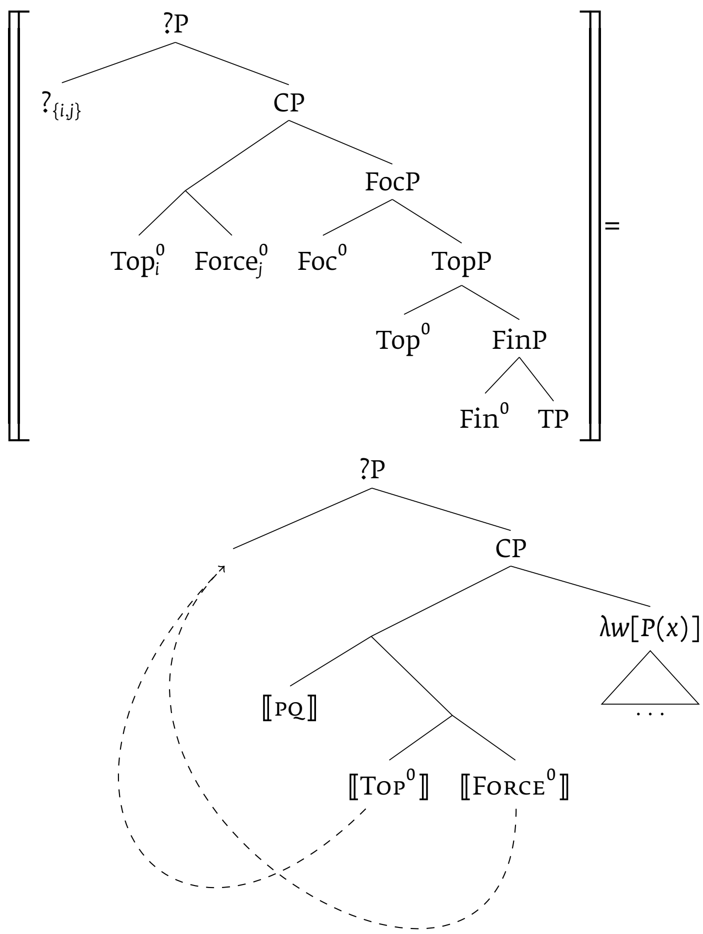
Semantically, we propose that the ToPr is part of the meaning of the high Topic head, i.e. ⟦ToPr⟧ ∈ ⟦Top^0⟧. The (potentially non-exhaustive meaning of theTop head is taken to be D_{REL}. The reasons for height preference will become clear in the second, structural, step.

Derivationally, we are concerned with the unfolding of heads up to the last point, when the C-head complex contains the high Topic head and the Force head, the former encoding for topicality (ToPr), the latter for interrogativity.

Given the need for the protoquestion (PQ) operator, itself of type ⟨stt⟩ for the calculation of of both Q and FR meanings, we stipulate its (syntactically silent) placement in the LP, such that Force^0 ⟩ Top^0 ⟩ PQ^0 ⟩ Foc^0. Although this is a stipulation, all classical semantic theories of the composition of questions assume it implicitly, hence the syntactic nature of PQ does not constitute any controversies here.

Given the type mismatch of the head-complex containing {Top^0, Force^0}, one of the heads moves out of the complex and is interpreted at the root.

(516)



The head adjacency follows from Shimada's (2007) model applied to Rizzi's (1997) dissection of the clause. We gain two advantages: firstly, the syntactic ontology of D_{REL} is no longer a stipulation as we are identifying it as Top^0. Secondly, Rizzi's (1997) LP provides a head-adjacent relation between (the high) Top^0 and $Force^0$ by virtue of Shimadaean head unfolding rendition. This way, we maintain, in slightly more syntactically technical terms, Chierchia and Caponigro's (2013) assumption that selection and excorporation of the second operator—C_2 vs. D_{REL}—is a matter of Agree relation.

BACK TO JAPONIC AND *KAKARI MUSUBI* In this paragraph, we return to *kakari musubi*, the data of which we briefly restate below.

(517) 敵見有 虎 可 吼登
atami-taru twora **ka** poyuru
iritated.STAT tiger K roar.ADN
'Is it [an irritated tiger]^F that is roaring?' (MYS 2.199)

Our analysis of *kakari musubi* will reply on the technical foundations of Chierchia and Caponigro (2013) and the results of Aldridge (2009).

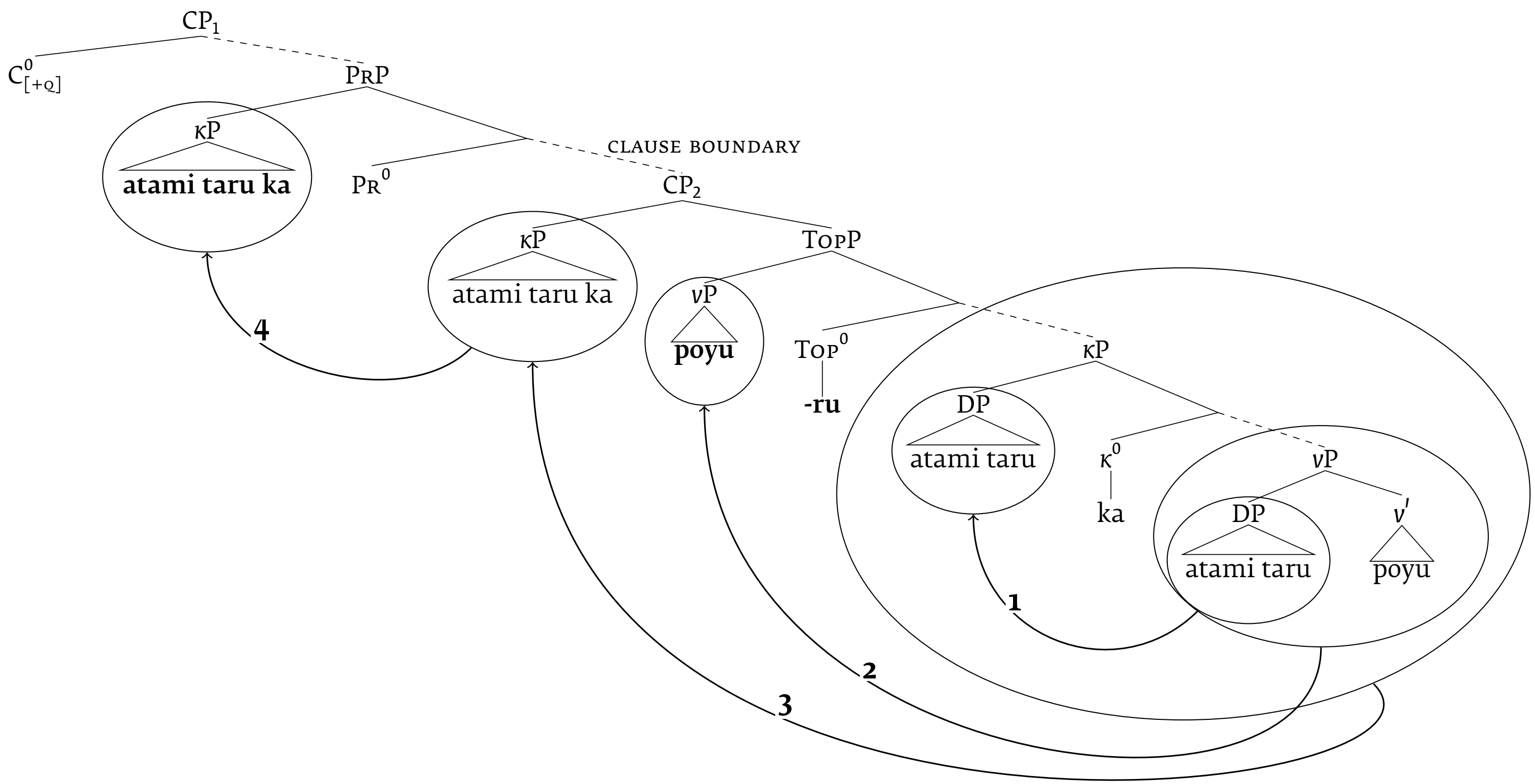
We take the *musubi* component of the construction, i.e. the presupposed content morphosyntactically marked with adnominal morphology—*-ru* in (517), to share the FR syntax and semantics as per (514). The *kakari* component results from movement of a segment contained within the *v*P to [Spec,κP], itself a slot in the left periphery of the *v*P. (Aldridge, 2009)

The adnominal marker is an exponent of the (semantically nominal) TOP^0, hence movement of the remnant *v*P material—*poyu-* 'roar(ing)' in (517)—to its specifier position results in pronunciation of the specifier and head as an adnominally marked verbal element (*poyu-ru*). The focus-associating κ-marked DP then remnant moves to the root.

We further adopt Whitman's (1997) analysis of *kakari musubi* as a cleft construction. Under a cleft-approach of Whitman (1997), the presupposition of the *musubi* constituent comes for free. (Delin 1992, *int. al.*) Note that both the cleft analysis (Whitman, 1997) as well as the FR analysis (Chierchia and Caponigro, 2013) require a biclausal structure, which we assume for KM. We further take the κP to move across the clause boundary from CP_2 into the matrix CP_1, which also contributes the interrogative meaning. Our analysis will maintain Whitman's (1997) tenets while expanding on it semantics, which will amount to a FR-treatment of KM.

The derivation of our exemplar case in (517) is therefore the one in (518). For simplicity, we ignore the copies from the internal structure of the moved material. We also make use of dashed nodes to ignore the intermediate projections which are not necessarily relevant to the derivation. Terminals on sites of pronunciation are marked in bold.

(518) Deriving (518):



Under this analysis, the interpretation of the lower clause, containing (and denoting) the *musubi* presuppositional component of the proposition is the same as the interpretation of a FR under Chierchia and Caponigro's (2013) analysis. The association with focus takes place in the higher clause, which is also, at least in the case of (517), interrogative.

The interpretation of the embedded clause (CP_2), turned into a DP along the lines explored above, is thus a presuppositional FR, while the higher (matrix) CP_1 involves a κ-headed focus construction and a question.

(519) a. $[\![CP_2]\!] = \lambda P \exists x[x = \iota x[\textsc{roared}_w(x)] \wedge P_w(x)]$

b. $[\![CP_1 \setminus C^0_{1+Q}]\!] = \mathfrak{X}_{[D]}(p) = p \wedge \forall q \in \mathfrak{A}(p)[[p \nVdash q] \rightarrow \neg q] \mid p = \exists x[x = \iota x[\textsc{roared}_w(x)] \wedge \textsc{iritated-tiger}_w(x)]$

c. $[\![CP_{1[+Q]}]\!] = \lambda q[\mathfrak{X}(p) = q \vee \mathfrak{X}(p) = \neg q]$
where $p = \lambda w \exists x[x = \iota x[\textsc{roared}_w(x)] \wedge \textsc{iritated-tiger}_w(x)]$

Recall also the fact that *kakari musubi* was lost in the post-classical period, when the interrogative function of the κ particle enters the language. This also shows the diachronic interlock between interrogative and cleft-like constructions. As Harris and Campbell (1995: 166) note, biclausal constructions are prone to changing (simplifying) into monoclausal ones. In (520), we list the three-stage principle of structure simplification from Harris and Campbell (1995: 166).

(520) **STAGE I** The structure has all the superficial characteristics of a biclausal structure and none of the characteristics of a monoclausal one.

STAGE II The structure gradually acquires some characteristics of a monoclausal structure and retains some of the characteristics of the biclausal one.

STAGE III The structure has all of the characteristics of a monoclausal structure and no characteristics of a biclausal one.

Note, however, a potential problem: if KM diachronically declines at the time when *ka* acquires interrogative force, then we have to assume, given our adoption of Chierchia and Caponigro's (2013) model, that *ka* has, technically, been interrogative throughout the history of early Japonic. Given Chierchia and Caponigro's (2013) theory, this seems to be the correct prediction. We, however, assume that *ka* occupied a syntactically lower (subclausal) position in OJ (Aldridge, 2009) and that its independent and true interrogative function arose through syntactic change when, as KM declined, *ka* was reanalysed as occupying a C-level position, which, we assume, occurred synchronically with the loss of biclausal structure (*qua* loss of KM).

5.5 Chapter summary

Assuming Chierchia's (2013b) research programme, which rests on the simple observation that the distribution of SIs is a Polarity sensitive phenomenon, this chapter has shown diachronic reflexes of the Polar and Scalar system of pragmatic strengthening. Implicatures strengthen meaning by reducing the logical space of possible meanings, as do Polarity Sensitive Items (PSIs).

In order to understand the semantic split of polar/universal meanings of early IE *wh*+μ terms, we have adopted a diachronic-comparative approach and developed an analysis of Japonic.

In Old Japanese, the [*wh*+μ] quantificational expressions were confined to inherently scalar (σ) complements, i.e. either numeral nominals or inherently scalar *wh*-terms (e.g. how-many/when), as Whitman (2010) first noticed. The combination of a numeral ($n \in \mathbb{N}$) and μ, $[_{\mu P}\ n\ \mu^0]$, yielded '*even n*'. Here, I focus on the latter and ignore the former numeral μ-hosts. The only two kinds of *wh*-terms which can serve as μ-hosts we find in OJ are temporal- (416) and quantity-*wh*-terms (431), i.e. those *wh*-abstracts with only a σ-domain of alternatives.

One of the ideas central to the proposal made in the paper is that the original μ^0 associated with scalar hosts, i.e. those elements endowed with [σ] feature, and that the exhaustification of the scalar space of alternatives, as per Chierchia's (2013b) system, delivered positive inferences. The prediction that scalar exhaustification of existential *wh*-terms makes is that, under negation, SIs should be borne out (as is the case with OJ). In 5.5, we sketch the semantic evolution of Japonic μ and κ particles.

We have hypothesises a narrow syntactic featural change from $[+\sigma, (-D)]$ to $[+D, (-\sigma)]$ for the development of polar expressions of the same morphosyntactic structure. This has been confirmed by the Early Middle Japanese (EMJ) where we encountered the rise of the polarity system. An additional and parallel reflex of this change also the shift from the meaning of 'even' ($[+\sigma]$) to 'also' ($[+D]$). Our synchronic analysis of μ-conjunction

(§4.3.4) has also been empirically confirmed in light of the rise of *μ*-marked conjunction constructions in EMJ.

This chapter has not only shown the synchronically explanatory and predictive power of Chierchia's (2013b) exhaustification-based approach to the polarity and scalarity systems, using which we have modelled semantic changes in Japonic, but has also, hopefully, shown that there is (a rather unexplored amount) of room in historical linguistics for cross-linguistic diachronic analyses.

Our Japonic-inspired analysis, if conjecturally transplanted onto IE, for reasons given above, would predict an inherently scalar diachronic core to $\mu/{*}k^{w}e$. In Chierchia's (2013b) system, the change from—what we have pretheoretically labelled—unrestricted universal quantification to the rise of the polarity sensitivity can be elegantly captured within a feature-based system operated on by exhaustification, structurally via $\mathfrak{X}$.

(521) a. $[\![[\neg\ \mu P]_1]\!] \rightsquigarrow$ SI: $\mathfrak{X}_{\sigma\mathfrak{A}}\Big[\neg[\ldots[_{\mu P}\ \ \exists_{[+\sigma]}\ \ \mu]]\Big] = \neg > \forall \vdash \neg\forall$

b. $[\![[\neg\ \mu P]_2]\!] \rightsquigarrow$ NPI: $\mathfrak{X}_{D\mathfrak{A}}\Big[\neg[\ldots[_{\mu P}\ \ \exists_{[+D]}\ \ \mu]]\Big] = \forall > \neg \vdash \neg\exists$

With novel and theoretically motivated precision of viewing *wh-μ* terms in IE ($={*}k^{w}o\text{-}{*}k^{w}e$), we have presented a novel view of a 'quantificational split' in IE. Using a cross-diachronic filter from Japonic, we have modelled a view of diachronic evolution of such quantificational terms.

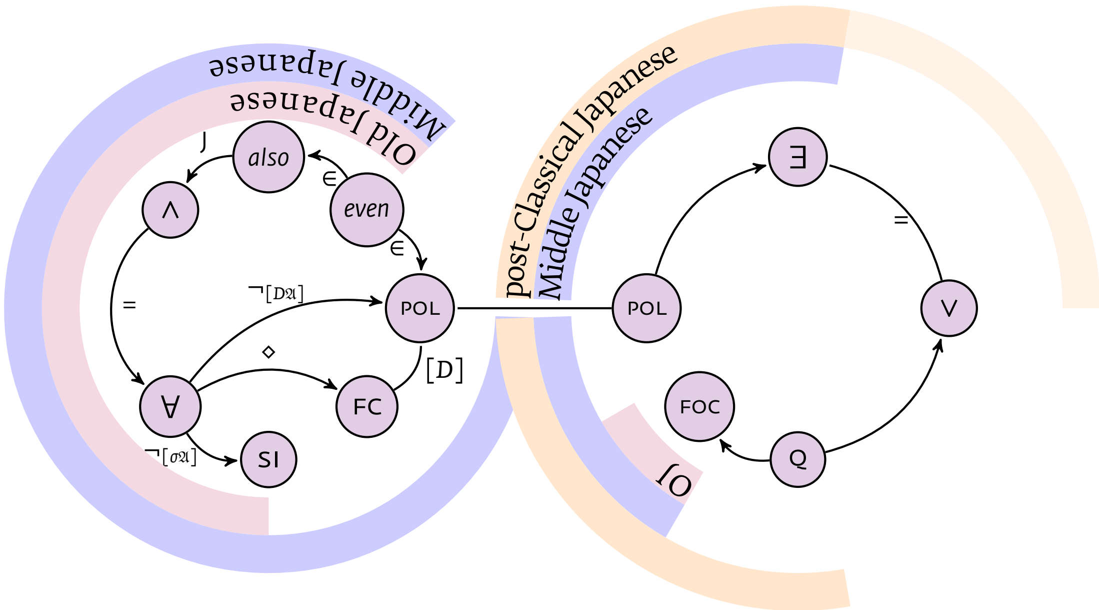


FIGURE 5.5.: *Diachronic-semantic oscillations of* μ (LEFT) *and* κ (RIGHT) *meanings*

6 Conclusion

This thesis has investigated diachronically the nature of syntactic-semantic atoms of propositional logic, used to express logical constructions like quantification, coordination and interrogation. With a two dimensional focus on synchronic typology and diachronic developments, we have explored the ways in which Indo-European (IE) specifically and Natural Language more generally incarnates logical terms.

Languages consistently contain a single set of two superparticles—μ and κ—which handles universal/existential as well as conjunctive/disjunctive constructions respectively. Aside from the latter coordinate/quantification semantics, μ may also serve as an additive and κ as an interrogative element. A desideratum of the present work was to unify not only the semantic but also the syntactic distribution of the contextual incarnations of the two kinds of particles by investigating the diachronic facts and processes underlying these linguistic phenomena.

Empirically, the thesis has focused on a morphologically rich collection of ancient (and modern) Indo-European (IE) languages, which—through their morphology—reveal otherwise silent syntactic material that we fail to find in a language like Japanese. The silent syntax we uncover by examining such languages points, among other things, to a syntactically—and semantically—*neutral* concept of *junction*, which is structurally and interpretationally the foundation underlying the systems of *con*junction and *dis*junction. By breaking down coordination into separate layers, I was also able to capture the syntactic and semantic differences, lying in the amount of layered syntactic projections, as well as the core components of the kinds of meanings the pair of particles dictates.

A conjunction word like $*k^we$ in early IE, for instance, did not only serve to conjoin elements (cf. synchronic function of *and* in English), but also to focalise an element by asserting additivity (cf. English *also*) or even universally quantify over elements (cf. synchronic function of *all*). Similarly, the disjunction word did not only express disjunction but was also used to express questions. My analysis aimed to explain this multi-functionality of conjunction and disjunction words by fine-graining their syntactic representations and attributing the differences in meaning to the amount of syntactic projection.

The work has potentially several consequences, spanning across synchronic and diachronic fields of linguistics. On the one hand, one of my chapters was devoted to a syntactic (and compositional semantic) reconstruction of coordination and some related constructions in PIE. On the other hand, my work shows that historical data and analyses may have a lot of bearing on our synchronic linguistic investigations of coordinate syntax or polarity words (like *any* in English). We have also presented a fresh comparative approach to IE and Japonic, arguing in Chapter 5 that μ-marked polarity sensitive expressions were diachronically not origination, neither in Japonic and nor in IE.

Through a review of a rich collection of data featuring a surprisingly uniform class of superparticles, we have been examining the relation between grammar and logic, that is, the way in which syntax encodes logical primitives. Partee (1992: 124f) has meditated on such encoding writing that "Natural language expression which seem to call for an analysis in higher types . . . tend to belong to small closed syntactic categories whose members seem very close to being universal." We have aimed at exploring, at least a fraction, of the diachronic nature of two such primitive categories—we have called these μ and κ.

We have implicitly been investigating Boolean algebraic structures. A Boolean algebra, or at least a Boolean subalgebra for conjunction and disjunction, in simplest formal terms, is a tuple containing a lexicon (L) and two boolean operators, defined over L.

(522) $\langle L, \wedge, \vee \rangle$

Driven by morphosyntactic evidence, I have also proposed a novel composition of exclusive disjunction, based on the resulting embedded exhaustification of the disjuncts. We have explored and shows in this thesis that natural linguistic words like 'and' and 'or' are not direct incarnations of

'$\wedge$' and '$\vee$' (in some languages, at least). Rather, 'and' and 'or' are subsets of two broader classes, μ and κ respectively. We have attempted a unification of the two classes by appealing to iterative exhaustification (Chierchia, 2013b) as a semantic signature of μ, and the inquisitive operator as a semantic signature of κ. We have also motivated a syntax and semantic for a Junction field, which pairs up two μ- or κ-headed constituents are delivers conjunction and/or disjunction, respectively. Rather than (522), a natural language Boolean algebra looks more like (523)

(523) $\langle L, \mu, \kappa, J \rangle = \langle L, \mathfrak{X}, ?, \bullet \rangle$

In this investigation, we have also been, more or less, implicitly considering the relation between the structure building (syntax) and the structure inferring components (semantics/pragmatics) interact. May (1991: 353) was among the first to argue very strongly for a disctinction between lexical items, whose meanings are underdetermined by UG, and logical terms, whose meanings are possibly totally determined by UG. These are all broader questions inherent to modern generative enterprise. The research thrust of the present work has tried aligning itself in the future directions of such questions. A Buddhist epilogue to the thesis is rather scalar: while it may not be much, it is hopefully something.

Appendices

A

The formal semantic system

This appendix outlines the formal foundation of the semantics that is utilised in this thesis. The semantic language I use is adopted in full from Chierchia (2013b: 136–139) where a version of two-sorted type theory known as TY2 is adopted.

A.1 The formal framework

A partial version of TY2 is used along with Kleene's (1950) strong logic of indeterminacy (K_3) for connectives and quantifiers, enriched so as to include indexical expressions (like *I* or *here*).

def. **I** TYPES

i. *Basic types:* `e` (entities), `t` (truth values), `w` (worlds/situations)
ii. *Functional types:* if `a`,`b` are types, ⟨`a`,`b`⟩ is a type (of functions of things of types `a` into things of type `b`)

def. **II** SYNTAX

i. *Lexicon:* for any type `a`, we have denumerably many variables and constants of that type
ii. *Functional application:* if β is of type ⟨`a`,`b`⟩ and α is of type `a`, $\beta(\alpha)$ is of type `b`
iii. *λ-abstraction:* if α is a variable of type `a` and β is an expression of type `b`, $\lambda\alpha[\beta]$ is of type ⟨`a`,`b`⟩

iv. If ϕ, ψ are of type $\mathtt{t}$, and α is a variable of any type, then the following are expressions of type $\mathtt{t}$: $\neg\phi$, $(\phi \wedge \psi)$, $(\phi \vee \psi)$, $(\phi \rightarrow \psi)$, $(\phi \leftrightarrow \psi)$, $\forall\alpha[\phi]$, $\exists\alpha[\phi]$.

def. **III** DOMAINS

i. $\mathfrak{D}_{\mathtt{e}} = U$

ii. $\mathfrak{D}_{\mathtt{t}} = \{0, 1\}$

iii. $\mathfrak{D}_{\mathtt{w}} = W$

iv. $\mathfrak{D}_{\langle \mathtt{a},\mathtt{b} \rangle} = [\mathfrak{D}_{\mathtt{a}} \Rightarrow \mathfrak{D}_{\mathtt{b}}]$

def. **IV** MODEL

A model M is a triplet $\langle U, W, F \rangle$, where W, U are as per definition above and F is a function such that for any $w \in W$ and any constant α of type $\mathtt{a}$, $F(\alpha)(w) \in \mathfrak{D}_{\mathtt{a}}$. An assignment g maps each variable of type $\mathtt{a}$ into a member of $\mathfrak{D}_{\mathtt{a}}$.

For any well-formed expression β, $[\![\beta]\!]^{M,g,w}$ is the value of β relative to M, an assignment to the variables g and a world/situation w, if defined. We will generally omit M from the superscript. The world w in the exponent of the interpretation function $[\![\cdot]\!]^{g,w}$ is to be understood as playing the role of the context of evaluation. This means that expressions like *man* or *walk* (of type $\langle s, \langle e, t \rangle \rangle$) are going to have a constant value across contexts, while the value of the expressions like *I* (of type $\mathtt{e}$) are going to vary across contexts.[1]

def. **V** SEMANTICS

i. if α is a variable of type $\mathtt{a}$, $[\![\alpha]\!]^{g,w} = g(\alpha)$

ii. if α is a constant, $[\![\alpha]\!]^{g,w} = F(\alpha)(w)$

iii. $[\![\beta(\alpha)]\!]^{g,w} = [\![\beta]\!]^{g,w}([\![\alpha]\!]^{g,w})$, if defined (else undefined)

iv. for any u, $[\![\lambda\alpha[\beta]]\!]^{g,w}(u) = [\![\beta]\!]^{g[\frac{\alpha}{u}],w}$, if defined (else undefined)

v. $[\![\exists\alpha[\phi]]\!]^{g,w} = 1$ iff for some u, $[\![\phi]\!]^{g[\frac{\alpha}{u}],w} = 1$

1 Examples:

i. For any w, $F([\![\text{walk}]\!])(w)$ is that member of d of $D_{\langle \mathtt{s},\langle \mathtt{e},\mathtt{t} \rangle\rangle}$ such that for any $w' \in D_w$ and any $u \in D_{\mathtt{e}}$, $d(w')(u) = 1$ iff u walks in w'

ii. For any w, $F([\![\text{I}]\!])(w) = u$, where u is the speaker in w

vi. $[\![\exists\alpha[\phi]]\!]^{g,w} = 0$ iff for all u in D_a (a being the type of α), $[\![\phi]\!]^{g[\frac{\alpha}{u}],w} = 0$, else undefined

vii. $[\![\neg\phi]\!]^{g,w} = 1$ iff $[\![\phi]\!]^{g,w} = 0$, else undefined

viii. $[\![\phi \wedge \psi]\!]^{g,w} = 1$ iff $[\![\phi]\!]^{g,w} = [\![\psi]\!]^{g,w} = 1$

ix. $[\![\phi \wedge \psi]\!]^{g,w} = 0$ iff $[\![\phi]\!]^{g,w} = 0$ or $[\![\psi]\!]^{g,w} = 0$, else undefined

x. *Truth:* an expression ϕ of type t is true relative to w (i.e., $[\![\phi]\!]^{w} = q$) iff for any appropriate function g to the free variables in ϕ relative to w, $[\![\phi]\!]^{g,w} = 1$. An assignment g to the free variables of ϕ relative to w is appropriate iff for all variables w of type s occurring free in ϕ, $g(w) = w$.[2]

[more on foundations from George (2011)

def. **VI** GENERALISED ENTAILMENT

i. if ϕ, ψ are of type t, $[\![\phi \subseteq \psi]\!]^{w} = 1$ iff for any w' if $[\![\phi]\!]^{w'} = 1$, then $[\![\psi]\!]^{w'} = 1$

ii. if β, γ are of type $\langle a, b\rangle$, where b is the type that ends in t, then: $\beta \subseteq \gamma := \forall\alpha[[\beta](\alpha) \subseteq [\gamma](\alpha)]$, where α is a variable of type a

def. **VII** CONSISTENCY

A set of formulae Φ is consistent (CON(Φ)) iff there is no formula ϕ such that $\Phi \vdash \phi$ and $\Phi \vdash \neg\phi$. Otherwise, Φ is inconsistent (INC(Φ))

i. Φ is *simply consistent* iff for no formula ϕ of Φ, both ϕ and $\neg\phi$ are theorems of Φ.

ii. Φ is *absolutely consistent* iff at least one formula of Φ is not a theorem of Φ.

iii. Φ is maximally consistent iff for every formula ϕ, if CON$(\Phi \cup \phi)$, then $\phi \in \Phi$

iv. Φ is said to contain witnesses iff for every formula of the form $\exists x\phi$, there exists a term t such that $[\exists x\phi \rightarrow \phi^{t}_{x}]$

def. **VIII** EQUIVALNCE CLASSES The following equivalnces hold:

i. commutativity

2 The effect of this definition of truth is that a formula like RUN(*John*)(w) is true relative to w iff $[\![\text{RUN}(\textit{John})(w)]\!]^{g,w} = 1$, for any g such that $g(w) = w$.

a. $\phi \wedge \psi \Leftrightarrow \psi \wedge \phi$
b. $\phi \vee \psi \Leftrightarrow \psi \vee \phi$

ii. associativity

a. $\phi \wedge (\psi \wedge \chi) \Leftrightarrow (\phi \wedge \psi) \wedge \chi$
b. $\phi \vee (\psi \vee \chi) \Leftrightarrow (\phi \vee \psi) \vee \chi$

iii. distibutivity

a. $\phi \wedge (\psi \vee \chi) \Leftrightarrow (\phi \wedge \psi) \vee (\phi \wedge \chi)$
b. $\phi \vee (\psi \wedge \chi) \Leftrightarrow (\phi \vee \psi) \wedge (\phi \vee \chi)$

def. **IX** QUANTIFIER DISTRIBUTION AND BOOLEAN IDENTITIES

i. Law of quantifier distribution #2 (Partee et al., 1990: 149, ex. 7-9):
$\forall x[\phi(x) \wedge \psi(x)] \Longleftrightarrow \big[\forall x[\phi(x)] \wedge \forall x[\psi(x)]\big]$

ii. Law of quantifier distribution #3 (*ibid.*):
$\exists x[\phi(x) \vee \psi(x)] \Longleftrightarrow \big[\exists x[\phi(x)] \vee \exists x[\psi(x)]\big]$

Following from the two laws above are the following homomorphisms (see Hammond 2006: 84):

i. $\forall x\big[\phi(x)\big] = \prod_{i=1}^{|\mathfrak{D}|} \phi(x_i)$

ii. $\exists x\big[\phi(x)\big] = \prod_{i=1}^{|\mathfrak{D}|} \phi(x_i)$

The truth-functional proof in IL for the homomorphism between quantificational and the Boolean terms is given below and is adapted from Takeuti (1987: 63).

PROOF. of (**IX**i) It hold that $\forall d \in \mathfrak{D}\big[[\![\forall x[\phi(x)]]\!] \leqslant [\![\phi(d)]\!]\big]$ since $\forall x\big[\phi(x) \rightarrow \phi(d)\big]$ is provable in IL. Now let $[\![C]\!] \leqslant [\![\phi(d)]\!]$ for every $d \in \mathfrak{D}$. Then $\Gamma, C \rightarrow \phi(d)$ is provable for every $d \in \mathfrak{D}$. Take d to be a free variable, which does not occur in $\Gamma, C, \forall x\big[\phi(x)\big]$. Then $\Gamma, C, \forall x\big[\phi(x)\big]$ is provable in IL.

PROOF. of (**IX**ii) Along the same lines as above.

This can also be indirectly proven by appealing to the Generalisation Theorem, following Enderton (2001: 117–118), which we state in (X) below.

def. **X** GENERALISATION THEOREM If $\Gamma \vdash \phi$ and x does not occur free in any formula, then $\Gamma \vdash \forall x\phi$.

PROOF. Consider a fixed set Γ and a variable x not free in Γ. We will show by induction that for any theorem ϕ of Γ, we have $\Gamma \vdash \forall x\phi$. For this it suffices (by the induction principle) to show that the set

$$\{\phi | \Gamma \vdash \forall x\phi\}$$

includes $\Gamma \cap \Lambda$ and is closed under *modes ponens*. Notice that x *can* occur free in ϕ. If ϕ is a logical axiom, then $\forall x\phi$ is also a logical axiom. Then, so is $\Gamma \vdash \forall x\phi$. ■

def. **XI** DE MORGAN LAWS In set-theoretic terms:

i. $\mathtt{C}(A \cup B) \Leftrightarrow \mathtt{C}(A) \cap \mathtt{C}(B)$

ii. $\mathtt{C}(A \cap B) \Leftrightarrow \mathtt{C}(A) \cup \mathtt{C}(B)$

PROOF. The proof is adapted from Mendelson (1990: 6). Let $A \subset S$ and $B \subset S$. Suppose $x \in \mathtt{C}(A \cup B)$. Then $x \in S$ and $x \notin (A \cup B)$. Thus $x \notin A$ and $x \notin B$, or $x \in \mathtt{C}(A)$ and $x \in \mathtt{C}(B)$. Therefore $x \in \mathtt{C}(A) \cap \mathtt{C}(B)$. Therefore, $\mathtt{C}(A \cup B) \vdash \mathtt{C}(A) \cap \mathtt{C}(B)$. Conversely, suppose $x \in (\mathtt{C}(A) \cap \mathtt{C}(B))$. Then $x \in S$ and $x \in \mathtt{C}(A)$ and $x \in \mathtt{C}(B)$. Thus $x \notin A$ and $x \notin B$, and therefore $x \notin (A \cup B)$. It follows that $x \in \mathtt{C}(A \cup B)$ and, consequently, $\mathtt{C}(A) \cap \mathtt{C}(B) \vdash \mathtt{C}(A \cup B)$. It therefore holds that $\mathtt{C}(A \cup B) \Leftrightarrow \mathtt{C}(A) \cap \mathtt{C}(B)$, which proves (*def.* **X**-i). ■

Proof for (*def.* **XI**-ii) follows along the same lines. A shorter proof is obtained if we apply (*def.* **X**-i) to the two subsets $\mathtt{C}(A)$ and $\mathtt{C}(B)$ os S. Therefore: $\mathtt{C}(\mathtt{C}(A) \cup \mathtt{C}(B)) = \mathtt{C}(\mathtt{C}(A)) \cap \mathtt{C}(\mathtt{C}(B)) = A \cap B$. Taking complements again, we arrive at $\mathtt{C}(A) \cup \mathtt{C}(B) = \mathtt{C}\Big(\mathtt{C}(\mathtt{C}(A) \cup \mathtt{C}(B))\Big) = \mathtt{C}(A \cap B)$, which entails $\mathtt{C}(A \cap B) \Leftrightarrow \mathtt{C}(A) \cup \mathtt{C}(B)$, thus proving (*def.* **XI**-ii). ■

The set-theoretic expressions trivially translate into propositional-logical terms:

i. $\neg[\phi \vee \psi] \Leftrightarrow \neg\phi \wedge \neg\psi$

ii. $\neg[\phi \wedge \psi] \Leftrightarrow \neg\phi \vee \neg\psi$

A.2 The dynamics of alternatives

In what follows, we outline how alternatives are recursively defined in Chierchia's (2013b) system.

def. **XII** DEFINITION OF THE SET OF ALTERNATIVES $[\![\alpha]\!]^{\mathfrak{A}}$, for any expression α, where $\mathfrak{A}$ is a function from expressions to a set of interpretations.

i. *Base clause.* Sample lexical entries:

a. *or/and*

- $[\![\text{or}]\!]^{\mathfrak{A}} = [\![\text{or}]\!]^{D\mathfrak{A}} \cup [\![\text{and}]\!]^{D\mathfrak{A}}$
- $[\![\text{or}]\!]^{D\mathfrak{A}} = \left\{ \begin{matrix} & \lambda p\lambda q[p \vee q] & \\ \lambda p\lambda q[p] & & \lambda p\lambda q[q] \end{matrix} \right\}$
- $[\![\text{and}]\!]^{D\mathfrak{A}} = \left\{ \begin{matrix} & \lambda p\lambda q[p \wedge q] & \\ \lambda p\lambda q[p] & & \lambda p\lambda q[q] \end{matrix} \right\}$

b. *some/a*

- $[\![\text{some}_D]\!]^{\mathfrak{A},g} = [\![\text{some}]\!]^{D\mathfrak{A}} \cup [\![\text{every}]\!]^{D\mathfrak{A}}$
- $[\![\text{some}_D]\!]^{D\mathfrak{A},g} =$ $\{\lambda P\lambda Q\exists x \in D[P(x) \wedge Q(x)] : D' \subset g(D)\}$
- $[\![\text{every}_D]\!]^{D\mathfrak{A},g} =$ $\{\lambda P\lambda Q\forall x \in D[P(x) \Rightarrow Q(x)] : D' \subset g(D)\}$

Other scalar items are defined along similar lines.[3]

i. For any lexical entry α, unless otherwise specified: $[\![\alpha]\!]^{\mathfrak{A}} = \{[\![\alpha]\!]\}^{(\mathfrak{A})}$, i.e. any lexical entry is an alternative to itself.

ii. *Recursive clause.* (Pointwise functional application/PFA) $[\![\beta(\alpha)]\!]^{(D)\mathfrak{A}} = \{b(a) : b \in [\![\beta]\!]^{(D)\mathfrak{A}} \text{ and } a \in [\![\alpha]\!]^{(D)\mathfrak{A}}\}$

iii. Strict σ-alternatives and contextual pruning:

- $[\![\alpha]\!]^{\sigma\mathfrak{A}} = \{p \in [\![\alpha]\!]^{\mathfrak{A}} : \text{ for no } q \in [\![\alpha]\!]^{D\mathfrak{A}}, q \subset p\}$
- $[\![\alpha]\!]^{C/\sigma\mathfrak{A}} = C$, where C is a subset of $[\![\alpha]\!]^{\sigma\mathfrak{A}}$ such that for any q, if q is a strongest member of $[\![\alpha]\!]^{\sigma\mathfrak{A}}$, then $q \in C$

3 In what follows, we omit the value assignment to variables from the superscript of the recursive calculation of the alternatives.

iv. *Alternative sensitive operators.* For each operator we define (i) its truth conditional import (which is always the same) and (ii) its σ-ALT and (iii) its D𝔄.

a. · $[\![\mathfrak{X}_{\sigma\mathfrak{A}}\phi]\!]^{g,w} = [\![\phi]\!]^{g,w} \wedge \forall p \in [\![\phi]\!]^{\sigma\text{-ALT}}[p \Rightarrow \lambda w'[[\![\phi]\!]^{g,w'}] \subseteq p]$
· $[\![\mathfrak{X}_{\sigma\mathfrak{A}}\phi]\!]^{\sigma\text{-ALT}} = \{[\![\phi]\!]^{g,w}\}$[4]
· $[\![\mathfrak{X}_{\sigma\mathfrak{A}}\phi]\!]^{D\mathfrak{A}} = \{\mathfrak{X}_{\sigma\mathfrak{A}(D)}(p_D) : p_D \in [\![\phi]\!]^{D\mathfrak{A}}\}$, where p_D has domain D and $\sigma\mathfrak{A}(D)$ are the σ-alternatives to p with domain D. The (sub)domain alternatives (DAs) of an exhaustification of the form $\mathfrak{X}_{\sigma\mathfrak{A}}\phi$ are the result of applying $\mathfrak{X}_{\sigma\mathfrak{A}}\phi$ to the D-alternatives of ϕ, pointwise.

b. · $[\![\mathfrak{X}_{D\mathfrak{A}}\phi]\!]^{g,w} = [\![\phi]\!]^{g,w} \wedge \forall p \in [\![\phi]\!]^{D\mathfrak{A}}[p \Rightarrow \lambda w'[[\![\phi]\!]^{g,w'}] \subseteq p]$
· $[\![\mathfrak{X}_{D\mathfrak{A}}\phi]\!]^{D\mathfrak{A}} = \{[\![\phi]\!]\}$
· $[\![\mathfrak{X}_{D\mathfrak{A}}\phi]\!]^{\sigma\mathfrak{A}} = \{[\![\phi]\!]^{\sigma\mathfrak{A}}\}$[5]

c. $[\![\mathfrak{X}_{Exh\text{-}DA}\phi]\!]^{g,w} = [\![\phi]\!]^{g,w} \wedge \forall p \in [\![\phi]\!]^{Exh\text{-}DA}[p \Rightarrow \lambda w'[[\![\phi]\!]^{g,w'}] \subseteq p]$, where $[\![\phi]\!]^{Exh\text{-}D\mathfrak{A}} = [\![\phi]\!]^{D\mathfrak{A}|R} = \{\mathfrak{X}_{\heartsuit\text{-}D\mathfrak{A}}(p) : p \in [\![\phi]\!]^{D\mathfrak{A}}\}$. For the definition of $\mathfrak{X}_{\heartsuit\text{-}\mathfrak{A}}(p)$, see definition below. In defining pre-exhaustification, we exhaustify $p \in [\![\phi]\!]^{D\mathfrak{A}}$ relative to the members of $p \in [\![\phi]\!]^{D\mathfrak{A}}$ that are innocently excludable (♡) relative to p. The D-alternatives and σ-alternatives of recursively exhaustified $\mathfrak{X}_{D\mathfrak{A}|R}\phi$ ($\mathfrak{X}_{Exh\text{-}D\mathfrak{A}}\phi$) are defined just like those of $\mathfrak{X}_{D\mathfrak{A}}\phi$ in (b).

d. Exhaustification with respect to ALT comes in two varieties:

def. **XIII** INNOCENT EXCLUSION (♡) and ♡-based exhaustification. (Fox, 2007) The set of ♡-𝔄 relative to p is defined as follows:

a. $\heartsuit\text{-}\mathfrak{A}_p = \bigcap\{X \subseteq \text{ALT} : \text{CONS}(p \wedge \neg\bigcap X) \wedge \forall q \in \mathfrak{A}(\text{CONS}(p \wedge \neg\bigcap X \wedge \neg q)) \Rightarrow q \in X\}$

b. $\mathfrak{X}_{\heartsuit\text{-}\mathfrak{A}}(\phi) = \phi \wedge \forall p \in \mathfrak{A}(p \in \heartsuit\text{-}\mathfrak{A}_\phi \wedge \notin p) \Rightarrow \neg p)$

4 That is, once $\mathfrak{X}_{\sigma\mathfrak{A}}$ applies to some expression ϕ, ϕ's σ-alternatives (other than ϕ itself) are no longer available.

5 The σ-alternatives of $\mathfrak{X}_{D\mathfrak{A}}\phi$ are just the σ-alternatives of ϕ.

B

Second-order exhaustification and anti-exhaustivity

In this appendix, we list Fox's (2007: 113) proof that second-order exhaustification obtains anti-exhaustivity (ANTI-$\mathfrak{X}$).

DEF. Let the following hold.

$$\begin{array}{rcl} C & = & \{p|p \in C\}(C \text{ is a set of propositions with } p \in C) \\ I & = & \heartsuit(p, C) \\ & \neq & \varnothing \\ I' & = & (C - I - p) \\ & \neq & \varnothing \\ \text{ANTI-}\mathfrak{X} & = & \bigcap\{\neg\mathfrak{X}_C(q) : q \in I'\} \cap \mathfrak{X}_C(p) \end{array}$$

THEOREM If ANTI-$\mathfrak{X} \neq \varnothing$ (is consistent), then $\mathfrak{X}_C(\mathfrak{X}_C(p)) = \mathfrak{X}^2_C(p) = \text{ANTI-}\mathfrak{X}(p)$.

PROOF By definition of $\mathfrak{X}$:

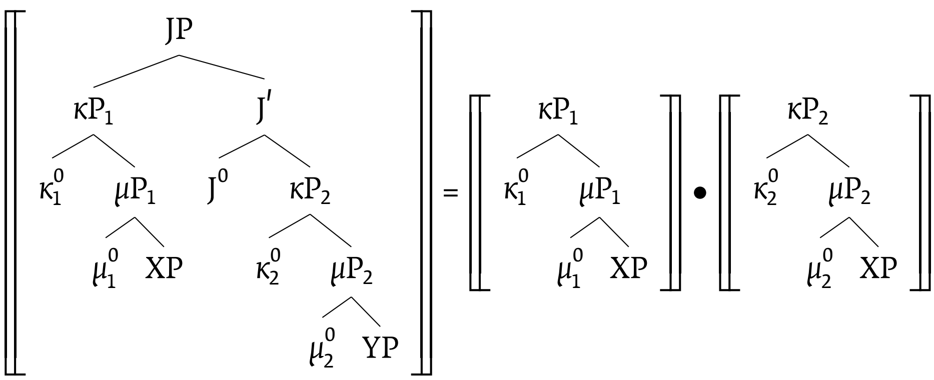
$$
\begin{array}{rcl}
\mathfrak{X}_C(p) & \vdash & \forall q \in I[\neg q] \\
\neg q & \vdash & \neg \mathfrak{X}_C(q) \\
\text{ANTI-}\mathfrak{X} & \vdash & \forall q \in I[\neg \mathfrak{X}_C(q)] \\
\text{ANTI-}\mathfrak{X} & = & \bigcap \{\neg \mathfrak{X}_C(q) : q \in I'\} \cap \{\neg \mathfrak{X}_C(q) : q \in I\} \cap \mathfrak{X}_C(p) \\
 & = & \bigcap \{\neg \mathfrak{X}_C(q) : q \in C - \{p\}\} \cap \mathfrak{X}_C(p) \\
\text{CONS}(\text{ANTI-}\mathfrak{X}) & \vdash & \heartsuit(\mathfrak{X}_C(p), C') = C' \mid C' := \{\mathfrak{X}_C(q) : q \in C\} \\
\mathfrak{X}^2_C(p) & = & \bigcap \{\neg \mathfrak{X}_C(q) : q \in C' - \{\mathfrak{X}_C(p)\}\} \cap \neg \mathfrak{X}_C(p) \\
 & = & \text{ANTI-}\mathfrak{X} \qquad \blacksquare
\end{array}
$$

C

The details of the exclusive implicature calculation

We prove that the syntactic structure of exclusive disjunction, shown to contain both the κ and the μ operators, obtains a compositional interpretation with ane exclusive component (524).

(524)



LEXICAL ENTRIES In (C.1), (C.2), and (C.4), we define the three core building blocks of our system using their proposed lexical entries.

$$
\begin{aligned}
[\![\mathrm{J}]\!] &= \lambda p \lambda q[p \bullet q] && \text{(C.1)}\\
&= \langle p, q \rangle \text{ (generalised form)} &&\\
[\![\kappa]\!] &= [\![\mathbf{?}]\!] && \text{(C.2)}\\
&= \lambda p[?p] &&\\
&= \lambda p \lambda q[q = p \vee q = \neg p] &&\\
&\vdash p \underbrace{\vee \neg p} \text{ (generalised postsuppositional form)} &&\\
&\vdash p \vee \neg p \text{ (generalised normal form)} &&\\
[\![\mu]\!] &= \lambda p[p \wedge \neg \mathfrak{X}(p)] \text{ (assertive form)} && \text{(C.3)}\\
[\![\mu]\!] &= \lambda p[\neg \mathfrak{X}(p)] \text{ (presuppositional form)} && \text{(C.4)}
\end{aligned}
$$

ASSUMPTIONS Following Alonso-Ovalle (2006), we assume that $p \vee q = \{p, q\}$.

THEOREM We now prove that

$$
\begin{aligned}
[\![\kappa]\!]([\![\mu]\!](p)) \bullet [\![\kappa]\!]([\![\mu]\!](q)) &= p \veebar p && \text{(C.5)}\\
&= [p \vee p] \wedge \neg[p \wedge q] \text{ (excl. comp., signature SI)} &&
\end{aligned}
$$

PROOF We assume in our computation below two propositions: $p, q \in C$. By symmetry we mean that compositional identity of the two juncts.

(525) First disjunct (κP_1^+):

$$\begin{array}{rcl} [\![\kappa P_1^+]\!] & = & [\![\kappa_1^0]\!]([\![\mu_1^0]\!]([\![XP]\!])) \\ & = & \lambda p[p \underbrace{\vee \neg p}](\lambda p[p \wedge \neg \mathfrak{X}(p)](p)) \\ & = & \lambda p[p \underbrace{\vee \neg p}](p \wedge \neg \mathfrak{X}(p)) \\ & = & [[p \wedge \neg \mathfrak{X}(p)] \underbrace{\vee \neg [p \wedge \neg \mathfrak{X}(p)]}] \\ \text{[via DEM]} & = & [[p \wedge \neg \mathfrak{X}(p)] \underbrace{\vee \neg [p \wedge \neg \mathfrak{X}(p)]}] \\ & = & [[p \wedge \neg \mathfrak{X}(p)] \underbrace{\vee [\neg p \vee \mathfrak{X}(p)]}] \end{array}$$

(526) Second disjunct (κP_2^+):

$$\begin{array}{rcl} [\![\kappa P_2^+]\!] & = & [\![\kappa_2^0]\!]([\![\mu_2^0]\!]([\![YP]\!])) \\ \text{[via SYMMETRY]} & = & [[q \wedge \neg \mathfrak{X}(q)] \underbrace{\vee [\neg q \vee \mathfrak{X}(q)]}] \end{array}$$

(527) Junction of the two disjuncts ($\kappa P_1^+ \bullet \kappa P_2^+$):

$$\begin{array}{rcl} [\![J^0]\!] & = & \lambda x \lambda y[x \bullet y]([\![\kappa P_1^+]\!])([\![\kappa P_2^+]\!]) \\ & = & \lambda x \lambda y[\langle x, y \rangle]([\![\kappa P_1^+]\!])([\![\kappa P_2^+]\!]) \\ & = & [\![\kappa P_1^+]\!] \bullet [\![\kappa P_2^+]\!] \\ [\![JP]\!] & = & \langle [\![\kappa P_1^+]\!], [\![\kappa P_2^+]\!] \rangle \\ & = & \Big\langle [[p \wedge \neg \mathfrak{X}(p)] \underbrace{\vee [\neg p \vee \mathfrak{X}(p)]}], [[q \wedge \neg \mathfrak{X}(q)] \underbrace{\vee [\neg q \vee \mathfrak{X}(q)]}] \Big\rangle \end{array}$$

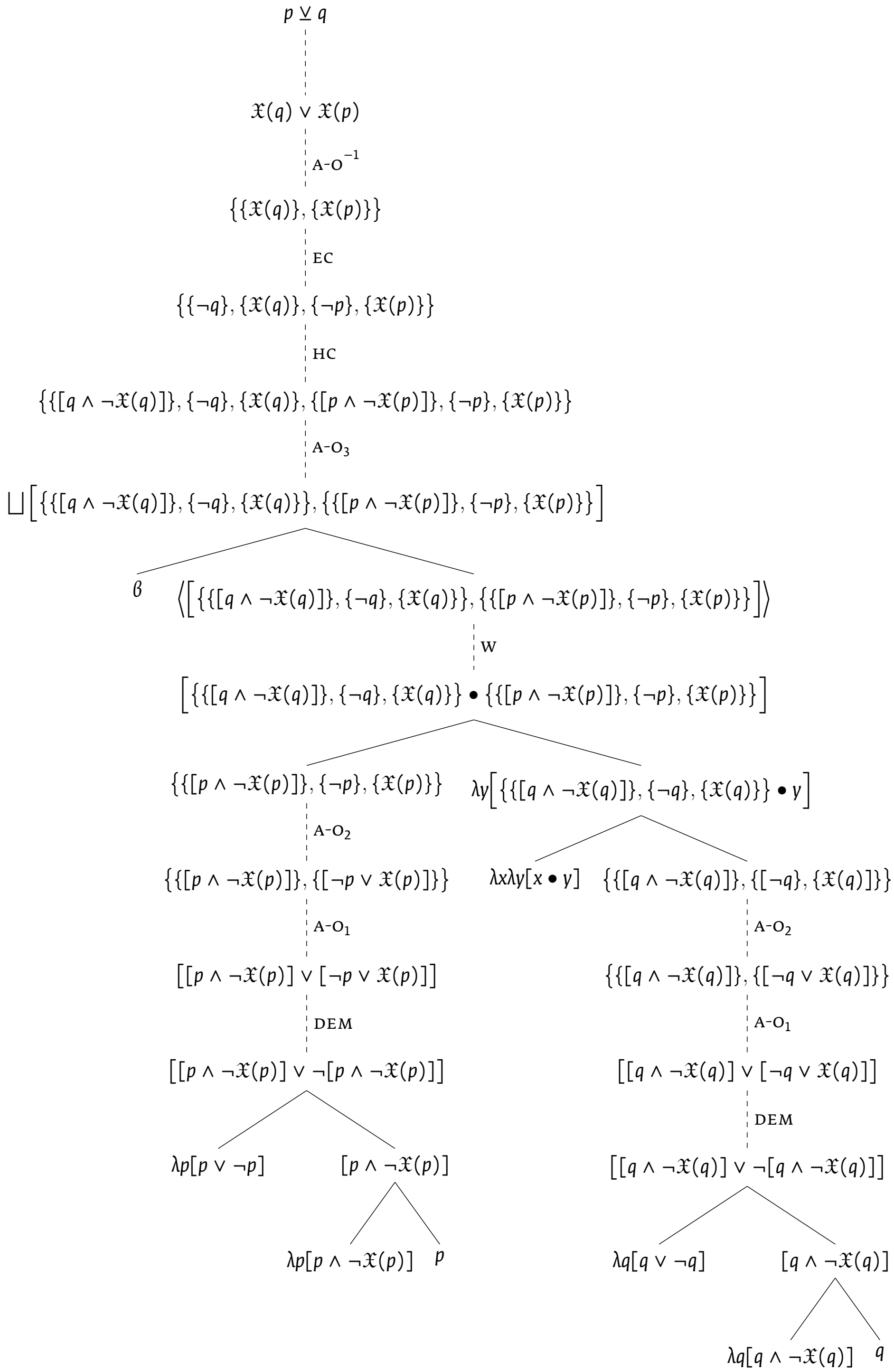
(528) Boolean mapping of the Junction phrase ($\beta_{\sqcup}$(JP)):

$$
\begin{array}{rcl}
[\![\beta^{0}_{\sqcup}]\!] & = & \lambda\langle x,y\rangle\,[\sqcup\{x,y\}]([\![\mathrm{JP}]\!]) \\
 & = & \lambda\langle x,y\rangle\,[x \vee y](\,\langle[\![\kappa\mathrm{P}^{+}_{1}]\!],[\![\kappa\mathrm{P}^{+}_{2}]\!]\rangle\,) \\
 & = & [\![\kappa\mathrm{P}^{+}_{1}]\!] \vee [\![\kappa\mathrm{P}^{+}_{2}]\!] \\
 & = & [[p \wedge \neg\mathfrak{X}(p)]\ \underbrace{\vee[\neg p \vee \mathfrak{X}(p)]}]\vee[[q \wedge \neg\mathfrak{X}(q)]\ \underbrace{\vee[\neg q \vee \mathfrak{X}(q)]}] \\
[\![\mathrm{JP}^{+}]\!] & = & [p \wedge \neg\mathfrak{X}(p)] \vee [q \wedge \neg\mathfrak{X}(q)]\underbrace{\vee[\neg p \vee \mathfrak{X}(p)]}\underbrace{\vee[\neg q \vee \mathfrak{X}(q)]} \\
 & = & [p \wedge \neg\mathfrak{X}(p)] \vee [q \wedge \neg\mathfrak{X}(q)] \vee [\neg p \vee \mathfrak{X}(p)] \vee [\neg q \vee \mathfrak{X}(q)] \\
\text{[via A-O]} & = & \Big\{[p \wedge \neg\mathfrak{X}(p)],[q \wedge \neg\mathfrak{X}(q)],[\neg p \vee \mathfrak{X}(p)],[\neg q \vee \mathfrak{X}(q)]\Big\} \\
\text{[via A-O]} & = & \Big\{[p \wedge \neg\mathfrak{X}(p)],[q \wedge \neg\mathfrak{X}(q)],\{\neg p\},\{\mathfrak{X}(p)\},\{\neg q\},\{\mathfrak{X}(q)\}\Big\} \\
\text{[via HC]} & = & \Big\{\{\neg p\},\{\mathfrak{X}(p)\},\{\neg q\},\{\mathfrak{X}(q)\}\Big\} \\
\text{[via EC]} & = & \Big\{\{\mathfrak{X}(p)\},\{\mathfrak{X}(q)\}\Big\} \\
\text{[via A-O}^{-1}\text{]} & = & \mathfrak{X}(p) \vee \mathfrak{X}(q) \qquad \blacksquare
\end{array}
$$

Note also that if the first conjunct of the LF entry for $[\![\mu]\!]$ is taken presuppositionally, the negative alternatives would be generated and the existential constraint would not need apply in this case.

Repeated proof schematically:

(529) Deriving the exclusive component:

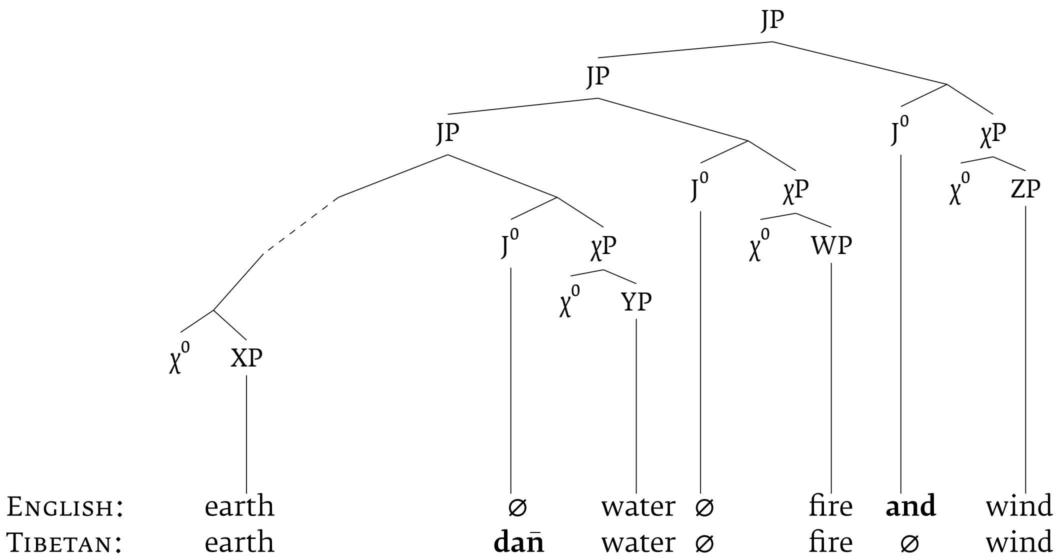


D

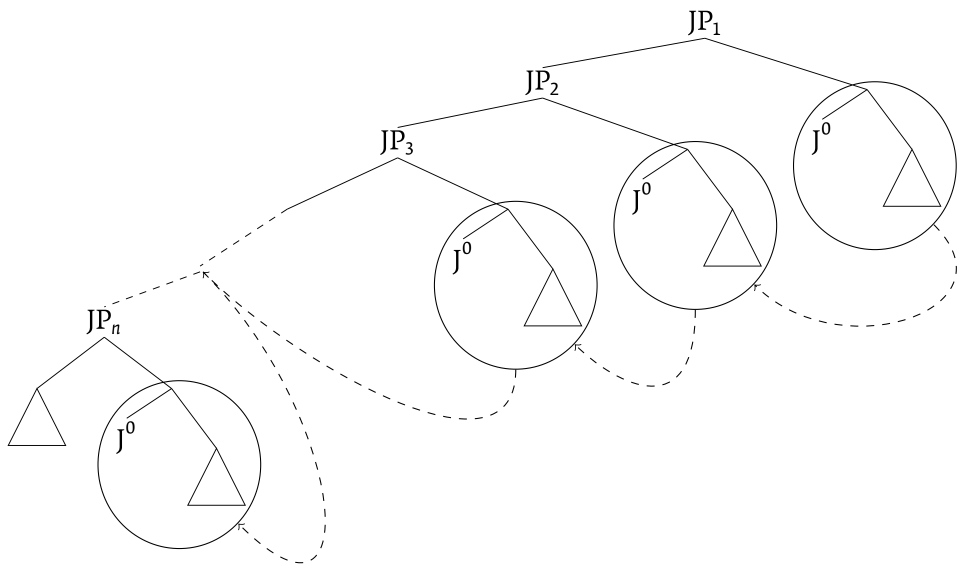
Polysyndetic composition of left-branching J-iterativity

This appendix provides a composition of polysyndetic coordination involving leftward-iterative Junction. Chapter 2 motivated the following syntactic structure:

(530) An *n*-ary coordination tree for and polysyndetic exponence:

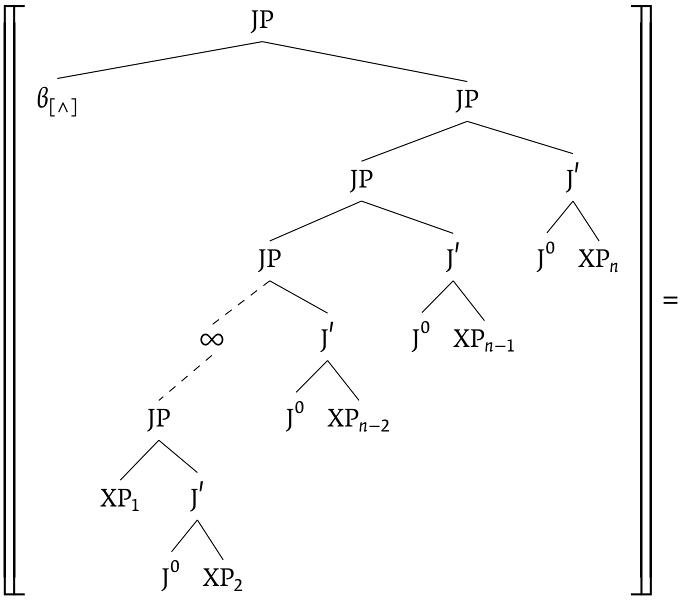


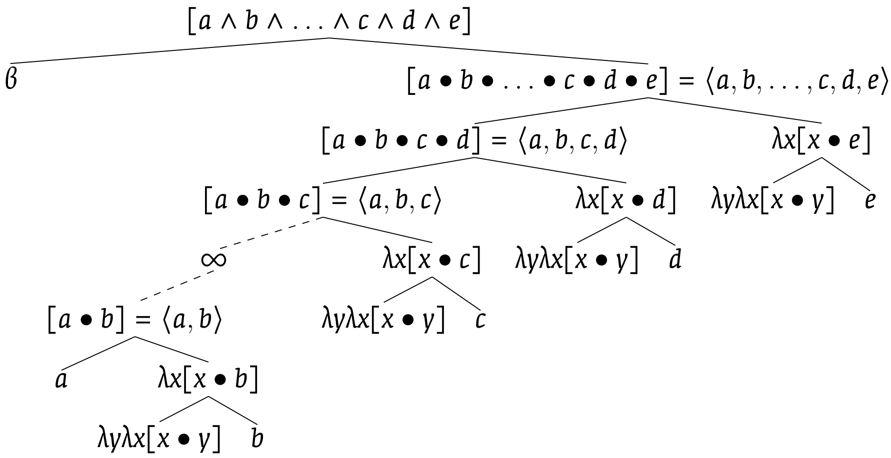
(531) A copy-theoretic derivation of polysyndetic coordination:



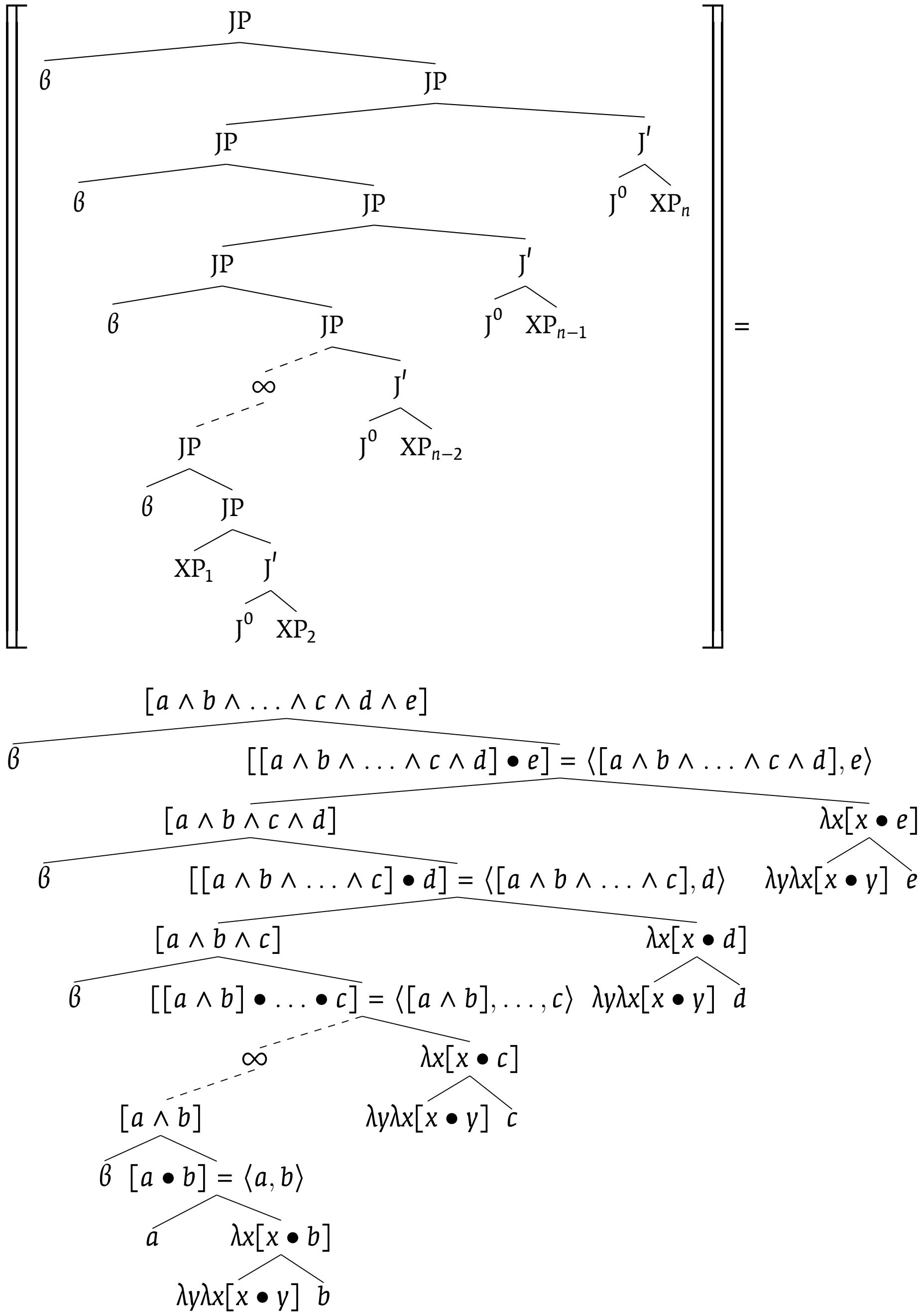
Given our assumptions on Boolean valuation of JPs, as developed in Chapter 4, the compositional interpretation of (531) obtains as per (??). Two compositional possibilities arise with respect to the structural role of the *β* operator: either each of J^0s requires a local *β*, or a single root-level *β* is compositionally sufficient to globally map all bullet-formed tuples to Boolean expressions. (532) shows the former and (533) shows the former. We relativise the constructions to *n*-ary argument coordinations for $\{1, 2, \ldots, n-2, n-1, n\}$. We assume that *β* has a conjunctive value, in line with Szabolcsi (2014c: 12–14) where the MEET operation is taken to be apply to pair as a matter of some default setting. Given associativity (Appendix A, *def.* **VIII**-ii), we flatten the products and conjunctions for simplicity.

(532) The composition of polysyndetic coordination involving a single global Boolean-mapping operator applied to an iterative left-branching JP:





(533) The composition of polysyndetic coordination involving multiple local Boolean-mapping operators applied to an iterative left-branching JP:



E

Concordance of coordinator occurrences in Vedic and post-Vedic Sanskrit

The statistical data is from Hellwig (2011), statistical entries for *Ṛgveda* are mine.

E.1 First-position coordinator *utá/uta* (उत/उ॒त)

	# occurences	# total words	proportion	avg. per period
ARCHAIC				0.431%
Ṛgveda	693	160710	0.00431	
EARLY				0.077%
Aṣṭādhyāyí	1	8765	0.00011	
Chāndogyopaniṣad	7	15557	0.00045	
Gopathabrāhmaṇa	1	9529	0.00010	
Śvetāśvataropaniṣad	5	2091	0.00239	
EPIC				0.034%
Carakasaṃhitā	1	94589	0.00001	
Mahābhārata	299	861589	0.00035	
Mūlamadhyamakārikāḥ	3	2827	0.00106	
Rāmāyaṣa	9	260851	0.00003	

Tantrākhyāyikā	2	8303	0.00024	
CLASSICAL				0.060%
Aṣṭāṅgahṛdayasaṃhitā	2	106552	0.00002	
Bhāgavatapurāṇa	23	42650	0.00054	
Bodhicaryāvatāra	5	13664	0.00037	
Daśakumāracarita	2	19875	0.00010	
Kumārasaṃbhava	3	10235	0.00029	
Kūrmapurāṇa	7	81755	0.00009	
Laṅkāvatārasūtra	63	13200	0.00477	
Liṅgapurāṇa	8	127397	0.00006	
Matsyapurāṇa	7	122452	0.00006	
Pañcārthabhāṣya	20	23143	0.00086	
Sāṃkhyakārikābhāṣya	1	9953	0.00010	
Suśrutasaṃhitā	1	146379	0.00001	
Vaiśeṣikasūtravṛtti	5	8649	0.00058	
MEDIEVAL				0.021%
Āyurvedadípikā	1	38692	0.00003	
Hitopadeśa	2	24928	0.00008	
Mṛgendraṭíkā	12	22027	0.00054	
Nāṭyaśāstravivṛti	1	2585	0.00039	
Nibandhasaṃgraha	2	7328	0.00027	
Parāśarasmṛtiṭíkā	2	7557	0.00026	
Rasaratnasamuccaya	1	28141	0.00004	
Skandapurāṣa	3	16377	0.00018	
Tantrasāra	1	14216	0.00007	
LATE				0.012%
MugdhāvabodhinI	1	30124	0.00003	
Sātvatatantra	3	10095	0.00030	
Skandapurāṣa (Revākhaṣṭa)	5	113982	0.00004	

E.2 Second-position coordinator *ca* (च)

	# occurences	# total words	proportion	avg. per period
ARCHAIC				0.515%

Ṛgveda	828	160710	0.00515	
EARLY				2.808%
Aṣṭādhyāyí	496	8765	0.05351	
Chāndogyopaniṣad	240	15557	0.01543	
Gopathabrāhmaṣa	149	9529	0.01564	
Śvetāśvataropaniṣad	58	2091	0.02774	
EPIC				3.958%
Carakasaṃhitā	4619	94589	0.04883	
Mahābhārata	35971	861589	0.04175	
Mūlamadhyamakārikāḥ	120	2827	0.04245	
Rāmāyaṣa	9222	260851	0.03535	
Tantrākhyāyikā	245	8303	0.02951	
CLASSICAL				2.978%
Aṣṭāṅgahṛdayasaṃhitā	3327	106552	0.03122	
Bhāgavatapurāṣa	788	42650	0.01848	
Bodhicaryāvatāra	421	13664	0.03081	
Daśakumāracarita	440	19875	0.02214	
Kumārasaṃbhava	132	10235	0.01290	
Kūrmapurāṇa	2605	81755	0.03186	
Laṅkāvatārasūtra	339	13200	0.02568	
Liṅgapurāṇa	6202	127397	0.04868	
Matsyapurāṇa	5719	122452	0.04229	
Pañcārthabhāṣya	653	23143	0.02822	
Sāṃkhyakārikābhāṣya	246	9953	0.02472	
Suśrutasaṃhitā	6857	146379	0.04684	
Vaiśeṣikasūtravṛtti	201	8649	0.02324	
MEDIEVAL				3.025%
Āyurvedadípikā	931	38692	0.02406	
Hitopadeśa	780	24928	0.03129	
Mṛgendraṭíkā	682	22027	0.03096	
Nāṭyaśāstravivṛti	74	2585	0.02863	
Nibandhasaṃgraha	124	7328	0.01692	
Parāśarasmṛtiṭíkā	220	7557	0.02911	
Rasaratnasamuccaya	981	28141	0.03486	
Skandapurāṣa	862	16377	0.05263	
Tantrasāra	338	14216	0.02378	
LATE				2.162%
Mugdhāvabodhinī	586	30124	0.01945	
Sātvatatantra	166	10095	0.01644	

Skandapurāṣa (Revākhaṣṭa)	3301	113982	0.02896

E.3 Diachronic summary: decline of initial bimorphemic *utá* (उत)

PERIOD	*uta* (उत)	*ca* (च)
archaic	45.562%	54.438%
early	2.912%	97.088%
epic	0.838%	99.162%
classical	2.213%	97.787%
medieval	0.740%	99.260%
late	0.699%	99.301%

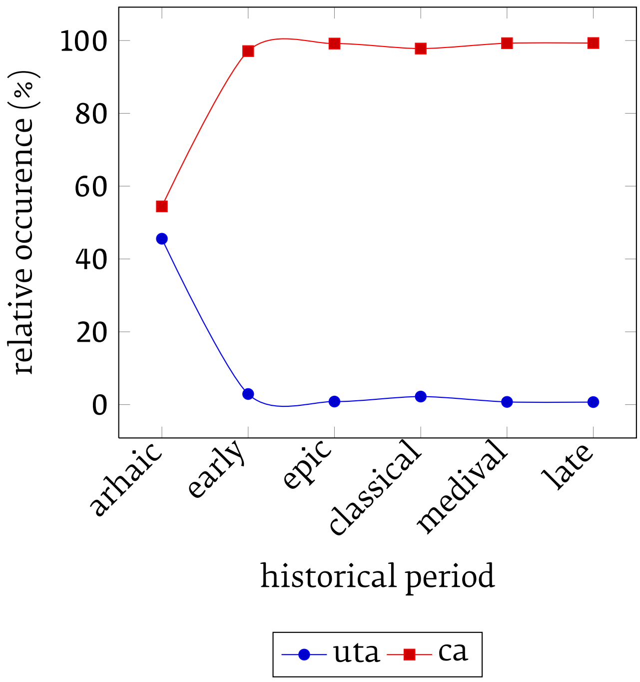


FIGURE E.1.: *The loss of the double system of coordination in Indic*

F

Old Irish Connectives

The following occurrence counts are drawn from the Parsed Old and Middle Irish Corpus as presented in Lash (2014).

	ocus	*occus*	*oc*	*os*	*ocuis*	*acus*	*accus*	⁊	*et*	Σ(*ocus*$_{\pm\text{VAR}}$, *et*, . . .)	*nō*	*nó*	*nū*	Σ(*no*$_{\pm\text{VAR}}$)	*acht*	*act*	Σ(*textitac*(*h*)*t*)	*fa*	*uel*	*sceō*	*l-*	Σ(all connectives)
Cam	15	0	0	0	5	0	0	0	8	28	0	0	2	2	0	0	0	0	0	1	1	32
Arm	0	0	0	0	0	0	0	44	15	59	1	0	0	1	0	0	0	0	0	0	0	60
LC	0	0	0	0	0	0	0	60	90	150	0	0	0	0	0	5	5	1	13	0	0	169
Com	1	0	0	0	0	3	1	89	1	95	7	1	2	10	1	0	1	0	0	0	2	108
Mass	0	0	0	0	0	0	0	48	0	48	0	0	0	0	0	0	0	0	0	0	0	48
Ps	119	0	0	0	0	0	0	8	0	127	0	9	0	9	7	0	7	5	0	0	0	148
WMS	3	0	0	0	0	0	0	23	17	43	0	0	0	0	1	1	2	0	0	0	0	45
MT	3	1	0	1	0	6	11	290	5	317	21	35	0	56	13	0	13	0	3	0	0	389
Hom	0	0	0	0	0	0	0	47	3	50	0	0	0	0	0	0	0	0	0	0	0	50
Lais	0	0	0	0	0	44	0	0	2	46	0	1	0	1	2	0	2	0	0	0	0	49
FR	28	0	0	0	0	0	0	14	0	42	0	1	0	1	2	0	2	0	0	0	0	45
FG	1	0	0	0	0	0	0	8	0	9	0	1	0	1	0	0	0	0	0	0	0	10
LH	55	0	0	0	0	0	0	139	90	284	5	0	0	5	3	0	3	0	7	0	9	308
TDH	0	0	2	0	0	0	0	19	0	21	0	0	0	0	0	0	0	0	0	0	0	21
Σ	225	1	2	1	5	53	12	789	231	1319	34	48	4	86	29	6	35	6	23	1	12	1482

	ocus$_{\pm\text{VAR}}$ / ⁊ / *et*	*nō*$_{\pm\text{VAR}}$	*acht*$_{\pm\text{VAR}}$	*fa*	*uel*	*l-*	*sceō*	Σ
Cam	28 87.50%	2 6.25%	0 0.00%	0 0.00%	0 0.00%	1 3.13%	1 3.13%	32 100.00%
Arm	59 98.33%	1 1.67%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	60 100.00%
LC	150 88.76%	0 0.00%	5 2.96%	1 0.59%	13 7.69%	0 0.00%	0 0.00%	169 100.00%
Com	95 87.96%	10 9.26%	1 0.93%	0 0.00%	0 0.00%	2 1.85%	0 0.00%	108 100.00%
Mass	48 100.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	48 100.00%
Ps	127 85.81%	9 6.08%	7 4.73%	5 3.38%	0 0.00%	0 0.00%	0 0.00%	148 100.00%
WMS	43 95.56%	0 0.00%	2 4.44%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	45 100.00%
MT	317 81.49%	56 14.40%	13 3.34%	0 0.00%	3 0.77%	0 0.00%	0 0.00%	389 100.00%
Hom	50 100.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	50 100.00%
Lais	46 93.88%	1 2.04%	2 4.08%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	49 100.00%
FR	42 93.33%	1 2.22%	2 4.44%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	45 100.00%
FG	9 90.00%	1 10.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	10 100.00%
LH	284 92.21%	5 1.62%	3 0.97%	0 0.00%	7 2.27%	9 2.92%	0 0.00%	308 100.00%
TDH	21 100.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	0 0.00%	21 100.00%

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