The formal diachrony of quantification

Tamás Halm[1,2]

1: Hungarian Research Centre for Linguistics

2: Pázmány Péter Catholic University

1. Introduction

The aim of this review chapter is to provide an introduction to the formal diachronic study of the semantics and syntax of quantification. This simple definition contains certain important restrictions which need to be elucidated before we proceed to the discussion proper.

By **diachronic** study, I mean works which describe how the system of quantification has changed over time in a given language or a set of languages. This excludes work which merely explores a snapshot of the system of quantification at a given point of time (be it in the present or the past).

By **formal** study I mean approaches which adopt or at least are informed by some formal frameworks of syntax or semantics and thus, aspire to move beyond the level of philological description and typological generalisation.

The term **quantification** also needs clarification: while for most linguists, the prototypical case of quantification is universal quantification over a set of individuals in the sense of Barwise & Cooper (1981), the landscape is a very broad and diverse. For reasons of space, and also in order to maintain a sensible division of labour with other chapters, I decided to focus on phenomena which at some level involve universal quantification in the logical sense. This decision luckily does not result in a significant loss of coverage: the bulk of formal diachronic study of quantification has indeed been devoted to universal quantification; while the study of existential quantification has been, with good reason, subsumed under the study of indefinites. Also, since diachronic change is often the result of reinterpretation through the mechanism of constant entailments (different constructions having similar or identical truth conditions), our discussion will inadvertently also touch upon related phenomena such as maximality operators, pluractionals, free-choice items (and indeed, indefinites).

1.1 Emerging themes and strands of research

The formal diachronic study of quantification is in the first stages of rapid development, powered by the advent of large and well-annotated electronic corpora and the advances of formal linguistics. Already, some cross-linguistic generalizations are emerging. In terms of grammaticalization (or reinterpretation) pathways, the following main patterns have been identified:

The **whole-to-all cycle** or spiral: this involves the tendency of adjectives with the meaning of 'healthy, whole, intact' to be reinterpreted as 'all'-type quantifiers. This tendency has been described in the seminal work of Haspelmath (1995) and has spurred much research since including Mladenova (2009), Martzloff (2014), Xing (2015), Bende-Farkas (2020) and Doron (2020).

From A-quantification to D-quantification: this is related to developments whereby an A-quantifier is reinterpreted as a D-quantifier. Phenomena under this rubric are discussed by Haspelmath (1995), Mladenova (2009), Xing (2015) and Bende-Farkas (2020).

The **Head Preference Principle** has been identified by Van Gelderen (2004) as a general driver of language change: phrases have a tendency to be reinterpreted as heads, but not vice versa. This principle is reflected in the diachronic change of quantification as well, as evidenced by the work of Haspelmath (1995), Martzloff (2014), Bende-Farkas (2014a) and Xing (2015) a.o.

Pluractionals to universal quantification proper: pluractional adverbials have truth conditions which are often very close to those of universal quantifiers. As a result, pluractionals are often reinterpreted as universal quantifiers. Such phenomena are discussed by Haspelmath (1995), Mladenova (2009) and Bende-Farkas (2014a, 2015).

The **Universal Semantic Cycle** has been proposed by Beck (2017, 2020), inspired by an observation of Haspelmath (1995): it describes a four-stage cyclical change from (i) covert quantification of propositional alternatives to (ii) covert quantification over lexical alternatives to (iii) quantification in the sense of generalized quantifiers (Barwise & Cooper 1981) to (iv) loss of quantification. Work in this very promising paradigm includes: Beck (2017, 2020, 2022) and Doron (2020). Bende-Farkas (2014a, 2015) to some extent anticipates parts of Beck's (2017) proposal.

Ontological semantic functionalization has been proposed by Gergel (2014): this is the situation where at the outset, lexical item A and lexical item B combine compositionally and after reinterpretation, the original semantic contribution of item B is incorporated into the lexical semantics of item A.

1.2 Challenges ahead and open questions

The formal study of quantification has mostly focused on semantics: there is a probably much to explore when it comes to **syntax and the syntax-semantics interface**. Interesting work has been done on this with regard to Hungarian, where it has been shown that the SOV to SVO change and the resulting development of an articulated functional left periphery has led to the development of a dedicated quantifier field and the syntactically overt marking of quantifier scope (É. Kiss 2014b). Since the SOV to SVO change has affected hundreds of languages, this certainly seems to be a promising line of research.

In terms of semantics: as we will see, type-theoretical **formal semantics** promises to be a powerful tool to describe and analyse the change of quantificational systems: there is some promising work on this (Gergel 2014, Bende-Farkas 2014a, 2015, Beck 2017, 2020, 2022, Doron 2020 a.o.), but there is a considerable amount of empirical data, such as the whole-all spiral, to which such tools have not yet been applied systematically.

2. Setting the stage – The sources of all and every

2.1 Haspelmath (1995)

In his seminal paper, Haspelmath (1995) investigated the diachronic sources of "universally quantifying determiners corresponding to English *all* and *every*". The two subtypes are delineated using surface syntactic criteria: *all*-type universally quantifying determiners associate with plural count nouns and mass nouns, whereas *every*-type UQDs (my abbreviation) associate with plural

singular nouns. (This is of course correlated to the fact that *every*-DPs are usually taken to be distributive whereas *all*-DPs are taken to be collective.)

Haspelmath's main claim is that the current syntactic distribution (and semantic interpretation) of these types of UQDs is a reflection of their respective origins: *all*-type UQDs generally derive from an adjective meaning 'whole'; wheras *every*-type UQDs have three common sources: (i) free-choice indefinite determiners such as English *any*, (ii) distributive [in current terminology, pluractional] prepositions and (iii) *all*-type UQDs.

Haspelmath covers a broad range of languages and language families, although the depth of empirical discussion is uneven and anything outside of Indo-European is only discussed in passim.

The *whole -> all* change is well attested in Romance and Greek: while Latin *totus* meant 'whole', its Romance derivatives (such as Portuguese *todo*) have a split interpretation: with singular count nouns, they retain the old meaning of 'whole' and with plural count nouns, they have the interpretation 'all'.

(1) a. *toda a casa* 'the whole house'

b. *todas as amigas* 'all the friends'

There has been a very similar change from Ancient Greek *hólos* 'whole' to Modern Greek *ólos* 'all'; and there is an ongoing process in Modern German, where *ganz* retains its original meaning of 'whole' alongside with an emerging more innovative 'all'-use in the colloquial register. A similar process has been reconstructed concerning Sanskrit *sarva-* 'whole, all' (<PIE **solwos* 'sound, well'). Hindi-Urdu *saara* 'all' developed from Sanskrit *sāra-* (originally 'strong, firm', reinterpreted as 'sound, whole'), Germanic *all* (from **allo* 'grown up', later reinterpreted as 'complete, whole'), and Greek *pãs* (cf. Sanskrit *śvā-* 'swell'). In addition to the languages discussed by Haspelmath (1995), we will see that later work has found similar phenomena in other languages such as Bulgarian (Mladenova 2009), Chinese (Xing 2015) and Hungarian (Bende-Farkas 2020).

Haspelmath hypothesises that the reinterpretation of 'whole'-words as 'all' happens gradually along the following cline (examples are from colloquial spoken German):

(2) a. singular count nouns (*die ganze Tasse* 'the whole teacup')

b. collective nouns (*die ganze Familie* 'the whole family') and mass nouns (*das ganze Wasser* 'all the water')

c. aggregates (i.e., plural individuals in the sense of Link (1983)): *die ganzen Tassen* 'all the teacups'

In later work on Bulgarian, Mladenova (2009) proposes and empirically supports a more nuanced cline (see later, together with a detailed evaluation of various similar proposals).

Haspelmath also discusses instances where "words meaning all are not derived from words meaning whole." This includes the postpositional quantifier *-tēr-* (followed by person/number suffixes) in Egyptian/Coptic, which derives from the postposed prepositional phrase *r ḏr-* (+person/number) 'to X's end'. Haspelmath further shows that there was an intermediate state in Ancient Egyption where *r ḏr* was an adverbial universal quantifier, before it solidified as an adnominal quantifier; making this an instance of an A-quantifier being reanalysed as a D-quantifier.

Turning to the sources of 'every', Haspelmath points out that in many languages, "the universal distributive determiner 'every'' is synchronically or etymologically derived from a wh-determiner [a wh-indeterminate or indeterminate pronoun in current terminology] by means of a special particle (originally meaning 'also', 'even', 'or', 'it may be' etc.)." In some languages, this is still visible on the surface:

(3) a. Chinese   *shéi*   *ye*   'everyone'
            who   also

     b. Korean   *nwukwu*   *-na*   'everyone'
            who   or

     c. Rumanian   *fie*   *-care*   'every(one)
            be.SUBJ.3SG   who/which

     d. Latin   *quis*   *que*   'every'
            who/which   and/also

     e. Gothic   *hwarjis*   *-uh*   'every'
            which   and/also

     f. Old Church *kŭ-*   *-žĭdo*   'every'
        Slavonic   which   'question particle'

In others, it has been obscured through morphophonological reduction: e.g. Modern English *each* (< OE *ælc* < Proto-Germanic **ajw-hwalik* 'ever-which'.

Furthermore, Haspelmath points out that in an even greater range of languages, free-choice items are composed similarly (Bremen 1983, Haspelmath 1997):

(4) a. Latin   *qui*   *-vis*   'any'
            which   you want

     b. Swedish   *vilken*   *som helst*   'any'
            which   is best

     c. Polish   *jaki*   *-kolwiek*   'any'
            which   < ever

     d. Hungarian   *akár*   *-melyik*   'any'
            want[1]   which

     e. Basque   *zein*   *-nahi*   'any'
            which   want

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[1] Haspelmath glossess *akár* as 'or', however, the strong consensus of linguists working on Hungarian FCIs is that *akár* actually goes back to *akar* 'want.3SG', cf. Halm (2023) for a discussion.

      f. Kannada *yaava X*   *-uu*   'any'

          which X   also

Haspelmath argues that the reinterpretation happened in two steps: some element + wh-determiner -> free-choice item -> universal.

Haspelmath identifies two sources for such paradigms: non-specific free relative clauses and parametric concessive conditional clauses (unconditionals is current terminology). In the first case, free relative clauses containing a wh-determiner and some other element (concessive particle, additive particle, *want*, *it may be* etc.) were reanalysed in the following way: the 'other element' was reinterpreted as an 'indefiniteness marker' and it morphologically combined with the wh-determiner, yielding a free-choice item:

(5)   a. *Ela   pode   tomar qual coisa quer.*   (Portuguese)

          She   can   take   what thing she wants.

->   b. *Ela   pode   tomar qual-quer coisa.*

          She   can   take   any   thing.

With parametric concessive conditionals, the picture is similar: the antecedent of the conditional contains a wh-indeterminate and some other element (concessive, be etc.), and the two are at some point reinterpreted and morphologically combined to yield a free-choice item:

(6)   a. *Where   ever   she goes, I will never leave her.*

          wh-indeterminate concessive particle

    b. *Wherever   she goes, I will never leave her.*

          free choice item

More examples and descriptive details are offered in Haspelmath (1997). Formal semantic accounts for this process are offered in later work by Beck (1997, 2020, 2022) and Halm (2023).

The second step is the reinterpretation of the free-choice item as a universal quantifier. Haspelmath argues that due to their well-known quasi-universality, free-choice items and universals very often have nearly identical truth conditions:

(7)   a. *Anyone can solve this puzzle.*

    b. *Everyone can solve this puzzle.*[2]

As Haspelmath points out, even in situations where there are differences in meaning, the sentence containing the FCI very often conversationally implicates its counterpart with the universal:

(8)   a. *Anyone come come in.*   --implicates--> b. *Everyone can come in.*

Thus, Haspelmath argues, the FCI-to-universal reinterpretation is an instance of 'pragmatic strengthening' (König and Traugott 1988), or, to use later parlance, of the semanticization of pragmatically inferred material (Eckardt 2006), and it relies on a configuration characterized by

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[2] My example.

constant entailments (Beck 2012, Gergel & Beck 2015): a situation where two compositionally different structures have the same (or very similar) truth conditions.

Further on, Haspelmath discusses instances where 'every' derives from a 'distributive preposition' (a pluractional preposition in current terminology, cf. Beck 2021 and references). A case in point is Ancient Greek *katá*, which in addition to its basic locative meaning 'along, throughout' could also be "used to indicate that a place or point in time is distributed over a multiple event". As has been pointed out in the literature on pluractionals (Beck 2021, Halm & Bende-Farkas 2024), pluractionality often has roughly the same quantificational import as universal adverbial quantification (day-by-day vs. every day, one-by-one vs each):

(9) *eporeúnto   ho   goneĩs   autoũ kat'   étos   eis Hierousalḗm* (Lk 2:41)

    they.went   the   parents   his   pluract   year   to Jerusalem

    'His parents went to Jerusalem year-by-year (=every year).'

This creates an environment conducive to reinterpretation; and indeed, Haspelmath shows that such a reinterpretation has taken place in Greek. Ancient Greek *kath' héna* '(one) by one' has been reinterpreted already in the Ancient Greek period as *katheís* 'everyone'). In Modern Greek, *kathís* is the colloqiual word for 'everyone' (having crowded out *pãs*), and *káthe* (which Haspelmath a shortened form of *kathís*) is the determiner 'every'. Note that this is an instance of a change from (i) pluractionality to universal quantification, of (ii) A-quantification to D-quantification and of (iii) phrase-to-head reinterpretation (as the DP *kathís* 'everyone' is reinterpreted as the D *kathé* 'every') (in line with the Head Preference Principle, van Gelderen 2004).

Ancient Greek *katá* is the source (having been borrowed into Late Latin) of Portuguese and Spanish *cada* 'every' and possibly (through a blend of Latin *quisque* and Vulgar Latin *cata unum*) of Italian *ciascuno* and French *chacun*, and thus French *chaque* (through back-formation). While Haspelmath does not differentiate in the glosses between 'every' and 'each', all the examples in this section are better translated as 'each', which might be connected to the fact that they derive from pluractionals which are inherently distributive. Haspelmath briefly discusses an analogous development in Indo-Aryan, where Hindi-Urdu *pratyek* 'every' is derived from *ek* 'one' and the Old Indic pluractional postposition *–prati*; as well as cases where 'every' is derived from reduplicated numerals or wh-indeterminates.

Finally, Haspelmath notes that 'all' can also be a source for 'every', with the typical pattern that the same lexeme is used in both senses: the 'all' reading is elicited in combination with definite plural NPs wheras the 'every' reading is elicited in combination with bare singular NPs:

(10) a. *todas as casas*   *toda casa*   (Portuguese, representative of Romance)

        'all the houses'   'every house'

    b. *pántes hoi hodoí*   *pāsa hodós*   (Modern Greek)

        'all the roads'   'every road'

    c. *kol ha-sfarim*   *kol sefer*   (Modern Hebrew)

        'all the books'   'every book'

To conclude, in this seminal paper, Haspelmath (1995) covers a wide range of languages and makes important and strong generalizations. While this paper lacks the formal rigour or the

empirical detail of some later work in the field, it remains the inspirational foundational text of the modern formal diachronic study of quantification. As we will see, a large portion of later work is dedicated to clarifying, formalizing, augmenting, refining or, in some instances, to critiquing Haspelmath's (1995) findings.

2.1 Universal quantification in Mandarin Chinese: Xing (2015)

Xing (2015) is a corpus-driven, in-depth analysis of the diachronic processes resulting in the emergence of **the universal quantifier _měi_ in Mandarin Chinese.** Spanning three millennia (from the eleventh century BC to the twentieth century AD), Xing (2015) identifies four steps of semantic change.

In Step1, the predicative adjective _měi_ 'flourishing' (possibly a derivation of _měi_ 'tips of bamboo shoots') was reinterpreted as _měi_ 'plentiful, abundant'. In Step 2, the predicative adjective _měi_ 'flourishing, abundant' was reinterpreted as the frequency adverbial _měi_ 'often, frequently'. In Step 3, the frequency adverbial _měi_ 'often, frequently' was reinterpreted as the temporal adverbial quantifier _měi_ 'every time'. In Step 4, the temporal adverbial quantifier _měi_ 'every time' was reinterpreted as distributive universal quantifying determiner _měi_ 'every'.

(11) a. 原田**每每**, 舍其舊而新是謀。(4th Century BC, Zuo Zhuan)

        yuántián   **_mèi-mèi_**   _shě_   _qí_   _jiù_   _ér_   _xīn_   _shì_   _móu_

        field   **flourish**   rid   POSS   old   but   new   PART   gain

        'The (bamboo) field is flourishing, (someone) gets rid of the old and seeks the new.'

   b. 懷和為**每**懷, 咨才為諏, (3rd Century BC, _Guoyu_)

        huái   _hé_   _wéi_ **_měi_**   _huái,_   _zī_   _cái_   _wéi_   _zōu_

        mindful   compromise   is **plenty**   in-mind   consult   talent is   consult

        'Thoughtful compromise takes a lot of thought. To consult talent is to seek advice.'

   c. 事, 猶琴瑟也, **每**終改調。(3rd Century BC, Tongxuan Zhenjing)

        shì   _yóu_   _qínsè_   _yě_   **_měi_** _zhōng găi_   _diào_

        things   like   string-music   PART **often** end   change   tune

        'Things like string music often change melody in the end.'

   d. 每有一事, 群臣同聲 (1st Century AD, Hanshu)

        měi   _yŏu_   _yī_   _shì_   _qún_   _chén_   _tóng_   _sheng_

        A-quant.   have   one   thing   mass   official   same   voice

        'Every time something comes up, all officials agree on it.'

   e. 每律各一, 內卑外高。(1st Century AD, Hanshu)

        měi   _lù_   _gè_   _yī_   _nèi_   _bēi_   _wài_   _gāo_

D-quant.   rule   each   one   inside   humble   outside   superior

'Every rule embodies this: humble inside and superior outside.'

Xing (2015) characterizes Steps 1 and 2 as instances of metaphoricalization and Step 3 as metonymization, whereas Step 4 is described as a case of semantic reanalysis. While Xing (2015) eschews a formal semantic or syntactic analysis, Step 4 can be straightforwardly characterized as an instance of an A-quantifer being reinterpreted as a D-quantifier, which involves a change in both the semantic type and the domain of quantification (<s,t> to <e,t><<e,t>t>). In syntactic terms, Step 4 is a case of phrase-to-head reanalysis. We can relate this to van Gelderen's (2004) Head-Preference Principle: the concept that language learners/users prefer heads to phrases and thus have a tendency to reanalyse phrases as heads in the course of language acquisition.

2.3 Universal quantifiers of time in Germanic: Leuschner (1996)

Leuschner (1996) provides a systematic account of the meaning history of the three 'ever'-words: *ever* (English), *je* (German) and *ooit* (Dutch). Synchronically, *ever-je-ooit* are NPIs, licensed (i) by (direct or indirect) negation, (ii) in interrogatives, (iii) in the protasis of conditionals and (iv) in comparatives. Leuschner (1996) argues that a quantificational contrast emerges between the existentially interpreted NPIs *ever-je-ooit* and their respective universal temporal quantifier counterparts *always-immer-altijd* under the scope of negation and in questions:[3]

(12)   a. *John didn't ever imagine this outcome.*   ¬ > ∃

       b. *John didn't always imagine this outcome.* ¬ > ∀

(13)   a. *Did John ever imagine this outcome?*   Q > ∃

       b. *Did John always imagine this outcome?*   Q > ∀

German *je* is the direct descendant of **aiw* 'always, ever' through OHG *io*. English *ever* is a descendant of OE *ǣfre*, which is a compound of *ā* (direct descendant of **aiw*) plus either *feore* 'in life' or *byre* 'in the event'. *Oit* is a descendant of Old Frisian **ô* (direct descendant of **aiw*) and Old Low Frankonian **giet* or Old Frisian **ieta* 'still', cognates of ModE *yet*. Modern German and Modern Dutch *immer* derive from *io/*eo +mêr/mere* 'more'.

Concerning pre-Modern meanings and meaning distinctions, based on the discussion of a handful of illustrative sentences and dictionary entries, Leuschner finds that in oth are glossed as 'ever' and also as 'always'. Leuschner finds that in Old and Early Middle English, *ā/ǣfre* was ambiguous between a universal temporal ('always') and a (negative) existential 'ever' reading. Leuschner offers no formal semantic or syntactic analysis; however, this quantificational plasticity is strongly reminiscent of the situation discussed by Beck (2017): therefore, an analysis in terms of indeterminate (temporal) pronouns bound by covert operators (universal, existential, negative) looks eminently plausible. In Old and Middle High German, *io/ie* displayed the same universal/(negative) existential ambiguity; and there was also *io mêr /iemer*, which Leuschner analyses as a version of *io/ie* marked for future reference.

The situation in Middle English, Middle High German and Middle Dutch is summarized as follows:

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[3] The notation and the second pair of sentences are mine.

(14)	MidE	MHG	MidD
universal (future)	*efre*	*iemer*	*emmer*
	(*a + in feore*)	(*ie + me^r*)	(**eo + mer*)
universal (past)	*efre*	*ie*	*ie, ooit*
	(*a + in feore*)		(**o^+*ieta*)
NPI existential	*efre*	ie	ie, ooit
	(*a + in feore*)		(**o^+*ieta*)

There are a number of interesting developments here: the reinforcement in English of *ā* 'always, ever' through the absorption of the intensifier *in feore* 'in life'; the reinforcement in Dutch of **ô* through the absorption of the particle **ieta* 'yet'; and the reanalysis of [ie 'always/ever' + *mêr* 'more'] as *iemer* 'always, +future'. These changes are plausible enough, however, no formal semantic account is offered here (or indeed later in the literature, as far as I know).

Next, Leuschner discusses the changes that led to the current situation:

(15)	ModE	ModG	ModD
universal	*always*	*immer*	*altijd*
NPI existential	*ever*	*je*	*ooit*

One striking development is the breakdown of a distinction between universal-future and universal-past: in English and Dutch, this is due to the adoption of an all-expression (*always* and *altijd*), whereas in German, the loss of the [+future] specification of *immer*. A similar process happened in Dutch too, but *immer/emmer* 'always' was then superseded by *altijd* 'always'. As Leuschner points out, both in Early Modern German and Dutch, we then see the emergence of *immermehr* 'always [+future]' (<*immer+mehr*) and *immermeer* 'always [+future]' (<*immer+meer*): a very clear instance of a spiral, where successive cycles of loss and reinforcement involve the same element (*mehr/meer*):

(16)   *ie* 'always' -> *iemer* 'always [+future] -> *immer* 'always' -> *immermehr* 'always [+future]

The other major development is the loss of the universal/(negative) existential ambiguity. In light of later developments in the field (specifically, the Universal Semantic Cycle of Beck), one possible analysis that offers itself is that the change involved a transition from a system of 'covert operators and indeterminate pronouns' to (adverbial) quantifier phrases in the Barwise&Cooper tradition.

In later work, Hoekstra, Slofstra & Versloot (2009) augmented the empirical map provided by Leuschner (1996) with a discussion of the diachrony of 'ever'-words in Frisian. A formal diachronic semantic and syntactic analysis of Germanic ever-words is, for the time being, outstanding.

2.4 From whole to all (and back) in Latin and Romance: Martzloff (2014)

Martzloff (2014) offers a detailed exploration of the prehistory of *omnis* and other Latin pronouns and adjectives meaning 'all' or 'whole'. In terms of the situation in Latin, Martzloff characterizes *omnis* as a "simple, unmarked' universal quantifier which could be interpreted distributively as well

as non-distributively (collectively). *Omnis* associated both with plural count nouns and singular count nouns. In the latter case, it combined with collective nouns or mass nouns or the names of unique entities such as regions and had a meaning corresponding 'the whole'. Martzloff shows that telling apart the contribution of *omnis* and *totus* is not trivial, however, both *totus* and *omnis* could associate with mass nouns as well as collective nouns, with similar if not identical meaning. Combining this with the situation in Romance (cf. Haspelmath 1995), the following picture emerges:

(17)

	singular count nouns	mass nouns	collective nouns	plural count nouns
Latin	*totus*	*totus/omnis*	*totus/omnis*	*omnis*
Portuguese	*todo*	*todo*	*todo*	*todo*

This is consistent with a diachronic process whereby *totus* (originally meaning 'whole' and being limited to singular count nouns) gradually spreads to nominals denoting various kinds of pluralities (mass nouns, collective nouns, plural count nouns). As we will see later on, Mladenova (2009) charts an almost identical development in the history of Bulgarian.

Turning to the prehistory of *omnis* itself, Marztloff argues, in agreement with Pauli (1885), Brugmann (1984) and Hackstein (2010), that *omnis* derives from *ops* 'abundance' (and not *amplus*, Balles 2009). In addition to phonological and morphological considerations, he also lists numerous parallels from various languages where 'whole' or 'all' derives from an adjective with the rough meaning of 'large'.

Finally, Martzloff remarks upon the fact that *omnis* can be used both as a determiner (D head in generative parlance) and as a 'substantive' (i.e., as a DP phrase). He tentatively argues that the phrasal use might be the original one, in which case, we have a phrase-to-head reanalysis at hand, in line with the Head Preference Principle (van Gelderen 2004) and also with the tendency for higher types (von Fintel 1995).

2.5 Quantification in Bulgarian: Mladenova (2009)

In an empirically rich and insightful paper, Mladenova charts the diachronic changes in the system of (mostly) universal quantification in Bulgarian. The main focus is a set of cyclical changes between 'all'- and 'whole'-words. As far as Modern Bulgarian is concerned, Mladenova argues that *vsički* 'all' and *cjal* 'whole' have roughly the same meaning contribution (collective universal quantification), but they pattern differently in terms of the semantic type of their possible associates:

(18)

		vsički 'all'	*cjal* 'whole'
a.	plural count nouns (*jabălki* 'apples')	✓	✗
b.	mass nouns (*kiselo mljako* 'yoghurt')	✓	✗
c.	abstract nouns (*măka* 'grief')	(✓)	✓
d.	collectives (*dobităk* 'cattle')	✓	(✓)
e.	'aggregates'[4] (*narod* 'nation')	✗	✓

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[4] The difference between collectives (such as *naselenie* 'population') and aggregates (such as *narod* 'nation') is that the former are uncountable (*edno naselenie, *dve naselenie*) while the latter are countable (*edin narod, dva naroda*). Note that

f. singular count nouns (*jabǎlka* 'apple')		✘	✔

Mladenova adopts, in the vein of Richter's (1909) and Sapir's (1930) intuition, a distinction apparently used in Finnish grammar (no sources provided) and also applied to English by Chesterman (1991:164)[5]; and she argues that *vsički* 'all' is a quantifier of totality which associates with so-called 'divisible' nominals whereas *cjal* is a quantifier of totality which associates with 'indivisible' nominals.
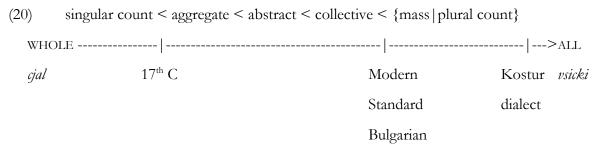
Next, Mladenova focuses on the dramatic language change that played out between the 17th century and today. While in the 17th century, *cjal* 'whole' was only used with singular count nouns, as of today, *cjal* associates with a much large class of nominals (18). Mladenova argues that this change can be described in a parametric fashion: the semantics of *cjal* 'whole' and *vsički* 'all' did not change: rather, what changed is which classes of nominals count as divisible or indivisible:

(19)   What counts as divisible in Bulgarian?

	17th C	today
count nouns (singular)	✘	✘
aggregates	✔	✘
collective nouns	✔	✔ (✘)
abstract nouns	✔	✘ (✔)
mass nouns	✔	✔
count nouns (plural)	✔	✔ (vsicki)

Mladenova paints a detailed empirical picture of the stages of this change: the transition from divisible to indivisible (i.e., the transition from association with *vsički* 'all' to association with *cjal* 'whole') first affected aggregates, then abstract nouns, then collectives nouns. In the Kostur dialect, this process went even further, and there, apparently all types of nouns now associate with *cjal* 'whole' only:

(20)   singular count < aggregate < abstract < collective < {mass|plural count}

WHOLE ----------------|-------------------------------------|-------------------------|--->ALL

cjal   17th C   Modern   Kostur   *vsicki*

Standard   dialect

Bulgarian

We can immediately note that this actually instantiates an implication hierarchy (Mladenova herself does not use this specific term). If, e.g., in any dialect of Bulgarian, collectives associate with *cjal* 'whole', than it follows that abstract nouns, aggregates and singular count nouns also

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Haspelmath (1995) uses 'aggregate' in a very different sense, as a label for what we might call plural individuals (including the denotation of plural count nouns).

[5] Chesterman (1991) applies this distinction to supplant the singular-plural dichotomy in order to describe the distribution of the indefinite article in English.

associate with. As Mladenova notes, this also raises the intriguing empirical question whether this same implicational hierarchy (or something similar) holds for other languages.

Following Brugmann (1894:60-64), Mladenova points out that in Ancient Greek, *pãs* covered the whole space of semantic totality. Then, *hólos* emerged and it gradually crowded out *pãs* until *hólos* became the only non-distributive quantifier (Brugman 1894:44-45, Frisk 1970, 2:381). And as of today, in Modern Greek, *holókléros* competes with *hólos* in the case of singular counts nouns and aggregates: this means that the cycle has started again, and the change can be characterized as a spiral:

(21)   (*pãs*) -> (*hólos – pãs*) -> (*hólos*) -> (*hólokléros – hólos*)

As we have seen, a less fine-grained but rather similar hierarchy of nominal categories emerges in the history of Latin-Romance (Haspelmath 1995, Martzloff 2014):

(22)   singular count < {collective|mass} < plural count

WHOLE --------------------------------------- | ---------------------------- | ---> ALL

totus   Latin   Romance   *omnis*

While in Latin, the space was split between *totus* and *omnis*, in Romance, *totus* covers the whole space. To this, Mladenova adds the observation that in Modern Romanian, while *tot* covers the whole inclusive totality space (and it is also used distributively), *intreg* 'entire' (a derivative of Latin *integer* 'unharmed') is competing with *tot* as a non-distributive quantifier in the case of singular count nouns, aggregates and collectives; another instance of a spiral:

(23)   (*totus-omnis*) -> (*tot*) -> (*intreg-tot*)

As we have seen, German *ganz* is also spreading along a similar cline (Haspelmath 1995):

(24)   singular count < collective < mass < plural count

WHOLE --------------------------------------- | ---------------------------- | ---> ALL

ganz   Standard   colloquial

                                     Modern   Modern

                                     German   German

And as we will see later, certain dialects of Hungarian are undergoing a similar change (Bende-Farkas 2020):

(25)   singular count < collective < mass < plural count

WHOLE --------------------------------------- | ---------------------------- | ---> ALL

egész   Modern   Csángó &

                                     Hungarian   Colloquial

                                                         Transylvanian

                                                         Hungarian

The emerging cross-linguistic empirical pattern is striking. However Mladenova's proposed account for this change strikes me as implausible. It is very unclear what it means for a category

of nouns, such as mass nouns, to be reinterpreted from divisible to indivisible. Assuming that massnoun-hood is a label for a certain semantic type, does this change mean that there is a type change happening? Generally, it is assumed that different categories of nominals have different but stable mereological types, therefore it might be more appealing to assume that it is actually 'whole' which changes its type over time (from adjective to maximality operator / quantifying determiner), so that, at the end of the process, 'whole' becomes the new 'all'. In any case, as is clear from this short discussion, the empirical pattern literally cries for proper formal semantic analysis.

Mladenova also points out a certain cyclicity. 17th Century Bulgarian had an (almost) unitary system as (with the exception of singular count nouns), every nominal category combined with the same 'operator': *vsički* 'all'. After this, the system started to change, and a split model emerged, with some categories combining with *vsički* 'all' and others with *cjal* 'whole'. Then, in the most innovative Kostur dialect, a system has been reached where once again, all categories combine with the same 'operator': *cjal* 'whole'.

3. The rise of explicitly formal approaches

3.1 Ontological semantic functionalization: Gergel (2014)

Gergel (2014) discusses the diachronic development of Modern English *most*. *Most* has two uses in Modern English: as a superlative morpheme attaching to a gradable expression (26) and as quantifying (strong) determiner (27):

(26) *The most recent studies supported the criticism.*

(27) *Most studies did not seem to support the criticism.*

There is ongoing debate whether synchronically, quantifying *most* should be analysed as a generalized quantifier in the sense of Barwise & Cooper (1981), establishing relations between sets (e.g. most(A,B) = $|A \cap B| > |A|/2$); or rather, quantifying *most* should be treated as the superlative of *many* (Hackl 2009), which itself is regarded "as a gradable modifier that modifies plural NPs ranging over pluralities that can be measured in terms of how many atomic parts they are composed of" (Hackl 2009:79). Gergel (2014) remains agnostic with regard to these two analyses, however, he points out that the superlative-quantifier analysis involves a decomposition of the word which is not visible on the surface, and, assuming that this analysis is on the right track, it falls to diachronic semanticists to explain how such a complexity may have evolved over time.

Gergel (2014) analyses the diachronic changes involved in terms of the functionalization of lexical material, proposing a specific and novel type of functionalization. While functionalization often involves changes such as the loss of theta-roles (Roberts 1985) or a type-shift to a higher type (von Fintel 1995), none of this is attested in the case of *most*. Instead, Gergel (2014) proposes a new mechanism called 'ontological semantic functionalization':

(28) MOST [part of [N]] -> MOST [N]

Historically, *most* used to combine with lexical items, specifically, relational nouns with the meaning 'part'. This noun was first reinterpreted to denote a partition in terms of the semantic ontology involved (e.g. pluralities of individuals). Later, this noun was "incorporated into the meta-language semantically and thus became an integral part of entry [of most] after the change",

resulting in the current state where taking recourse to a partition is part of the lexical semantic entry of *most*.

Using corpus evidence, Gergel points out that in Old and Middle English, the precursors of *most* (*maest* and its variants) simply meant 'of high degree in a scale', in essence, 'largest'. Already in Old English and continuing into Middle English, *maest* frequently co-occurred with singular nouns meaning 'part' (*dæl* and its variants and later the French loanword *part*):

(29) *scheome is þe meste del as seint Austin seið of ure penitence*

     shame is the largest part as saint Augustine says of our penitence

This usage is preserved in the fossilized expression *for the most part* 'for the largest part'. A quantificational reading is first attested in Early Modern English (note that on this reading the nouns are plural):

(30) *Wheras through most Counties of this Realme Horstealine is growen so co~mon*

Gergel (2014) argues that [*maest dael/part* NP₂]-sequences in Old and Middle English were indirect partitive constructions (cf. Corver & van Riemsdijk 2001):

(31) *and þone mæstan dæl þæs folces ofslogon*

    and the.ACC largest.ACC part.ACC the.GEN people.GEN killed

    'And (they) killed the biggest part/most of the people.'

The Modern English [*most* NP] construction can only be regarded as partitive if one assumes the presence of a silent nominal [*most* Ø_{NP} NP].[6] Gergel (2014) regards the stipulation of a silent noun invariably projected with *most* arbitrary; and instead, proposes a structure whereby *most* projects all the relevant semantics (including partitioning) at LF by itself.

Adopting Hackl's (2009) analysis, at this point Gergel assumes that 'quantifying' *most* is not an atomic element, but rather, the superlative of *many*, and its semantics is essentially identical to the semantics of superlatives in general. Namely, the constituent containing the superlative *-est* and a cover comparison class C moves at LF in order to bind a degree variable d_i, and the availability of two landing slots accounts for the ambiguity between the relative reading and the proportional reading (cf. also Heim 1985, 1999 and Szabolcsi 1986):

(32) a. [John climbed [the [-est C]ᵢ [dᵢ -many mountains]]]

     'John climbed more than half of the relevant mountains.' (proportional reading)

    b. [John [-est C]ᵢ [climbed [the dᵢ -many mountains]]]

     'John climbed more mountains than any other salient individual.' (relative reading)

In terms of the diachronic change, Gergel (2014) proposes that it was an instance of ontological semantic functionalization, a novel mechanism defined as follows:

(33) An item undergoes ontological semantic functionalization diachronically iff it changes from compositionally combining with an originally lexical item *I* at a time t₁ towards

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[6] My notation.

incorporating a variant of *I* induced in the meta-language of semantic interpretation at a subsequent time t₂.

In terms *most*, ontological semantic functionalization involved the transition between (i) compositionally combining with a semi-functional nominal with the meaning 'part' to (ii) becoming ontologically enriched so that the partitivity is now hard-wired into the lexical semantics of *most*.

3.2 The Universal Semantic Cycle

3.2.1 Germanic (English, mostly)

An important emerging paradigm in the formal study of the diachrony of quantification is due to Beck (2017, 2020): the hallmarks of this approach are a strong grounding in type-theoretical formal semantics, the ambition to formulate a cross-linguistically valid model of cyclical change in the realm of universal quantification and very strong empirical foundations (the use and painstaking analyses of considerable amounts of data from electronic historical corpora). Works in this paradigm include Beck (2017, 2020, 2022) and Doron (2020). The diachronics study of indefinites Italian by Degano and Aloni (2021) and the study of FCIs in Hungarian by Halm (2023) is also in part inspired by this paradigm. Bende-Farkas (2014a, 2015) predates and to some extent, anticipates the Universal Semantic Cycle.

The aim of Beck (2017), is to provide a formal semantic account for Haspelmath's (1995) typological observation that crosslinguistically, free choice relative clauses frequently serve as the diachronic sources of universal quantification. Beck argues that this reinterpretation is in a sense natural since the two sentences below (34ab), while structurally and compositionally different, have roughly the same truth conditions (cf. constant entailments, Beck 2012 and Beck & Gergel 2015, cf. also Eckardt 2009):

(34)   a. *I will read [whichever book you recommend]*   free choice relative

     b. *I will read every book (that you recommend)*   universal DP

       'for all x, x a relevant book: I will read x'

Adopting the generalized quantifier treatment for *every* (Barwise & Cooper 1981, Heim & Kratzer 1998), (34b) can be paraphrased as:

(35)   'every individual that has the property of being a book has the property of being read by me'

As far as (34a), the free choice relative clause is concerned, Beck adopts Hirsch's (2015) analysis. The wh-expression *whichever book* introduces Hamblin-alternatives (Hamblin 1973), alternative books, and these alternatives project to the propositional level, yielding alternative propositions of the structure 'you recommend book x'. In free choice relatives, these propositions go into the antecedent of a conditional and then the interpretation we receive is:

(36)   'Of all alternative propositions p: if p is the proposition that you recommend x (x a book) and p is true, then I will read the book that you recommend'

Beck argues that these two stages (free-choice relative and universal quantifier) are two stages of a four-stage cycle, which she names the Alternative Semantic Cycle (later it will be renamed as the Universal Semantic Cycle in Beck 2020):

(37) The Alternative Semantic Cycle (also known as the Universal Semantic Cycle)

Stage 1: covert universal quantification over alternative propositions in free-choice relatives:

$$\forall p[p \in \{FCR(x) \mid x \in Alt(wh)\} \rightarrow \varphi(p)]$$

Stage 2: lexical universal quantification over alternatives:

$$\forall x[x \in Alt(wh) \rightarrow Q(x)]$$

Stage 3: lexical universal quantification over individuals by universal DP

$$\forall x[P(x) \rightarrow Q(x)]$$

Stage 4: group-denoting DP with possible universal distributive readings

$$max(\lambda x.P(x)) \in [\lambda z. \forall x[x \leq z \rightarrow Q(x)]$$

In Stage 1, we have covert universal quantification over alternative propositions triggerred by the wh-expression. Following Hirsch's (2015) model (inspired by Rawlins's analysis of unconditionals such as *Whichever book you recommend, I will read Harry Potter.*, the meaning of (38) is derived as follows:

(38) *I will read [whichever book you recommend].*

First, the wh-expression introduces alternatives:

[[*whichever book*]] = {War and Peace, Harry Potter, Syntactic Structures} = {W, H, S}

These are then projected up, yielding alternative propositions:

[[*whichever book you recommend*]] = {you recommend W, you recommend M, you recommend S}

This set of alternative propositions is then placed in the antecedent of a hidden conditional structure (IF), which is then quantified over by a covert universal quantifier over alternative propositions (ALL-ALT$_{FCR}$), yielding the logical form:

[ALL-ALT$_{FCR}$ [IF [$_{FCR}$ whichever book you recommend]] [I read IT]]][7]

'Of all alternative propositions p: if p is the proposition that you recommend x (x a book) and p is true, then I will read the book that you recommend'

In Stage 2, we have lexical quantification over alternatives. Beck's exhibit for this stage is alternative-sensitive universal quantification expressed by the particle *-mo* in Japanese:

(39) *dono   gakusei-no   okaasan-mo odotta*

which   student-GEN   mother-mo danced

'The mother of every student danced.'

for all alternatives x such that x ∈ {y's mother | y a student}: x danced

---

[7] IT is a covert pronoun with an E-type semantics [[IT]]=the book that you recommend

$$\forall x[x \in Alt(wh) \rightarrow Q(x)]$$

According to Shimoyama (2001, 2006), *-mo* expresses universal quantification over the alternatives provided by the associate of *–mo*. This associate contains a wh-expression, which triggers alternatives that project up to the level of the *mo*-associate.

Stage 3 is the textbook case of lexical universal quantification over individuals by a universal DP:

(40)   *The students read every book.*

$$\forall x[P(x) \rightarrow Q(x)]$$

'every invididual entity is such that if it is a book then the students read it.'

Beck argues that Stage 3 is not a stable end-state, pointing out that in Present-Day English, universally quantified phrases are often interpreted non-quantificationally, as group-denoting DPs (cf. Champollion 2010) with possible universal distributive readings:

(41) $max(\lambda x.P(x)) \in [\lambda z. \forall x[x \leq z \rightarrow Q(x)]$

Here, max(.) simply represents the standard semantics generally assumed for definite plural DPs (e.g. Link 1983):

(42) $[[\textit{the sheep}]] = max(\lambda x.sheep(x)) = x: P(x) \ \& \ \forall y[P(y) \rightarrow y \leq x]$

'*the sheep* is the largest x such that sheep applies to x and everything that is a sheep is part of x, i.e. the largest group of individuals that consists of sheep'

Beck proposes that the bridge that facilitates reinterpretation between Stage 3 and Stage 4 is the quasi-equivalence (i.e., almost identical truth conditions) between (43a) and (43b):

(43)   a. *Heidi read every book.*

b. *Heidi read the books.*

In the case of (43a), universal quantification is introduced by the universal quantifier:

(44)   *Heidi read every book.*

[[every book] [Heidi read t]

$[[every \ book]] = \lambda Q. \forall x[book(x) \rightarrow Q(X)]$

$\forall x[book(x) \rightarrow Heidi \ read \ x]$

'For each x such that x is a book, Heidi read x.'

In the case of (43b), the object DP simply denotes a group, and universal quantification is introduced by the distributive operator (DIST) in charge of the distributive interpretation of the predicate (Link 1983):

(45)   *Heidi read the books.*

[[the books] DIST [Heid read t]]]

$[[the \ books]] = max(\lambda x.book(x))$

$[[DIST]] = \lambda Q.\lambda z. \forall x[x \leq z \rightarrow Q(x)]$

max(λy.book(y))∈[λz.∀x[x≤z→Heidi read x] =

∀x[x≤max(λy.book(y)) -> Heidi read x]

'For each x such that x is a part of the largest book group, Heidi read x.'

This means that the truth conditions of (44) and (45) are equivalent, though the ingredients are different. Beck claims that this situation of constant entailments facilited the reanalysis: a reinterpretation of everyone as a group-denoting DP was harmless in that it did not change the truth conditions of such sentences.

Beck argues that the Alternative Semantic Cycle displays a deep parallelism with Jespersen's (1917) cycle for negation. In both cases, the cycle is related to a certain logical concept (negation, universal quantification). At Stage 1, the lexical expression undergoing the cyclic change does not in itself express this logical concept: rather, it occurs systematically in environments where the concept is expressed "by a complex composition of ingredients". At Stage 2, expressing the logical concept becomes a lexical property of the relevant linguistic expression, in conjunction with further ingredients (two negative particles in Jespersen's cycle, a wh-element plus a universal in the AltSemCycle). At stage 3, the semantics of the linguistic expression is in complete overlap with the logical concept (negation, universal quantification). At stage 4, this semantics is weakened – opening up the way for a new cycle or spiral with new linguistic expressions.

The objective of Beck (2020) is to provide an analysis of the quantificational system of Old English in terms of alternative semantics in the vein of Hamblin (1973) and Shimoyama (2006). Old English lacked quantifiers, FCIs and NPIs as separate lexical categories: rather, such interpretations were elicited by so-called bare pronouns such as *hwa* 'who/what', *hwelc* 'which' or *hwaer* 'where', and their prefixed version (the *ge*-paradigm and the *a*-paradigm).

(46) a. *To hwam   ga   we*

     to whom   go   we

     'To whom do we go?'   *question*

   b. *(Nellaþ   hi gelyfan)   ðeah   hwa   of deaþe arise*

                                 though who of death arose

     'they will not believe it, though someone rose from death'   *existential*

   c. *het   ða   hyssa   hwæne   hors   forlætan*

     ordered (he)   then (of) warriors   whom   horse leave

     'he then ordered everyone of the warriors to leave his horse behind'   *universal*

   d. *And   a. a. a.   to worulde   buton   æghwilcum   ende Amen*

     and   ever ever ever to world   without   A-GE-which   end   Amen

     'And ever, to time without end.' ('…without any end…')   *NPI*

   e. *Sua   hwa   ðonne sua his   lif   to biesene   bið   oðrum, …*

     so   who   then so   his   life   to example is (to) other

     'Whoever, then, makes his life an example to others, …'   *FCR*

f. *Ælc (=a-hwelc) mon mot onsacan frympe   & werfæhðe,*

   a-which   man may deny   entertainment & slaying

   gif he mæg oððe dear.

   if he may or   dare   FCI

   'Any man may deny entertainment and slaying, if he is able to or dares.'

Beck (2020) assumes that these pronouns are so-called indeterminate pronouns: pronominal expressions that are used as interrogative pronouns; however, they or their morphological derivations can also be interpreted as indefinites, NPIs, universal or FCIs. The synchronic study of indeterminate (i.e., quantificationally underspecified) pronouns (attested in a variety of languages such as Japanese, Latvian, Hungarian, etc.) goes back to Kuroda (1965) and has been brought to the fore by Shimoyama (2001) and Kratzer and Shimoyama (2002) (more recent discussions include Mitrovic 2014 and Szabolcsi 2015).

Beck identifies the following possible readings of indeterminate pronouns in Old English: question, free choice relative clause (FCR), free-choice item (FCI), negative polarity item (NPI), universal, existential (see above). The three paradigms (the bare series, the *ge*-series and the *a*-series) differ significantly in terms of the availability of the various readings:

(47)

	question	FCR	FCI	NPI	Univ	Exist
bare series	✓	✓	✓		✓	✓
ge-series			✓	✓	✓	✓
a-series			✓	✓	✓	

The outline of Beck's analysis is as follows: indeterminate pronouns are analysed as alternative triggers (in line with earlier proposals such as Hamblin 1973, Shimoyama 2001, Kratzer & Shimoyama 2002). There are also covert operators (question, universal, existential etc.) which interact with the propositional alternatives triggered by the indeterminate pronouns. So sentence interpretation is derived from an interplay between covert propositional operators and alternative-inducing wh-indeterminates. Crucially, there are restrictions as to which pronoun paradigm can associate with which operator – Beck derives these restrictions from the lexical properties of each series.

Inspired by a Hamblin (1973)-style approach to question semantics (where the denotation of a question is a set of propositions, i.e., the set of possible answers), Beck assumes that an indeterminate pronoun introduces lexical alternatives (*who*: {Aelfred, Bede, Caedmon, …}), which then combine with the syntactic environment (_ *left*) to project propositional alternatives (*who left* {that Aelfred left, that Bede left, that Caedmon left…})

More precisely, adopting the framework of Beck (2006, 2016) a wh-indeterminate has no ordinary semantic value, only an alternative semantic value:

(48) a. $[[who]]_O$ = undef (is undefined)

    b. $[[who]]_{Alt}$ = $\{x \mid x \in D\}$ = {Aelfred, Bede, Caedmon}

    c. $[[who\ left]]_O$ = undef (is undefined)

d. $[[\textit{who left}]]_{Alt} = \{lw. \text{ x leftw} \mid x \in D\} \quad = \{\text{that Aelfred left, that Bede left, that Caedmon left}\}$

The simplest case is the derivation of the interrogative reading. The contribution of the (silent) question operator is to raise the alternative semantic value to the level of ordinary semantic value (as the ordinary semantic value of a question is exactly this set of propositional alternatives); this is necessary as otherwise, we would run afoul of the principle of interpretability (Heim and Kratzer 1998, Beck 2006): *An LF must have an ordinary semantic interpretation*

(49) a. $[[Q\ XP]]_O = [[XP]]_{Alt}$

b. $[[Q\ [\textit{who left}]]]_O = [[\textit{who left}]]_{Alt} = \{\text{that Aelfred left, that Bede left, that Caedmon left}\}$

Alternative-semantics is best-known for its applications to focus (Rooth 1985, 1992); but as Beck notes, it has been used to account for various phenomena such as: free-choice relative clauses (FCRs, Rawlins X, Hirsch 2016, Halm 2023 a.o.), negative-polarity items (NPIs, Krifka 1995, Lahiri 1998, Chierchia 2006 a.o.), free-choice items (FCIs, Menéndez-Benito 2010, Chierchia 2013 a.o.), universal and existential constructions with indeterminate pronouns in Japanese (Shimoyama 2001) and indefinites in German (Kratzer and Shimoyama 2002).

As Beck notes, it is probably not a coincidence that it is exactly these readings that indeterminate pronouns in Old English has. This motivates her general strategy for accounting for these readings: in each case, the relevant interpretation is elicited via the interaction of an alternative-triggering wh-indeterminate and an alternative-evaluating silent operator:

(50)   [Op […… wh-indeterminate …]]

        |_____|

Interrogatives and FCRs have the same basic structure (in FCRs, there is also universal quantification over the set of propositional alternatives, plus a cover if-operator, see Hirsch 2016 for details):

(51)   [Q […… wh-indeterminate …]]

        |_____|

Universal and existential interpretations are generated when a covert universal (ALL) or existential (EXIST) operator quantifies over the set of propositional alternatives projected by the lexical alternatives introduced by the wh-indeterminate:

(52) a. [ALL /EXIST […… wh-indeterminate …]]

            |_____|

b. $[[ALL\ XP]]_O(w)=1$ iff for all $p \in [[XP]]_{Alt}$: $p(w)=1$

c. $[[EXIST\ XP]]_O(w)=1$ iff for there is a $p \in [[XP]]_{Alt}$: $p(w)=1$

The identification of free-choice readings is not trivial as free-choice items are often interchangeable with a universal with no perceptible change in the interpretation:

(53)   *You can pick hwelc of these three cards.*

       'You can pick any of these three cards.'

'You can pick each of these three cards.'

∀x[x is one of these three cards -> you can pick x]

There exist two heuristics that can be used: FCIs come with an exceptionally wide domain (Kadmon and Landman 1993) and they are intensional: the universal quantification (if one adopts a universal analysis of FCIs as Beck does, following Dayal 1998, Alonso-Ovalle and Ménendez-Benito 2020) is over possible rather than actual entities. Beck also advances a theoretical consideration: it has been convincingly argued (Haspelmath 1995, Beck 2018, 2018) that there is a cross-linguistically attested reinterpretation cline which involves the reinterpretation of indeterminate pronouns first as FCRs and FCIs and then as universals. Thus, *hwelc* 'which' is the diachronic origin of the universals *each* and *every*. In light of this, and given that *hwelc* 'which' has a universal reading, it would be illogical if it lacked the FCI reading.

"For the sake of concreteness", Beck models FCIs as involving "a kind of generic quantification over possible individuals" (Menéndez-Benito (2010)). As usual, the wh-indeterminate introduces lexical alternatives, which are then projected to the level of propositional alternatives, and these alternatives are evaluated by a cover modal or generic operator. This operator, All-Alt, is modal in nature: it is sensitive to the normal course of the events and it quantifies over possible rather than actual entities introduced by the FCI:

(54)   a.   [All-Alt [… wh-indeterminate …]]

         |—————|

b. $[[\text{All-Alt}_R \text{ XP}]]_O(w) = 1$ iff for all p such that $p \in [[\text{XP}]]_{Alt}$:

for all w' such that R(w')(w), p(w') = 1, where R(w')(w) iff w' follows the normal course of events in w (R is realistic)

NPIs present another empirical challenge: since in the bare and the *ge*-series, an existential interpretation is also available, how can one tell apart (weak) NPIs from ordinary narrow scope existentials?

(55)   *I didn't eat hwelc cookie.*

'I didn't eat any cookie.'

'I didn't eat a cookie.'

¬∃x[cookie(x) & I ate x]

Beck here advances an interesting theoretical argument: if one adopts (i) the alternative semantic analysis of wh-indeterminates advocated for here and (ii) the alternative semantic theory of NPI-licensing (Krifka 1995, Lahiri 1998, Chierchia 2006), than the bare series cannot have a NPI-interpretation. The reasons is simple: the licensing mechanism of NPIs according to Chierchia (2006) requires that a wh-indeterminate qua NPI have an ordinary semantic value in addition to an alternative semantic value, and under Beck's analysis, the bare series does not have an ordinary semantic value.

However, as far as the *ge*-series is concerned, the close analysis of a number of examples leads Beck to conclude that with a reasonable certainty, the *ge*-series did have an NPI-interpretation. Beck argues that this is possible because the contribution of *ge*- is exactly to create an ordinary semantic value for the wh-indeterminate (which in its bare form has no ordinary semantic value):

(56) a. [[*ge*-XP]]$_O$ = ∪[[XP]]$_{Alt}$ (if the elements of [[XP]]$_{Alt}$ are not of type <e>)

= λP.λw.∃x[x∈[[XP]]$_{Alt}$ & P(w)(x)]) (if the elements of [[XP]]$_{Alt}$ are of type <e>)

b. [[*ge*-XP]]$_{Alt}$ = [[XP]]$_{Alt}$

The ordinary semantic value of a *ge*-indeterminate is the union of the propositional alternatives elicited and projected by the wh-indeterminate. This explains why the *ge*-series does not have a question or FCR-interpretation (the Q particle needs an operand without an ordinary semantic value), and correctly predicts that the *ge*-series can have a genuine NPI interpretation (as it meets the requirements of EXH). This semantic contribution of the prefix is motivated from the semantic contribution of its likely diachronic source, the free morpheme *ge*, (cf. Beck 242-246 for details, and also Erlewine 2017 for a similar proposal). The NPI-interpretation of the *ge*-series is derived in the standard fashion of Chierchia (2006) (cf. Beck 2020: 248-249 for details and a worked-out example).

The interpretive possibilities of the *a*-series form a proper subset of those of the *ge*-series: FCI, NPI, universal. Beck correlates this to the semantics of the free morpheme *a*, which is the temporal universal quantifier 'always':

(57) [[*always$_C$*]] = λp$_{<i,st>}$.λw. for all t in C, p(t)(w)=1

Beck proposes that the prefix *a*- derives from lexical *a*, and it imposes the requirement that the evaluation operator must have universal quantificational force ('universal agreement'.) Beck models this on negative concord (specifically, Penka (2011)): in each case, there is a (potentially) silent, semantically interpreted element with an interpretable feature (iNeg, i∀) and an overt element which does not feed the interpretation (having an uninterpretable feature (uNeg, u∀):

(58) a. [$_{NegP}$ [$_{Neg}$ Neg [… neg-word[uNeg] …]]]

|-----Agree----------|

b. [ALL/All-Alt/EXH [… a[u∀]-ge-hwa …]]

|-----Agree-------|

This means that, in Beck's analysis, there was a diachronic change which involved the reinterpretation of lexical *a* (an interpretable exponent of universal quantification, i∀] to prefix *a*- (the exponent of an uninterpretable u∀ feature). This parallels nicely with a development described by Gianollo (2017, 2018): interpretable negator Latin *nec* (iNeg) turned into a prefix participating in negative concord with an uninterpretable feature [uNeg] in Romance negative indefinites (e.g. *nessuno*). We can also point to another parallel: agreement cycles, which involve the reanalysis of personal pronouns as first clitics and then as agreement-marking morphemes: this change has also been analysed as a transition from interpretable to uninterpretable phi-features (cf. van Gelderen 2023: 140-156).

In terms of diachrony, Beck argues that Old English represented a transition between Stage 1 (covert universal quantification over alternative propositions) and Stage 2 (Universal quantification over individual alternatives) of the Universal Semantic Cycle (see above).[8]

Beck (2022) is a follow-up of Beck (2020), charting the diachronic changes in the system of quantification from Old English to Middle English. The Early Middle English (EME) period (ca.

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[8] This is the same as the Alternative Semantic Cycle, just with a new name.

1150-1250) is characterized by a reduction of the combinatory freedom of Old English (OE): while the basic semantics remains the same, the feature system of the *a*-series gets to play a larger role: the operator-trigger relationship becomes more constrained. The *ge*-series falls out of use; the bare series retains some of its quantificational (i.e., non-question) interpretations, but there is a strong decline in frequency and variability: the question interpretation predominates, existential interpretations are still possible (to a more and more limited extent), but universal interpretations are no longer accessible. The *a*-series continues to function with its universal, NPI and FCI readings. Complex forms going back to *æfre ælc* 'ever each' start to appear, but remain in the minority as non-complex forms still predominate.

Late Middle English (LME, 1420-1500) is a period of the transition: the flexibility of operator-trigger quantificational system is lost and a new system emerges where there is a direct, one-to-one relationship between the semantic interpretation (question, universal, existential, NPI, FCI) and the morphological form of the wh-expression. The non-bare (*a*-)series develops into complex expressions such as *every*, *each* or *every each*. NPI and FCI interpretations of the non-bare series are lost, which means that there arises a one-to-one correspondence between the covert ALL operator and the non-bare series, which sets the stage for members of the non-bare series (such as *every* and *each*) to be reinterpreted as the exponents of a universal operator. Also, in LME, the bare series only has a question interpretation, so there is one-to-one correspondence between the silent operator (Q[iWH]) and the alternative trigger (bare-indeterminate[uWH]).

In terms of a formal analysis, in EME, non-bare forms carry the uninterpretable feature [u∀] and via universal agreement require an operator of the ALL, All-Alt or EXH tpye (all of which are [i∀]). The bare series can be evaluated by Q, presumably by EXIST (to a more and more limited extent) but very probably not by ALL.

In LME, the non-bare series continues to have the feature [u∀], however, there is a change in the feature composition of the operators: only ALL retains [i∀] (i.e., All-Alt and EXH lose their [i∀] feature): this means that the non-bare series can only be interpreted universally. The bare series acquires an obligatory [uWH] feature and thus, it can only be evaluated by Q[iWH], meaning that only a question interpretation is possible now.

The result of these changes is that in LME, a one-to-one correspondence arises between operator and trigger. This make possible a reinterpretation: instead of postulating a silent operator rigidly associated with an overt but indirect correlate via agreement; an LME or EModE speaker can posit a more simple structure, with less silent material: the ex-indeterminate is reinterpreted as the actual exponent of a standard universal quantifier. Consider:

Before reinterpretation (LME):

(59) a. *uwilc sunne-dei is observed*

      each Sunday is observed

    b. [[uwilc sunne-dei]] = {x: x is a Sunday}   *Alternative trigger*

    c. [ALL[i∀] [[uwilc sunne-dei][u∀] is observed]

    d. For all propositions p: p∈{that x is observed | x is a Sunday} -> p is true

After reinterpretation (late LME or EModE)

(60) a. [[DP *ech Sunday*] *is observed*]

b. [[ech]] = λP.λQ.∀x[P(x) -> Q(x)]   *Generalized quantifier*

c. [[ech Sunday]] = λQ.∀x[Sunday(x) -> Q(x)]

d. ∀x[Sunday(x) -> observed(x)]

To conclude, while Old English was a period in transition between Stage 1 and 2 of the Universal Semantic Cycle; Middle English is characterized as a leading up to the transition from Stage 2 to 3. And, arguably, Modern English witnesses a move to Stage 4.

3.2.2 From a collective to a free choice determiner in Biblical Hebrew: Doron 2020

The starting point of Doron's paper is the cross-linguistic observation of Haspelmath (1995) that (A) collective universal determiners (like English *all*) often derive from adjectives meaning 'entire/whole'; whereas (B) distributive universal determiners (like English *every*) have two systematic sources (Bi) free choice determiners (elucidated by Beck 2017) and (Bii) collective universal determiners like *all*.

It is this latter pathway (collective universal determiner to distributive universal determiner) that Doron focuses on. In fact, Doron argues that for many languages, the (Bii) is a cycle that contains (Bi):

(61) collective universal determiner -> FC determiner -> distributive universal determiner

Specifically, with regard to Hebrew *kol*, Doron (2020) proposes the following "Distributivity Cycle":

(62) a. Adj/Noun 'entire(ty)'

        —I--->

b. collective universal determiner

        —II--->

c. free-choice (FC) determiner

        —III--->

d. distributive universal determiner

Steps I and II took place in Biblical Hebrew: noun *kol* 'entirety' grammaticalized as the collective determiner *all*, and it did not have a distributive meaning other than as a Free Choice/NPI determiner such as *any*. Step III happened in Modern Hebrew (possibly somewhat earlier): free-choice *kol* was reinterpreted as a distributive universal meaning 'every'. Doron argues that the wide range of interpretations *kol* has in Modern Hebrew (all/any/every) is a direct consequence of this process.

Biblical Hebrew (BH) did not have a distributive universal determiner, or indeed, any determiner, being an NP (as opposed to DP) language (cf. Boskovic 2008). As argued by Doron & Meir (2013, 2016), the "article" *han-* was actually not a D but a word-level inflectional prefix marking the emphatic state (as opposed to unmarked absolute state or the construct state marking relationality or possessedness). NPs in argument position underwent type-shift (definite type-shift / iota type-shift or indefinite type-shift / existential closure).

Doron argues that in BH, originally, *kol* was a degree noun, which headed the pseudo-partitive construction and it denoted "the degree of entirety".

(63)   *kol*   *hā-hăkāmīm*

      KOL(of)   the-skilled.MP

      'all the craftsmen' (lit. 'the totality of the craftsman') (Ex. 36:4)

The original noun-hood of *kol* is supported by its distribution and indeed, traditional grammars of the Bible also classified *kol* as an 'abstract substantive denoting totality' (Joüon 1923: §139e). That is, *kol* NP at this stage was non-quantificational (and non-distributive): this is evidenced by (i) the lack of scope ambiguity, (ii) the fact that the cardinality of *kol* NP could be predicated about and (iii) agreement patterns among other things). *Kol* NP is strictly speaking not interpreted as 'all N' but rather as 'the totality of Ns': *kol* NP denoted the entirety/totality of a group or indeed of an individual or a mass term. More formally, it is non-quantificational operator that applied to "a NP which denotes substance, mass or count, singular or plural, and yields a portion of the NP substance that consists of the entirety of those individuals whose parts satisfy NP. Hence *kol* maps a predicate P to the set of individuals, atoms or sums, satisfying *P." (Doron 2020:11)

(64) $[[kol]] = \lambda P.\lambda x.*P(x)$

      where *P denotes the minimal divisive predicate of Krifka (1989) which includes P: P itself where P is divisive per se, or the pluralized version of P

In argument position, the default interpretation of *kol* NP is definite: the maximal individual ɩx.kol[[NP]](x) satisfying it. In downward entailing (DE) environments, however, the indefinite interpretation (arising via via predicate modification and existential closure) is stronger and thus favoured. This is due to the stronger meaning hypothesis (*Pick the stronger meaning*, Dalrymple et al. 1994). Since this indefinite interpretation of *kol* NP only arises in DE environments, indefinite type-shifted *kol* NP in BH can be regarded as a negative polarity item (NPI).

Since *kol* is not distributive, one might wonder what its exact contribution is: in other words, what is the difference between NP and *kol* NP? Doron argues that *kol* is a slack regulator (cf. Brisson 1997, Krifka 2006, Lasersohn 1999, Schwarz 2013), it reduces (eliminates) exception-tolerance:

(65)   *qārōaʕ*   *ʔɛqraʕ*   *ʔɛt*   *ham-mamlākā*   *mē-ʕālɛkā*   …   *raq*   *ʔɛt*   *kol*

      tear.INF   tear.MOD.1S   ACC   the-kingdom   from-over.2MS …   but   ACC   KOL
      ham-mamlākā   *lō*   *ʔɛqraʕ*   –   *šēbɛṭ*   *ʔɛhād*   *ʔɛtēn*
      the-kingdom   NEG   tear.MOD.1S   –   tribe.MS   one.MS   give.MOD.1S
      li-bn-ɛkā
      to-son-POSS.2MS
      'I will surely tear the kingdom away from you… However, I will not tear away the whole kingdom; I will give one tribe to your son.' (1Kings 11:13)

Ham-mamlākā 'the kingdom' involves the pragmatic looseness characterised as slack: depending on the context, *I will tear the kingdom away.* is taken to be true even if some part of the kingdom is not actually taken away. *Kol ham-mamlākā* strictly means the totality of the kingdom, every single tribe of it. A similar slack regulation function has been ascribed to *all* (Dowty 1987, Brisson 1997, 2003). However, *all* and (pseudo-partitive) *kol* are fundamentally different in terms of their

syntax: with *all*, maximality is due to quantification over individuals (cf. Winter 2001), with *kol*, it is "a consequence of measurement as expressed by the pseudo-partitive construction" (Doron 2020:13). Doron also shows that *kol* NP in itself is never distributive in BH: distributivity is encoded by other means (e.g. the lexical item ʔīš 'each', lit. 'man'; pluractional adverbials; floated (inflected) *kol*; and dependent relational nouns).

The environments in which indefinite-*kol*-NP can be found in BH include downward entailing environments that typically license NPIs (negation, questions, complements of adversative verbs, before PPs, comparative PPs, antecedents of conditionals) and also environments that typically license FCIs *strictu sensu* (generics, free relatives). Further on, Doron shows that in the scope of existential modals, *kol* NP has a free choice reading. *Kol* NP is also found in the scope of imperative/commissive modal operators, as well as being modified by a relative cause: in such cases, it is interpreted like *whatever/whoever*, a free relative with FC interpretation.

Doron argues that as far as BH concerned, the FC reading of indefinite-*kol*-NP arises via the mechanism describe by Kratzer & Shimoyama (2002): the distribution requirement qua conversational implicature. Later on, argues Doron, this FC interpretation was semanticized and reanalysed as being part of the lexical meaning of *kol* – in line with Eckardt's (2006: 236) conception of grammaticalization as the semanticization of pragmatically inferred information, leading to the reanalysis of *kol* as a free-choice item ('any').

Finally, Doron turns to Step III of the distributivity cycle, which leads to the current situation in Modern Hebrew (the change actually may have occurred in Rabbinical Hebrew already), where *kol* has a distributive universal reading in addition to the free choice item reading:

(66)   *kol* NP = every (distributive universal) / any NP$_{et}$

Doron does not dwell much on the specifics of this change, other than stating that Step III must have happened in line with Beck's (2017) proposal: "the conjunction of the alternative propositions which underlies FC readings developed into universal quantification over individuals".

Another important change is that in post-Biblical Hebrew, *ha-* was reanalyzed as a definite determiner of category D – so definite noun phrases are no longer (iota-shifted) NPs but true DPs (Doron & Meir 2016). This means that in Modern Hebrew, there is a difference in interpretation of *ha*-prefixed and *ha*-less Ns with *kol*, with plurality also playing a role. Consider:

(67) a. *ha-hanhala   lo   hithayba   le-qabel   et   kol   ha-tlunot*
          the-administration   NEG   commited   to-accept   ACC   KOL   the-complaints
          'The administration did not commit to accept all/*any complaints.'

      b. *lo   nimce'u   kol   tlunot   mucdaqot*
          NEG   found   KOL   complaint.FP   justified.FP
          'There weren't any justified complaints found.'

      c. *ha-hanhala   lo   hithayba   le-qabel   et   kol   tluna*
          the-administration   NEG   commited   to-accept   ACC   KOL   complaint
          'The administration did not commit to accept every/any complaint.'

To summarize:

(68) a. *kol* DP   = all DP$_e$ partitive structure expressing totality (quasi-collective universal)

b. *kol* NP$_{plural}$ = any NP$_{et}$ free-choice item ("remnant of Biblical syntax")

c. *kol* NP$_{singular}$ = ever/any NP$_{et}$ distributive universal / free-choice item

This means that in Modern Hebrew, all the stages of the cycle are preserved and visible.

3.3 From indeterminates to A-quantification to D-quantification in Hungarian: Bende-Farkas (2014a, 2015, 2020)

Bende-Farkas (2014a) is corpus-driven empirical study of universal quantification in Late Old Hungarian, focusing on two quantifiers expressing maximality or universality: *mind* 'all' (an A-quantifier which resembles English *all* or French *tous/toutes*) and *minden* 'every/everything/everyone' (akin to English *every*). In addition to providing a type-theoretic characterisation of these two operators, Bende-Farkas also discusses several diachronic phenomena, such as (i) the transition from A-quantification to D-quantification and (ii) the change from a quantification system based on "long-distance (quasi-)binding of indeterminate pronouns" to one where "determiners and quantifying DPs bind individual variables locally" (i.e., from Stage 1 to Stage 3 of Beck's (2017, 2020) Universal Semantic Cycle).

Bende-Farkas analyses Old Hungarian *mind* as a floating A-quantifier. In the oldest surviving text in Hungarian, the Funeral Sermon and Prayer (1192-1995), the only expression conveying universal quantification is *mend*[9] 'all':

(69)   a.   *Es*   *vimagguc*   *mend*   *szentucut.*

       and   worship.1PL   all   saint.PL.ACC

       'and let us pray to all the saints'

    b.   *mend*   *ozchuz*   *iarov*   *vogmuc*

       all   that-to   walk-part   be.1PL

       'we are all to walk there'

Bende-Farkas sketches the following compositional analysis of *mind*. *Mi* 'what' is taken to be a wh-indeterminate triggering individual lexical alternatives, and *-nd* is assumed to denote "a functor which takes these alternatives as input and returns the entire set (or the greatest individual 'built' from the members of that set"). Unfortunately, the details of this analysis are not formally spelled out. Since, as we will see later on, Early Old Hungarian had a system similar to Stage 1 of the Universal Semantics Cycle of Beck (2017, 2020) (remnants of which survived well into Late Old Hungarian), a different potential analysis also appears feasible, whereby *-nd* could be analysed as an overt exponent of Beck's ALL-operator, or maybe an exponent of [u∀]. (This would arguably make *mind* a representative of Stage 2 of the USC.)

Bende-Farkas argues that prior to the emergence of *minden* 'every', Late Old Hungarian did not have D-quantification. Universal and universal-like readings were elicited by (i) means of the A-quantifier *mind*, by (ii) other A-quantifiers such as *-nkéd*-suffixed numerals and nominals (*egy-enkéd* one-PLACT 'one by one', *fej-enkéd* head-PLACT 'one by one', *nap-onkéd* day-PLACT 'day by day'[10]) and (iii) covert quantification over propositional alternatives projected by wh-indeterminates (as a

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[9] *Mind* and *mend* are dialectal variants of the same word.
[10] In later work, Halm and Bende-Farkas (2024) argued that these are pluractional adverbials and not strictly speaking universal quantifiers.

remnant of the Early Old Hungarian system of quantification which thus resembled Stage 1 of Beck's Universal Semantic Cycle).

Bende-Farkas argues that the *mind->minden* change is an instance of "type-driven change": "a diachronic application of the [synchronically posited] type-shifting principles of formal semantics" (cf. Partee (1987), Partee-Rooth (1983), Winter (2001); see also Chapter 7 in Eckardt (2006)). The reinterpretation happened in four stages:

(70)   From *mind* 'floating all' to *minden* 'every(thing/one)'

Stage 1: *mind* 'floating all'	VP-modifier	$<<e,t>,<e,t>>$
Stage 2: *minden$_{Adj/Adv}$* 'entire(ly), full(y)'	adverb/adjective	$<<e,t>,<e,t>>$
Stage 3: *minden$_D$* 'every'	quantifying determiner	$<<e,t>,<<e,t>,t>>$
Stage 4: *minden$_{DP}$* 'everything/everyone'	quantifying DP of type	$<<e,t>,t>$

Stage 2 thus crucially mediates between Stage 1 ('all') and stage 3 ('every'). *Minden* 'entire(ly), full(y)' (ambiguous between adjective and verb) is argued to be derived from *mind* 'floating all' via the suffix *-en*. There is some limited empirical evidence suggestive of an adjectival/adverbial *minden*:

(71)   *Eʒ   ʒamos   ʒent   napokban myndden   eletewnket   meg   yobbohok*

this   numerous   holy   days-in   every   life.POSS.1PL.ACC PRT   improve.1PL

'During these many feast days we should improve our entire life.'

However, it remains unclear how exactly a combination of the floating quantifier *mind* with a manner/cardinality suffix *-en* (see discussion below) would derive the required reading (no synchronic or diachronic compositional analysis is given). This cline is also rather different from the more generally attested pattern:

(72)   a. whole -> all -> every (English, German, Greek etc., Haspelmath 1995 a.o.)

b. all -> whole -> every (Bende-Farkas 2014)

The final step in the process was the reinterpretation of *minden$_D$* as *minden$_{DP}$* by saturating the first argument of *minden$_D$* with the predicate 'thing/individual':

(73)   *mėguǫn   menden   varost   &   mēdent   a   fǫldǫn*

PRT.take.PST.3SG   every   town.ACC   and   everyone.ACC   the   land.on
lakoʒot

dwell.PART.ACC

'He conquered every town and everyone living in the region.'

This last step is atypical in that it goes against the Head-Preference Principle (van Gelderen 2004) and the general tendency in diachronic change for higher types (von Fintel 1995).

Bende-Farkas also carries out a detailed study of the syntactic side of the change: while *mind* 'floating all' is adjoined to the DP or the (extended) VP, quantifying determiner *minden* is integrated into the DP. In the same volume, É. Kiss (2014b) analyses the external syntax of quantifiers in Late Old Hungarian, showing that (similarly to Modern Hungarian) they occupy

dedicated scope-taking positions on the left periphery of the sentences, having undergone quantifier-raising (in the case below, we witness over Q-raising from an embedded non-finite clause into the functional left periphery of the matrix clause):

(74) *Es*   *[mend paradisumben*   *uolov*   *gimilcictul]ᵢ*   *munda*   *neki*

      and   all   Paradise-in   be.PART   fruits.from   tell.PST.3SG   DAT.3SG

      elnie   tᵢ

      live.INF.3SG

      'And he told him to eat all fruits in Paradise'

The question of distributivity is also examined in much empirical detail. In Modern Hungarian (cf. Szabolcsi 1997), *minden* 'every' is inherently distributive. Bende-Farkas argues that *mind* 'floating all' is not a proper quantifier with Restrictor and Nuclear Scope, rather, it is a maximality operator: a predicate modifier which says that the predicate P holds of the maximal individual $\cup(X)$ constructed from the collection X (X being contributed by the DP-associate of *mind*) – so essentially, it is a definite description:

(75) *mind* (non-distributive): $\lambda P.\lambda X.[P(\cup(X))]$

Though the notation is different, this is identical to the 'every' part of group-denoting everyone discussed by Beck (2017, 2020) in Stage 4 of the Universal Semantic Cycle (see above).

As far as Old Hungarian *minden* 'every' is concerned, Bende-Farkas argues that it represented a bridge between *mind* 'floating all' and Modern Hungarian *minden* 'every (distributive)' in terms of its semantics:

(76) *minden* (non-distributive) $\lambda P.\lambda Q.[Q(\cup P)]$ Old Hungarian

This formula is taken to mean that the predicate Q is true of the maximal individual with property P. Bende-Farkas argues that here, we already have a tripartite structure of sorts but we haven yet gone all the way to classical Barwise & Cooper (1981) style generalized quantifier semantics, something which is reached only later:

(77) *minden* (distributive): $\lambda P.\lambda Q.\forall x.[P(x)->Q(x)]$ Modern Hungarian

This cline is elegant and makes sense theoretically, and the empirical evidence, while somewhat sparse, is also compatible with this account. Note that the transition from *mind* 'maximality operator' to *minden* 'distributive every' is the exact opposite of what is presumably happening in Modern English (Stage 3 to 4 of the Universal Semantic Cycle) – presenting a challenge to the unidirectionality and/or the universality of the Universal Semantic Cycle.

Bende-Farkas (2015) is a rich and perceptive survey and analysis of universal quantification (broadly construed) in Old Hungarian. This includes (i) A-quantification (*mind* floating 'all', pluractionals and reduplicated indeterminates), (ii) the rise of the D-quantifier *minden* 'every', (iii) quasi-universal or maximal readings conveyed by correlatives (Lipták 2009, Belyaev and Haug) and (iv) the transition of a system of (covert propositional operators plus) bare wh-indeterminates to morphologically complex wh-indeterimnates. Since (i) and (ii) are discussed in more detail in Bende-Farkas (2014) (see above), I will focus on (iii) and (iv) in what follows.

Bende-Farkas (2015) argues that Early Old Hungarian, the period which directly predates our earliest written sources, in all probability had a system of bare indeterminate pronouns being bound by silent propositional operators (much like the Old English system described by Beck 2017, 2020, see above). Remnants of this system are sporadically detectable in Late Old Hungarian texts: bare pronouns can be interpreted as NPIs in the scope of a negator, as existential/FCIs in the antecedent of a conditional or as an existential bound by existential closure:

(78) a. *az   egÿebekrewl   nem   tudok   mÿtt*

    the   other.PL.from   not   know.1SG   what.ACC

    'I do not know anything about the rest.'

  b. *Ha   ky   kerdenee   honnan   volt   az [...]*

    if   who   ask.COND.3SG   whence   was   it

    'If someone/anyone were to ask why it was the case that [...]'

  c. *ky   kezeyt,   ky   edes   ʒemeyt   [...]   apolgatyaak   vala [...]*

    who   hand.POSS.3SG.PL.ACC   who   sweet   eye.POSS.3SG.PL.ACC   kiss.PAST.3PL   PAST

    'Some were kissing his hands, some were kissing his eyes.'

Bare pronouns also featured in so-called correlatives[11] (correlatives resemble free relatives in their syntax and semantics, the major difference being that (i) correlatives can include several relative expressions and (ii) and at least one of the relative expressions has a so-called correlate, typically, a demonstrative in the matrix clause). Such usage is preserved well into Modern Hungarian in proverbs such as:

(79) *ki   mint   veti   ágyát,   (az)   úgy   alussza   álmát*

    who   how   set.3SG   bed.3G.ACC   that   so   sleep.3SG   dream.3SG.ACC

    'The way someone sets their bed determines how they sleep.'

Since correlatives are close to free relatives, one could plausible treat free relatives in the way proposed by Beck (2020) wrt to free relatives in English, with the propositional alternatives triggered by the wh-indeterminate going into the antecedent of a covert conditional structure, possibly involving the presence of a silent Q-operator as well. Alternatively, one could pursue a grammaticalization analysis, based on the proposal by Belyaev & Haug (2020) to the effect that correlatives cross-linguistically are derived from paratactic constructions. Consider the illustrative toy example below:

(80) *ki   mint   veti   ágyát,   (az)   úgy   alussza   álmát*

    who   how   set.3SG   bed.3G.ACC   that   so   sleep.3SG   dream.3SG.ACC

    'Someone sets their bed somehow. This (same) person sleeps that way (in a corresponding way).

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[11] Correlatives are discussed, but only in connection with the *vala*-wh-series.

Late Old Hungarian saw the emergence and solidification of particle plus indeterminate combinations:

(81)   Late Old Hungarian particle+wh indeterminate series

	universal	existential	correlative	FCI	NPI
vala+wh-indeterminate:		✓	✓	✓	
se(m)+wh-indeterminate					✓
akár+wh-indeterminate			✓	✓	
minden+wh-indeterminate	✓				

This gradual process led to the current situation in Modern Hungarian, where bare pronouns can only be interpreted as questions words. As far as particle+wh-indeterminate combinations are concerned, Bende-Farkas takes these particles to be the exponents of uninterpretable features which have to be checked by a higher covert operator, with the exception of *minden-*, which is an exponent of a universality/maximality operator (see the discussion of Bende-Farkas 2014 above).

This change is very similar to the reduction of the combinatorial possibilities in the Late Middle English period discussed by Beck (2022). Bende-Farkas (2014a) does not discuss the origins of these particles and the reinterpretation process involved. As far as the *se(m)*-series is concerned, É. Kiss (2014) proposes that this derived from a combination of *es* 'focus particle', *nem* 'negator' and the indeterminate pronoun (adjacent with the former in the preverbal focus position):

(82)   [*es* 'focus particle' + *nem* 'negator'] + *ki* 'who' -> *senki* 'who[uNeg]'

In later work, Halm (2023) offers a formal diachronic analysis for the emergence of the two FCI-paradigms: the *akár*-paradigm in Old Hungarian (first FCR, then FCI: *akárki* 'whoever -> anyone') and the *bár*-paradigm in Middle Hungarian (first FCR, then FCI: *bárki* 'whoever -> anyone').

Since Bende-Farkas stops at the end of the Late Old Hungarian period, mapping the changes from then on to current Modern Hungarian remains an open challenge. Most synchronic analyses of Modern Hungarian assume (either implicitly or explicitly) that particle+pronoun combinations such as *minden-ki* 'everyone', *vala-ki* 'someone', *bár-ki* 'anyone', *sen-ki* 'no-one' do not involve quantification by covert operators over propositional alternatives, and also, that these lexemes are no longer compositional (though see Szabolcsi 2015 for a different view):

(83)   a. *minden-ki* 'everyone'   universal quantifier (Barwise & Cooper)

       b. *vala-ki* 'someone'   positive polarity (Heimian) indefinite

       c. *bár-ki* 'anyone'   free-choice-item (intensional indefinite)

       d. *sen-ki* 'no one'   negative universal quantifier

If this is indeed the case, Hungarian can be said to have undergone a change from Stage 1-2 to Stage 3 in the Universal Semantic Cycle.

Bende-Farkas (2019) analyses an ongoing 'whole'->'all'->'every' type reinterpretation process in Transylvanian and Csángó (or Moldavian) Hungarian:

(84)   a. *egész*   'healthy, whole, complete'

c. *az egész* the whole 'universal collective/distributive determiner associating with count nouns'

d. *az egész-en* the whole-EN 'floating quantifier all'

The starting observation of Bende-Farkas is that in Moldavian (Csángó) Hungarian and in colloquial Transylvanian Hungarian, *az egészen* is used as a floating quantifier, associating with plural individuals (count nouns, pronouns):

(85) *Megérkeztünk* *az* *egész-en.*

PRT.arrive.PAST.1PL the whole-EN

'We have all arrived.' (my gloss)

In addition to this, in these variants of Hungarian, *az egész* can also be used as a collective as well as a distributive universal determiner:

(86) a. *Egy* *fán* *volt* *az* *egész* *madár.*

One tree.on was the whole bird

'All the birds were in one tree.'

b. *Az* *egész* *politikusnak* *van* *autója.*

the whole politican.DAT is car.3SG

'Every politician has a car.'

In terms of composition, Bende-Farkas relates the obligatory presence of the definite article to Matthewson's (2001) claim that strong universal determiners always involve a (covert or overt) D head.

The –*en* suffix has two functions in Modern Hungarian: (i) that of turning adjectives into adverbs (ügyes-en skilful-EN 'skillfully') and (ii) that of turning quantifiers into predicative elements' (cf. Csirmaz & Szabolcsi 2012 and Schvarcz 2022):

(87) a. *A* *legtöbb* *diák* *szorgalmas* *volt.*

the most student diligent was

'Most students were diligent."

b. *A* *szorgalmas* *diákok* *voltak a* *legtöbb-en.*

the diligent students were the most-EN.

'The diligent students were the most numerous.'

Bende-Farkas argues that *az egészen* 'floating all' is derived from *az egész* 'every' in the same way as other adverbial quantifiers such as *a legtöbben* are derived from D-quantifiers such as *a legtöbb*. That is, this process is synchronic and compositional.

Bende-Farkas has a detailed look on the diachronic process using a varied range of resources (the Old Hungarian Corpus (Simon & Sass 2012, Simon 2014), the Historical Dictionary of Transylvanian (Middle to Early Modern Hungarian) as well as hand-collected data from the

internet reflecting current colloquial usage). Based on this analysis, the following stages are identified:

(88)   Stages of the whole->all reinterpretation in Transylvanian and Csángó Hungarian

Stage 1:   with abstract nouns (often denoting institutions) and nouns denoting collective entitities, *egész* 'whole' gets reinterpreted as *egész* 'entire, all (collective)':

(a) *egész   emberi   nemzet*

whole   human   nation

'the whole humanity' -> 'all humanity'

Stage 2: these expressions are reinterpreted pointwise, due to metonymy

(b) *egész   Jeruzsálem*

whole   Jerusalem

'all Jerusalem' -> 'everyone in Jerusalem'

Stage 3: the all-construal is extended to count nouns

(c) *az   egész   város   -->   az   egész   házak*

the   whole   city   the   whole   houses

'all the city'   'all the houses'

Stage 1 held in Old Hungarian, Stage 2 was reach from Late Old to Early Middle Hungarian. These stages affected all dialects of Hungarian. Stage 3 was only reached in Transylvania and the Csángó dialect region. Bende-Farkas (2019:63-64) also claims that *az egész* has been further reinterpreted from D to DP for some innovative speakers, however, the evidence provided is inconclusive.

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