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Interpretive language change under Constant Entailments: Stable common ground updates as catalysts for semantic change

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This paper proposes a hypothesis concerning interpretive language change, the Constant Entailments hypothesis. The hypothesis is phrased here in pragmatic terms. It says that interpretive change is facilitated when the overall pragmatic impact of an expression is the same before and after the change. To put it differently, the common ground update that an expression causes to be performed is the same for the source analysis and the goal analysis of the expression. The pragmatic version of Constant Entailments allows us to develop a systematics of pathways of interpretive change, considering truth conditional content, presupposition and implicature in diachronic change. We present several case studies to show what is gained by our perspective. The case studies concern clausal connectives, focus particles, quantifiers and an interrogative complementizer.

1 Introduction

Our paper investigates interpretive language change and argues that such change is facilitated when the overall message remains stable. In a first step, we are going to develop the theory by revisiting the English adverb *again*, whose meaning has been extensively studied both from a synchronic (e.g. Dowty 1979; von Stechow 1996; Fabricius-Hansen 2001) and a diachronic perspective. Based on a case study on the interpretive development *again* in the history of English (Beck & Gergel 2015), we explain our compositional semantic approach to interpretive language change and introduce the concept of Constant Entailments (section 2). In section 3, we reformulate the theory by focusing on the notion of pragmatic equivalence in terms of constant common ground (CG) updates under combinatory ambiguity: One and the same pragmatic meaning, or to put it differently: one and the same common ground update, can arise in two different ways, by way of the source analysis or by way of the goal analysis. Interpretive language change is facilitated when many contexts are such that this pragmatic equivalence holds. This is our answer to the general problem of grammatical change: how can a speaker acquire the new grammar while functioning in the language community with the old grammar if the grammar at the new stage, including its interpretation component, is different than the grammar of the old stage?

Our reformulation of Constant Entailments leads us towards a new systematics of types of interpretive change, relating truth conditional content and other, pragmatic, meaning components, in particular presupposition and implicature. Several case studies in section 4 illustrate how our taxonomy orders instances of interpretive language change. We apply the idea of Constant Entailments as constant CG updates to connectives (the well-known development of causal connectives out of temporal ones), to quantifiers arising out of portion or size nouns, to focus particles (exclusive particles out of adjectives), and to the rise of the interrogative complementizer *whether* from an indeterminate pronoun. Section 5 concludes the paper.

2 Reanalysis under constant Entailments: the case of *again* (Beck & Gergel 2015)

The sentence in (1) is ambiguous (e.g. Dowty 1979). It can be true in a context in which the door had been opened earlier, and after some interval, the door opened once more; that is, the opening of the door is repeated. The so-called repetitive reading is paraphrased in (2a). Interestingly, the sentence can also be true if the door had never opened before (for example, it was constructed in an open state). Something caused the door to close, and afterwards, something caused the door to return to an open state. We will call the second reading the non-repetitive reading here. It has been analyzed as counterdirectional (e.g. in Fabricius-Hansen 2001) or as restitutive (e.g. in von Stechow 1996). The two paraphrases in (2b(i)) and (2b(ii)) reflect these two analyses of the non-repetitive reading. According to the counterdirectional analysis, the non-repetitive use

of *again* indicates a reversal of direction (e.g. *open/close*); according to the restitutive analysis, the non-repetitive use of *again* indicates the restoration of a result state (i.e. *to be open*). The two analyses have synchronically been seen as competing explanations of the non-repetitive reading.

(1) The door opened again.

(2) a. The door opened, and the door had opened before. (repetitive)
b. (i) The door opened, and the door had closed before. (counterdirectional)
(ii) The door opened, and the door had been open before. (restitutive)

Beck & Gergel (2015) study the diachronic development of English *again* on the basis of diachronic corpora. They argue that both analyses apply, but at different times in *again*'s diachronic trajectory. In the Old English YCOE corpus (Taylor et al. 2003), they find many prepositional uses of (the predecessor of) *again* with the meaning 'against'. The few potential attestations of adverbial *again* in Old English all show a counterdirectional interpretation comparable to the one in (3), from the OED. According to the OED, the prevalent reading then was 'in the opposite direction; back' (sense I.1.a), which is clearly related to the meaning of the prepositional uses 'against, in direction of, towards', which were predominant at that stage.

(3) He sceaf þa mid ðam scylde, þæt se sceaft tobærst, and þæt spere
he pushed then with the shield that the shaft burst and that spear
sprengde, þæt hit sprang **ongean**.
sprang that it sprang against
'He pushed then with the shield, so that the shaft of spear burst apart, and he broke the spear, that it sprang **back**.'
(OED, *Battle of Maldon* (1942) 137; gloss and translation added)

This is confirmed by Beck & Gergel's study. Furthermore, they provide evidence that repetitive readings of *again* only became systematically available during the Middle English period, after the counterdirectional adverb had developed from the Old English preposition. (4) presents an early example of repetitive *again*. A schematic representation of *again*'s diachronic development is given in (5): from the preposition, first an adverb with only a counterdirectional interpretation developed. Later, a repetitive adverb arose from the counterdirectional one.

(4) This zodiak which that is part of the 8 speer, over-kervith the equinoxial, and he overkervith him **ageyn** in evene parties;
'The zodiac, which is that part of the 8th sphere, intersects the equinoctial and intersects it again in equal parts.'
(CMASTRO,669.C1.168, 14th c.; cited from Beck & Gergel 2015: 173, ex. 30)

(5) preposition ('against') → adverb (counterdir.) → adverb (repetitive)
Old English Middle English (1st half) Middle English (last quarter)

We concentrate on the second step in (5) here (see Beck & Gergel for the first step, development of the counterdirectional adverb from the preposition). The development of the repetitive from the counterdirectional adverb is *prima facie* quite surprising. It looks as if the word changes from meaning one thing to meaning quite the opposite. (6a) and (6b) provide lexical entries of the two *again*s (after Beck & Gergel 2015) which highlight the change in the lexical semantics of the adverb (here and throughout, we work with simple versions of a standard semantic analysis of the phenomenon under investigation, aided by informal paraphrases for the convenience of the reader).

(6) a. counterdirectional *again*:
[[again$_{ctr}$]] = λP.λe: there is an e' before e such that P$_{ctr}$(e').P(e)
'The opposite of P, P$_{ctr}$, has happened before.'

b. repetitive *again*:
[[again$_{rep}$]] = λP.λe: there is an e' before e such that P(e').P(e)
'The same thing has happened before.'

If one looks at the two lexical entries in (6), it is hard to answer the question of what would motivate such a development. Beck and Gergel argue that under the analysis of von Stechow (1996), there is an important connection between the two readings of the sentence in (1) which is instrumental to this development: On the non-repetitive reading, the result state of the door being open is repeated. This observation gives rise to an analysis in which structures with non-repetitive readings and structures with repetitive readings actually involve an adverb with one and the same lexical entry, namely the repetitive one in (6b). One way to obtain the non-repetitive reading is to combine the repetitive lexeme *again* with a structure as in (7), in which the verb *open* is decomposed into a covert verb and a Small Clause SC expressing the result state:

(7) [$_{VP}$ ∅ [$_{SC}$ [$_{SC}$ the door open] again$_{rep}$]]

The phonologically empty verb contributes a causal action. Repetitive *again* modifies SC. What is repeated is therefore just the state of the door being open. This reading can thus also be called 'restitutive' (the result state of the door being open is restored).

The diachronic development thus amounts to the reanalysis from (8a) to (8b):

(8) a. Structure: [$_{VP}$ [$_{VP}$ the door open] again$_{ctr}$]
[[again$_{ctr}$]]: 'The opposite of P, P$_{ctr}$, has happened before.'
Overall interpretation: **counterdirectional**
'The door opened, and earlier, it had closed.'

b. Structure: [$_{VP}$ ∅ [$_{SC}$ [$_{SC}$ the door open] again$_{rep}$]]
[[again$_{rep}$]]: 'The same thing has happened before.'
Overall interpretation: **restitutive**
'The door opened, and earlier, the door had been open.'

c. **Aggregate situation:**
door open → closing → door closed → opening → door open

A hearer, or language acquirer, could analyze (1) with a different adjunction site for *again,* (8b) than the speaker, (8a). The syntax of the language allows for a structure in which the adverb modifies the result-state-denoting constituent SC 'the door open' as in (8b), instead of the VP as in (8a). The hearer/acquirer can still derive the appropriate truth conditions for the sentence, however, if, simultaneously, *again* changes its meaning from counterdirectional to repetitive. Both the analysis in (8a) and the analysis in (8b) are true in the type of situation described in (8c).[1]

The new adverb (i.e. repetitive *again*) must have first arisen in contexts like (1), in which the non-repetitive reading of the sentence can plausibly be analyzed as involving counterdirectional *again* or as restitutive, i.e. involving repetitive *again* plus low adjunction site. The actual historical example in (9a) (from the PCEEC corpus, Taylor et al. 2006) is parallel to (1) in this respect. It is important to find such 'bridging contexts' (see section 3) because in terms of word meaning, the counterdirectional interpretation 'the opposite has happened before' is not naturally related to the repetitive interpretation 'the same thing has happened before' in isolation.

(9) a. I sende yow þe obligacion her-wyth acordyng to yowre desyre, and a letter to Bedyngffelde thankyng hym for yow, and more-ouer letyng hym know off myn entent. Opyn it and close it **ageyn** iff ye lyst.
'I'm sending you the obligation along with this, as you requested, together with a letter to Bedyngfeld thanking him on your behalf, and moreover letting him know about my intentions. Open it and close it (back) again if you'd like.'
(John Paston II, PCEEC-PASTON,I, 496.156.4835, 15th c.)

b. Counterdirectional analysis: (You) open it/you close it.

c. Restitutive analysis: It was closed and you do something that causes it to be once more closed.
(adapted from Beck & Gergel 2015: 174, ex. 33)

To sum up, Beck & Gergel's case study on *again* exemplifies how simultaneous change in the lexical entry that goes into the composition and rebracketing of the syntactic structure (from *again* modifying VP to *again* modifying SC) produce an equivalent overall sentence interpretation (counterdirectionality/restitution), but based on a different composition path. Two different

[1] As a result of the reanalysis in (8), there was an intermediate stage where speakers probably had two lexical entries (counterdirectional *again*, repetitive *again*). During the EModE period, the repetitive reading becomes the dominant use of *again* and eventually, in late modern English, counterdirectional *again* is no longer systematically available. This can be seen in examples in which a counterdirectional interpretation does not coincide with a restitutive interpretation, for instance (i). See Beck & Gergel (2015) for details.

(i) Ron talked again to Harry.
counterdirectional reading in EModE: Ron answered Harry.

combinations of ingredients lead to the same propositional interpretation. Beck & Gergel (2015) (also Beck 2012) propose that **Constant Entailments** are instrumental in interpretive change of this type:

(10) **Constant Entailments** (after Beck & Gergel 2015; 158):
Variability in the meaning of an expression α between interpretations α' and α" is promoted by the existence of contexts φ in which an occurrence of α under both interpretations α' and α" leads to the same proposition φ'.

In their case study, the expression α referred to in (10) is the adverb *again*, and interpretations α' and α" are (6a) and (6b) respectively: its counterdirectional and its repetitive lexical entry. Sentence contexts φ are examples like (1) and (9a). The next section takes up the core idea of (10) and develops a refinement.

3 Constant Entailments as identical context updates

As Beck and Gergel's (2015) diachronic account of *again* has shown, it is not useful to look at the lexicon in isolation. Instead, what is required is a complete compositional analysis of the surrounding sentence structure including lexical meanings, syntactic structure, semantic composition and pragmatic components. Different analyses with different divisions of labor between these components can lead to the same sentence meaning. In the following, we will call this 'combinatory ambiguity'. Generalizing from the case of *again*, Beck & Gergel (2015; 195) propose the following abstract representation of change under such combinatory ambiguity:

(11) Let S be a string α β γ, and [[S]] = p.
How p is composed depends on
(i) syntactic structure,
(ii) the lexicon, and
(iii) the composition principles used
(plus pragmatic/contextual information, which we ignore for now).

There are e.g. possibilities a. and b.:

a. [S [X α β] γ]]
[[S]] = [[X]] ⊕ [[γ]]

b. [S α [Y β γ]]
[[S]] = [[α]] ⊕ [[Y]]
Different choices for [[α]], [[β]], [[γ]] and ⊕ (the composition principle, e.g. function application or predicate modification) could lead to the same proposition p = [[S]].

Beck & Gergel (2015) explicitly state that this is a simplification in that they have ignored the role of pragmatic and contextual information in (11). In the following, we will reformulate their theory and bring in the role of pragmatic information. This will allow us to expand the theory

to cover further types of interpretative change, notably also those in which implicatures and presuppositions (PSPs) play a crucial role.

Like Beck & Gergel, we consider language change from the point of view of language acquisition (cf. e.g. Kroch et al. 2000). Language acquirers match sentences with situations when acquiring meaning (e.g. Crain & Lillo-Martin 1998). From a set of pairs of a sentence S and a situation in which the sentence is true, they extract the proposition p expressed by sentence S, i.e. the set of worlds/situations described:

(12) a. $<S,s_1>$, $<S,s_2>$, …
b. $[[S]] = p_{<s,t>}$
$= \{s: S \text{ is true in } s\}$
$= \{s_1, s_2, \ldots\}$

Furthermore, acquirers must deduce the compositional ingredients, e.g. word meaning, from the sentence meanings. For example, from the propositions expressed by sentences S1 and S2 containing lexical items α and β, but otherwise identical, acquirers would infer the lexical meaning [[α]] of α and [[b]] of b, as shown in (13).

(13) a. $[[\ [_{S1}\ X\ \alpha\ Y\ ]\ ]] = p$
b. $[[\ [_{S2}\ X\ \beta\ Y\ ]\ ]] = q$
c. $[[\alpha]] = \alpha'$, $[[\beta]] = \beta'$

So how can a language acquirer deduce something different about a compositional ingredient than what the target grammar specifies at the time? Given that language acquirers match sentences with situations, the context and thus pragmatic content play a crucial role. Going back to the case study of counterdirectional/restitutive *again*, let's be more explicit about the sense in which the counterdirectional source analysis and the restitutive goal analysis lead to the same interpretation in a specific pragmatic context. (14c), the outcome of the goal analysis of (1) = (14a), and (14b), the outcome of the source analysis, are not semantically equivalent.

(14) a. The door opened again.
b. The door opened, and the door had closed before. (counterdirectional)
c. The door opened, and the door had been open before. (restitutive)

But when we envision situations in which (14b) is true, we come up with a sequence of events as described in (15) (anticipated in (8c)). Those are identical to the sequences of events that allow (14c) to be true, in (16).

(15) a. The door is open. ← inferred
b. The door closes. ← contributed by *again*'s PSP in (14b)
c. The door opens. ← contributed by the assertion of (14b)

(16) a. The door is open. ← contributed by *again*'s PSP in (14c)
b. The door closes. ← inferred
c. The door opens. ← contributed by the assertion of (14c)

(15) and (16) differ in terms of where the meaning components entailed by the overall sentence meaning come from, as indicated. Under the restitutive analysis, a closing event has to be inferred in order for there to be an opening event. Under the counterdirectional analysis, a state of the door being open has to be inferred in order for there to be a closing. These inferences are not given by compositional semantic interpretation, they are pragmatic. (15) and (16) differ as well in terms of their presuppositions. Thus when we want to talk about different combinatory paths leading to the same overall interpretation, a pragmatic definition of 'the same interpretation' is needed. This subsection lays the foundations for such a pragmatic definition.

While Beck & Gergel explicitly state that pragmatic content plays a role, their formulation of Constant Entailments in (10) above does not reflect that. In order to accurately capture that the relevant notion of 'same interpretation' is pragmatic, we rephrase (10) as in (17). (17) is also explicitly tailored towards diachronic change (CE in (17) stands for 'critical expression', for instance the adverb *again* in the case study).

(17) **Constant Entailments** (pragmatic definition):
Interpretive change in the meaning of a CE α from interpretation α' to α" is promoted by the existence of structures S(α) and contexts c such that the **updated context c'** after utterance of S(α) is the same under both interpretations α' and α".

Our definition of pragmatic interpretation is based on the notion of common ground. We take Stalnaker (1978) as our starting point, cf. (18).

(18) a. common ground: set of propositions that the participants in the conversation accept as true for the purposes of the conversation.
b. context set: intersection over common ground – a set of possible worlds (the worlds in which everything the participants assume is true).

Next we turn to **context updates**. When a sentence S that expresses a proposition p (i.e. [[S]] = p) is successfully **asserted**, the context set is updated with p by intersection, (19).

(19) context update:
Let c be the current context set and p a proposition.
the new context c' = c + p = {w: w∈c and w∈p}

When a sentence has a **presupposition**, it expresses a partial proposition: the proposition is only defined in worlds in which the presupposition is true. In order to update with a partial proposition, the context set has to entail the presupposition, as defined in (20) (Stalnaker (1974), Karttunen (1974); von Fintel (2003) calls (20) 'Stalnaker's bridge').

(20) update with presuppositional proposition:
Let c be the current context set and p be a partial proposition.
c + p is only defined if for all w∈c: p is defined.
If defined, c' = c + p = {w: w∈c and w∈p}

Finally, it often happens that a hearer understands more than what the semantics of an utterance conveys. This case is modelled in (21). A classic example is **implicatures** (Grice 1975; 1978; Gamut 1991), but other inferences may have a similar effect on the common ground (compare again the above example with *again*).

(21) update with inference:
Let c be the current context set and let p be the proposition expressed by sentence S asserted in c. Let I be an inference that an utterance of S in c invites.
If I is drawn, then the updated context c' = c + p + I.

Equipped with these basic pragmatic tools, we can revisit the issue of combinatory ambiguity. In addition to semantic equivalence – two structures express the same proposition -, we want to consider **pragmatic equivalence** (in a given context): two structures lead to the same context update. One possible way for this to happen is that a meaning component could be part of the semantics under one analysis and a pragmatic inference under the other analysis, as shown in (22).

(22) **Identical Context Update**:
a. [[S]] = A & B
c' = c + [[S]] = c + A + B
b. [[S]] = A
utterance of S in c invites the inference that B
c' = c + [[S]] + B = c + A + B

Generally speaking, the idea is that pragmatic equivalence/Constant Entailments provides an interpretive stability that allows the old and the new grammar to function simultaneously. At the same time, combinatory ambiguity is the circumstance that allows language change to proceed. We propose that combinatory ambiguity under interpretive stability (in terms of constant common ground updates) is a catalyst for changes, in particular for meaning shifts that are puzzling if one looks at the critical expression in isolation.

Evans & Wilkins (2000: 550) have argued that a new meaning arises in a regularly occurring context that supports an "inference-driven contextual enrichment". It is in such "bridging contexts" that "speech participants do not detect any problem of different assignments of meaning to the form because both speaker's and addressee's interpretations of the utterance in context are functionally equivalent, even if the relative contributions of lexical content and pragmatic enrichment differ" (ibid.). The notion of bridging context has been taken up by many authors with partially differing conceptualizations and definitions (see Traugott 2012 for an

overview).[2] A recurrent assumption in many, if not all, previous studies is that changes supported in bridging contexts are processes through which a pragmatic meaning component (be it a Gricean implicature, be it an 'invited inference' (Traugott & König 1991; Traugott & Dasher 2002 etc.)) has become lexicalized or conventionalized. By contrast, our theory does not imply this kind of directedness. In what follows we will also present case studies for the opposite change, i.e. for pathways where truth conditional meaning components of an expression develop into pragmatic meaning components (implicatures). For a context to function as a 'bridging' context in our theory, it is only required that it enables identical contexts updates via combinatory ambiguity.

4 A new taxonomy of interpretive change

The first merit of this proposal is that it relates lexical change to compositional semantics and formal pragmatics, thus permitting an explicit analysis of the diachronic pathways we observe. A second merit is that it may permit us to consider diachronic changes that have been pointed out in the literature in a systematic manner. Subsection 4.1 sets the scene by introducing the systematics. Subsections 4.2, 4.3, 4.4 and 4.5 present case studies in which different instances of this taxonomy are analyzed.

4.1 Introducing the systematics

Constant Entailments suggests a taxonomy of interpretive language change that involves pragmatic components. We expect that in language change, shifts are possible between truth conditional content, presuppositions (PSPs), and implicatures or inferences. We will consider the following types of shifts in the next subsections:

(23)
1. A meaning component shifts
   a. from implicature to truth conditions or
   b. from truth conditional content to implicature
2. A meaning component shifts
   a. from PSP to truth conditions or
   b. from truth conditional content to PSP

This systematics invites a series of research questions. We may ask, for example, which of the types of change above are typical. Can we find putative examples/classes of expressions for types of change that have not been reported or are understudied? We can investigate different types of implicatures in diachronic processes (generalized vs. particularized, scalar etc.); and so on. The case studies below begin this project.

[2] Diewald (1999; 2002) uses the term 'critical context' instead of 'bridging context'. In her studies on the grammaticalization of German modal verbs the critical context is characterized by "multiple structural and semantic ambiguity" (ibid. 2002: 116) triggering an opacity in interpretation. This opacity leads to a situation where different alternative interpretations are evoked, eventually the deictic (≈ epistemic) meaning, which is about to be grammaticalized, gains ground as the favoured interpretation as it arises through different ways of pragmatic inferencing. Diewald (2002) also discusses the notion of bridging contexts in Heine (2002) and points to parallels, but also to some major differences.

The attentive reader will notice that (23) does not exhaust the logical possibilities. There is of course also the possibility of interpretive language change within the realm of truth conditional content. Moreover, a meaning component could change its status from PSP to implicature or vice versa, and similarly for potential further kinds of meaning component. We will not discuss putative examples of such further types of interpretive change. This is not to suggest, of course, that such changes do not exist (see for example Eckardt (2001; 2006) on the diachronic development of the German focus particle *selbst* 'even', Deo (2015b) on change in the domain of aspect, Gergel (2010) on the development of *rather*, Beck (forthcoming) on universal quantification, and Eckardt (2011), Deo (2014; 2015a) for overviews). Our goal in this paper is not to be exhaustive; rather, we want to introduce a set of case studies that support the pragmatic version of Constant Entailments (17) and the resulting systematics based on standard semantic and pragmatic analyses of the phenomena they involve.

Before we get started with concrete examples of semantic change in search of answers to the systematic questions we raise, let's clarify what a compositional semantic and pragmatic analysis of language change comprises. The general task of formal semantic analysis of interpretive language change is summarized in (24), after Beck (forthcoming). For any given instance of interpretive change, we ideally want to answer **Q1 Source and goal** and **Q2 Steps of change** (remember that CE is the critical expression, the expression whose meaning undergoes change).

(24) **Compositional interpretive change**:
analysis of source → steps of change → analysis of goal
Q1 Source and goal: What is the interpretation of the structure investigated before and after the interpretive change?
- syntactic structure in which CE occurs
- [[CE]]
- composition of [[CE]] with its sentence environment
- pragmatics of structure with CE

Q2 Steps of change: How does the structure come to acquire the new (semantic and pragmatic) meaning?

The strategy shown in (24) is what we will apply to the case studies below. We will present four case studies which we consider plausible instantiations of the different types of interpretive change in (23). In each case study, we rely on established semantic analyses of the phenomena under investigation. In subsection 4.2 we comment on interpretive change from implicature to truth conditional content. We use connectives, in particular, to provide a specific analysis in terms of Constant Entailments. In subsection 4.3 we discuss the development of size noun-based quantifiers as a potential candidate for the opposite development, i.e. from truth conditional to implicated meaning. Subsection 4.4 examines change from assertion to PSP in the rise of a focus particle, and subsection 4.5 investigates an interrogative complementizer as an instance of

change in the reverse direction, from PSP to assertion. At the end of section 4, the taxonomy in (23) will have gained both concreteness and plausibility.

4.2 From implicature to assertion

Among the four logical possibilities presented in subsection 4.1, only meaning changes driven by implicatures have been discussed extensively as one major type of interpretative change. Implicature-based accounts have been proposed for interpretative changes in many different types of expressions. In fact, it was the founder of implicature theory himself, Paul Grice, who cursorily noted that "it may not be impossible for what starts life, so to speak, as a conversational implicature to become conventionalized" (Grice 1975: 58). While Grice did not expand on this putative diachronic dimension of implicature theory, Levinson in his early work went as far as to propose that

(25) implicature plays a major role in language change, triggering both semantic and syntactic changes. Indeed it seems to be one of the single most important mechanisms whereby matters of language usage feed back into and affect matter of language structure. It is thus a major route for functional pressures to leave their imprint on the structure of a language.
(Levinson 1983: 166)

A phenomenon that has been cited again and again as a typical and wide-spread instance of the conventionalization of an implicature are meaning changes in **connectives**. One major subtype is the development of causal connectives out of temporal ones. The *World Lexicon of Grammaticalization* lists the following cases – many more have been discussed cross-linguistically:

(26) Archaic Chinese *yushi* 'at that time, from that time', temporal marker > *yushi,* causal conjunction […]. Old High German *dia wila so* 'so long as' > German *weil* 'because'[…]. Latin *posteaquam* 'after', 'ever since' > French *puisque* 'since', causal marker; French *quand* 'when', 'because' […]. Latin *dum* 'when', 'as long as', 'because' […]. Finnish *kun* 'when', 'while', 'as', 'since', 'because' […]. Estonian *pärast* 'after', 'because of'; *kuna* 'while', 'as', 'since', 'because' […]. Romanian *din moment ce* 'from the moment', 'because,' and so on […].
(Kouteva et al. 2019: 425; references deleted)

The frequency of this particular meaning change is generally attributed to the *cum/post hoc ergo propter hoc* fallacy ('with/after this, therefore because of this.'). The basic idea is that connectives indicating (partial) temporal overlap or temporal posteriority between two sentences in many contexts give rise to causal conversational implicature.

As mentioned in the *World Lexicon of Grammaticalization,* this type of meaning change can be observed in the diachronic development of the German causal subjunction *weil*, which

ultimately goes back to Old High German *dia wîla so*, an adverbially used accusative DP *dia wîla* 'the-ACC while-ACC' modified by a relative clause introduced by the particle *so*. In Early New High German, the nominal expression was eventually reanalyzed as a complementizer (C°) (cf. Eberhardt & Axel-Tober 2023 for details). In Early New High German, the complementizer *weyl* was still used with its original temporal meaning 'at the time/lit. while that; during'. The purely temporal reading is present in example (27) from *Luthers Taufbüchlein*:

(27) **weyl** die paten das kind noch hallten ynn der tauffe, sol yhm der
while the godparents the child still hold in the basin shall it the
priester die hauben auffsetzen.
priest the hat on.put
'While the godparents are holding the child in the basin, the priest shall put on the hat.'
(Luther 12, 46, DWB2, vol. 28, column 766)

In the often-cited example (28) from the Grimms' dictionary a causal interpretation can be inferred: 'Because the master craftsman had left the workshop, the apprentice worked with less care'.

(28) **weil** der meister die werkstatt verliesz, arbeitete der gesell
while the master the shop left worked the journeyman
lässiger.
more casually
'When the master left the workshop the journeyman dawdled.' (DWB2, vol. 28, column 770)

Such a causal reading frequently arises in sentences with temporal connectives, see for instance the modern German and English examples in (28') and (28").[3] But as the cancelability test shows, the causal meaning is often merely a conversational implicature.[4]

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[3] English *while*, a cognate of German *weil*, goes back to a nominal expression with a relative clause, cf. Old English *þa hwile þe* 'at the time that'. Parallel to German *weil*, it was reanalyzed as a complementizer. In the late 14th century, it is attested in contexts with causal conversational implicatures (Traugott & König 1991):

(i) Thar mycht succed na female, Quhill foundyn mycht be ony male.
'No female was able to succeed while any male could be found.'
(1375, Barbours Bruce 1.60 [OED]; cited from Traugott & König 1991: 201, ex. 17).

Unlike in the case of German *weil,* the causal implicature was not 'conventionalized'.

[4] In the case of German *weil*, the causal interpretation has completely replaced the original temporal one in the standard language. In other cases, the 'conventionalization' of the implicature has led to polysemy or lexical split. In this case, expressions may also occur in contexts in which the original meaning is ruled out. English *since*, for example, may be used in its original temporal sense or atemporally with an individual-level predicate:

(i) I have done quite a bit of writing since we last met. (temporal) (Traugott & König 1991: 194, ex. 3a)
(ii) Since Mary is a genius in physics, she passed the exams easily.

(28') a. Als/Während/Solange der Meister nicht in der Werkstatt war, arbeitete
when/while/as long as the master not in the workshop was worked
der Geselle weniger sorgfältig.
the journeyman less carefully
'While/when the master was absent, the journeyman worked less carefully.'

b. conversational implicature: 'Because the master craftsman had left the workshop, the apprentice worked with less care.'

c. cancelability test: The apprentice was an idle skitter, who never took up any responsibility for his work. (Even) when/as long as the master had left the workshop, the apprentice worked with less care.

(28") a. Since Susan left him, John has been very miserable.
(Traugott & König 1991: 194, ex. 3b)

b. conversational implicature:
'Because Susan left him, John has been very miserable.'

c. cancelability test:
Since Susan left him, John has been very miserable. In fact, he has been miserable ever since he first met her. (Haug 2008: 290)

The sentence with the goal meaning *Weil der Meister die Werkstatt verlassen hatte, arbeitete der Lehrling nachlässiger* 'because the master left the workshop, the apprentice worked with less care' clearly differs in truth conditions from its putative diachronic source meaning 'While/When the master craftsman had left the workshop, the apprentice worked with less care'. Standard causal adverbials can be questioned or negated, which shows that they contribute to the truth conditional, at-issue content of the host clause:

(29) a. Der Lehrling arbeitete nicht nachlässiger, weil der Meister die
the apprentice worked not more casually because the master the
Werkstatt verlassen hatte, sondern weil er durch Geräusche von
workshop left had but because he by sounds from
draußen abgelenkt war.
outside distracted was
'The apprentice did not work with less care because the master craftsman had left the workshop, but because he was distracted by noise from outside.'

b. Mary did not pass the exam since she is a genius in physics, but because she cheated.

Thus the old (= temporal) and the new (= causal) usage are semantically different; but there is pragmatic equivalence in many contexts and the same context update of the common ground is performed. The cancelability test (27), (28) is designed to provide a context in which this pragmatic equivalence does not arise, but such contexts are not typical in natural language use.

In order to analyse the semantic change, we sketch a semantic and pragmatic analysis of a simplified example (30) below.

(30) Weyl der Meister weg war, bummelte der Geselle.
while/because the master gone was dawdled the journeyman
'The journeyman dawdled while/because the master was absent.'

(31a) and (31b) paraphrase the temporal 'source' and the causal 'goal' interpretation respectively.

(31) a. The relevant time in the past includes a time of the master being absent, and a time of the journeyman dawdling, and the time of the dawdling is included in the time of the absence.
b. At the relevant time in the past, the master was absent and the journeyman dawdled and the absence caused the dawdling.

Both interpretations involve two propositions, the one expressed by the subordinate clause and the one expressed by the main clause.

(32) a. [[the master be absent]] = $\lambda w.\lambda t.absent_{w,t}(M)$ "p_1"
b. [[the journeyman dawdle]] = $\lambda w.\lambda t.dawdle_{w,t}(J)$ "p_2"

The critical expression CE in the example is *weyl*. The two different meanings for the connective, the old temporal one and the new causal one, are given in (33a) and (33b) (see e.g. Fabricius-Hansen (1991), Romero & von Stechow (2009), Lewis (1973) for a basic semantics of temporal and causal subordinate clauses).

(33) a. *weyl* as *when/while*, temporal:
p_2 while p_1:
$\lambda w.\lambda t.\exists t_1 t_2[t_1 \subseteq t \ \& \ t_2 \subseteq t \ \& \ p_1(w,t_1) \ \& \ p_2(w,t_2) \ \& \ t_2 \subseteq t_1]$
'p_1 occured and p_2 occured and the time of p_2 is included in the time of p_1'
b. *weyl* as *because*, causal:
p_2 because p_1:
$\lambda w.p_1(w) \ \& \ p_2(w) \ \& \ CAUSE(p_1,p_2)$
'p_1 occured and p_2 occured and p_1 caused p_2'
(i.e. if p_1 hadn't occurred, p_2 wouldn't have)'

This leads us to the following meaning components and their sources for the two analyses:

(34) **old analysis** – temporal *weyl*:
a. p_1 occured ← truth conditional content
b. p_2 occured ← truth conditional content
c. the time of p_2 is included in the time of p_1 ← truth conditional content
d. $\sim>$ p_1 caused p_2 ← implicature

(35) **new analysis** – causal *weyl*:

a.	p_1 occured	← truth conditional content
b.	p_2 occured	← truth conditional content
c.	p_1 caused p_2	← truth conditional content
d.	=> p_1 and p_2 occured during the same time.	← inference from the text

We see that once more, there is pragmatic equivalence with different sources for some meaning components. A former implicature (34d) is incorporated into the lexical semantics (35c). The change in meaning falls under the Constant Entailments hypothesis as stated in the previous section.

Our analysis answers (36).

(36) What does it mean that pragmatic meaning becomes 'conventionalized'?
(cf. the quotation by Grice above)

If a meaning component of an expression contributes to or constitutes its truth conditional content, this is the most typical instance of 'coded/conventionalized' meaning. The famous case of causal connectives developing out of temporal ones thus typically involves change along pathway (23; 1a) (implicature > truth conditional).

4.3 From assertion to implicature

In the previous subsection we dealt with the widely-discussed phenomenon that meaning components from conversational implicature develop into truth conditional content. To our knowledge, the opposite case, i.e. the development of merely implicated from truth conditional content (cf. pathway (23; 1b) in the taxonomy above), has not been addressed explicitly in the previous literature. In this section, we shall argue that the evolution of quantifier expressions from size nouns is a potential candidate for this pathway – in English and in further languages with quantifiers from comparable sources.

Quantifiers have special pragmatic properties. They have been argued to systematically evoke pragmatic enrichment through scalar implicatures (Grice 1975). In the following example, the use of the quantifier *a lot of/lots of* triggers the conversational implicature that not all of the students fell sick during the excursion:

(37) a. During the excursion, a lot of/lots of students fell sick.
b. Implicature: Not all of the students fell sick during the excursion.

The meaning component that not all of the students fell sick during the excursion is not part of the truth conditional contribution of the quantifier. Its status as a conversational implicature is confirmed by the standard tests: it can be cancelled, suspended or reinforced:

(38) a. During the excursion, a lot of the students fell sick.
b. cancellation: During the excursion, a lot of, in fact all of the students fell sick.
c. suspension: During the excursion, a lot of, if not all of the students fell sick.
d. reinforcement: During the excursion, a lot of the students fell sick, but some did not show any symptoms at all.

The quantifiers are part of an entailment scale whose different positions are lexicalized by a set of specific quantifying expressions – a Horn scale (Horn 1972), here:

(39) few > some > many/lots/a lot > most > all

According to the classical analysis of implicatures, the speaker chooses the lexical item from this scale in accordance with Grice's (1975) second maxim of Quantity, which requires them to be as informative as is required (no more, no less). Since the scalar implicature is systematically (or 'generally') evoked by the quantifier, it is not tied to a specific context. Grice (1975; 1989) thus calls inferences of this type 'generalized' conversational implicatures. (More modern incarnations would make use of an exhaustivity operator to derive this meaning component; see e.g. Chierchia & Fox & Spector 2012).

This "inferential meaning […] constructed around the basis of lexical or coded meaning" (Levinson 2010: 174) is of special importance to us when we consider the diachronic development of certain quantified expressions. There is a well-attested diachronic path from binominal constructions with lexical 'part-of' meanings to quantifiers (e.g. Traugott 2008a; b; Brems 2011; 2012 on English quantifiers such as *a bit of* or *a lot of,/lots of*, *heaps of*, *a bunch of;* cf. also Seržant 2021 for a typological survey). In the following, we will illustrate this development by looking at the English large quantity quantifier *a lot of/lots of*. We shall thus argue that the meaning component 'part of, not all' is originally lexically encoded as part of a binominal construction (=NP *of* NP-syntagm, cf. Brems 2011; 2012). But when the first noun, i.e. the 'size noun' (ibid.), structurally develops into a quantifier, it is integrated into a lexical scale of the type in (39). Consequently, this meaning component becomes a pragmatic inference, a generalized conversational implicature.

In the binominal construction, in which a *lot/lot(s)* does not function as a quantifier, and which is marginally still in use in modern English, *a lot/lot(s)* can be modified or even be preceded by a quantifier, cf. (40a). In the plural (=*lots*), it triggers verbal agreement if used as a subject, cf. (40b).

(40) a. I used to fetch **three lots of milk** and I had a sixpence a week.
(CWO-brspok, Brems 2012: 208, ex. 9)
b. **Three lots of milk** are in the fridge.

Originally, *lot(s)* denoted objects of random selection that were used in decision making or in the resolution of disputes (cf. *Oxford English Dictionary* [OED], sense I.1.a) and from this the more abstract meaning in which it denotes something that falls to someone by fate developed that is still sporadically used in contemporary English (cf. *the lof of the working man = 'the fate' of the working man*, Brems 2012: 203). In (41a) and (41b) it is used with an even more abstract sense. According to the OED, *lot* may refer to "[a] part or portion of something; a number of things or people forming part of a larger whole." (sense II.8). This sense is also attested quite early, e.g. in the following examples from the *Ormulum*:

(41) a. Þe maste lott tatt he3hesst iss. Iss þatt lærede genge. Þatt iss 3uw
the great lot that highest is is that learned group that is you
sett abufenn 3uw. To 3emenn & to lærenn.. **Þiss lott off all crisstene**
set above you to lead and to teach. This lot of all Christian
follc Iss he3hesst unnderr criste.
people is highest under Christ.
'The great group that is highest is the host of the learned, who are set above you to lead and to teach … This group of all Christian people is the highest under Christ, [for they are set here at the helm to govern both the others.]'
(*c*1175 *Ormulum* (Burchfield transcript) l. 15248, cited from OED, sense II.8, translation added from Ashe 2019, highlighting added)

b. tat tegg [LB: Farisewisshe menn] wisslike warenn **an lott off tatt**
that they certainly were one lot of that
Judisshenn follc
Jewish people
'that they certainly were part of the Jewish people'
(PPCME, The Ormulum, c1200; from Brems 2012: 217, ex. 26)

Brems (2011: 211) cites (41b) and further examples from the *Ormulum* and argues that these are instances of an early 'part of' use where *lot* refers to a portion or part and the second NP in the *of*-phrase (cf. *Þiss lott **off all crisstene follc*** in (41a) or *an lott **off tatt Judisshenn follc*** in (41b)) can either contain animate or inanimate concrete nouns or even more abstract nouns. In these uses, the noun *lot* lexically contributes a 'part of' meaning.

The quantifier use, in which *a lot of* and *lots of* denote "[a] large number or amount" (OED, sense V.18), seems to occur only several hundred years later. In Brems (2011; 2012) data ranging from 1780 to 1850, examples are attested that are ambiguous between the old lexical use and the new quantifier reading, cf. (42). Such examples can be paraphrased either by 'a group of' or by 'much, many' (Brems 2011: 212; 2012: 218).

(42) There was **a whole lot of people** behind.
(OBC, 1790s; from Brems 2012: 217, ex. 31)

Brems (2012: 217) notes that in the ambiguous examples the entity that is portioned of or quantified over is typically something concrete, either animate or inanimate. Somewhat later unambiguous attestations of plural *lots of* quantifying the abstract *room* emerge, cf. (43a). Traugott (2008a) provides examples where *a lot* is modified by a degree modifier such as *quite*, (43b). In examples of this type, *a lot* is unambiguously used as a quantifier. They occur from around 1900 on.

(43) a. What, there's **lots o' room**!
(CLMET 2, *Agnes Grey*, c1847; from Brems 2012: 218, ex. 33)
b. the moon had risen and was letting **quite a lot of light** into the bank
(1902 Hornung, The Amateur Cracksman [UVa]; from Traugott 2008a: 232, ex. 21c)

We now turn to our semantic analysis of the change. We present an analysis of the origin, choosing the lexical 'part of' construction as our point of departure (OED sense II.8 from above). We relate this analysis to an analysis of the goal of the change, the quantifier construction, by way of a bridging context. The bridging context is a predicative use of the 'part of' construction as exemplified by (41b). Instead of actual examples like (41), we use the simpler (44).

(44) The apples are a part ('lot') of the fruit.

We focus on the interpretation in terms of mereological parts of this 'part of' construction (while this may not be the only possible meaning, it is certainly prominent). The meaning of (44) is represented in (45). The concepts of plural ontology that (45) uses are introduced in (46) for the interested reader.

(45) a. $A < F$
b. $A = \max(*\lambda x.\text{apple}(x))$
the largest sum of apples (in the context)
$F = \max(*\lambda x.\text{fruit}(x))$
the largest sum of fruit (in the context)
c. The sum of all apples is a proper part of the sum of all fruit (in the context).

(46) a. $x < y$ iff x is a mereological part of y
e.g. my arm is a part of me (e.g. Link 1983; Champollion & Krifka 2016)
b. max: the element of a set that has all other elements as parts
c. $[*P_{<e,t>}]$ is the smallest property P' such that the conditions in (i) and (ii) are satisfied.
(i) $P' \supseteq P$
(ii) for all x, $y \in D$: if P'(x) and P'(y) then P'(x + y)
e.g. $*\lambda x.\text{apple}(x)$ is the set that contains all apples and groups of apples (cf. Link 1983)

Next, let's look at the analysis of the quantificational counterpart of (44), (47). The standard semantics in terms of Generalized Quantifier theory (e.g. Barwise & Cooper 1981) is given in (48).

(47) A lot of the fruit are apples.

(48) $\text{card}(\{x:\text{fruit}(x)\} \cap \{x:\text{apple}(x)\}) \geq n$
where the context determines the threshold value n for what counts as a lot.

(48) is intended to be neutral with regard to the particular reading that the quantifier *a lot* gives rise to. Parallel to *many*, several readings are possible (cf. e.g. Partee (1989), Westerståhl (1985), Penka (2018) among many others; see in particular Penka for examples with *many* parallel to (48') and the terminology). Penka (2018) offers a compositional derivation of the three readings without assuming any lexical ambiguity for *many*. Although we cannot do justice to her proposal here,[5] we conjecture that similar to her analysis for *many*, there are compositional routes to calculating different values for *n* in (48) that are instrumental to deriving the different readings. Thus we will work with one interpretation for *a lot*, (49b) below.

(48') a. A lot of Huskies are blue-eyed. (proportional)
'Blue-eyed Huskies are numerous proportionally to Huskies overall.'
b. A lot of SCANDINAVIANS won the Nobel Prize in literature. (reverse)
'Nobel Prize winning Scandinavians are numerous compared to other countries.'
c. There are a lot of apples. (cardinal)
'The overall number of apples is large (in the context).'

(49) puts the 'old' contribution of *lot* and the new contribution of *lot* side by side. Clearly, the lexical change in isolation appears unmotivated.

(49) a. $[[\text{lot}_{\text{old}}]] = \lambda x.\lambda y.y < x$
'y is a mereological part of x'
b. $[[\text{lot}_{\text{new}}]] = \lambda P.\lambda Q.\ \text{card}(\{x:P(x)\} \cap \{x:Q(x)\}) \geq n$
'the intersection of the Ps and the Qs is numerous'

But in the context of a predicative sentence like (44), the path of the reanalysis of *lot* becomes transparent. In (50), we take a closer look at the entailments of the semantics of (44), i.e. of plain (50a). (50b) presents an entailment of (50a) in (frequent) contexts in which the two groups

[5] Penka's analysis decomposes a quantified DP with *many* into a gradable predicate 'x are d-many', an existential quantifier that binds x and a degree operator POS that binds d. These three components can combine with the rest of the clause in different ways, and POS freely associates with focus. In this way, different comparison classes for POS can be derived, which in turn determine the value of *n*. Different sentence readings are thus expected.
Although *a lot* seems to share the readings that *many* gives rise to, it is not clear that the same analysis can simply be applied to *a lot*. Note in particular that *a lot* is not gradable. We must leave this issue open, and use the lexical entry in (49b) as a stand-in for analyses that reflect a possible internal complexity of the quantifier.

related by the 'part of' relation are genuine pluralities. In that case, the sets described by the two predicates have an intersection with multiple members. Thus (50b) puts us on track towards the truth conditional content of the (future) quantifier.[6] (50c) examines another entailment of (50a): if the smaller group is a proper part of the larger group,[7] then not all entities that have the property of being in the larger group belong to the smaller group.

(50) a. $A < F$

b. Assuming genuine pluralities $A = \max(*\lambda x.\text{apple}(x))$, $F = \max(*\lambda x.\text{fruit}(x))$:
$A < F \Rightarrow \text{card}(\{x:\text{fruit}(x)\} \cap \{x:\text{apple}(x)\}) \geq n$ (for some n)
If a group of apples is a proper part of a group of fruit, then there is an intersection of apples and fruit with a number of elements n ($n > 1$).

c. $F \neq A$
If the apples are a proper part of the fruit, then there are fruit that are not apples:
$\exists x[x < F \,\&\, \neg(x < A)] \Leftrightarrow \neg\forall x[\text{fruit}(x) \rightarrow \text{apple}(x)]$
Not all fruit are apples.

This entailment is familiar from the quantifier construction as well: it is the well-known scalar implicature 'not all'. What we observe in this semantic change, then, is a shift in the origin of an entailment between the source and the goal, and another shift to what we might call a pragmatically equivalent restatement of the truth conditions. The overall sentence meaning in the bridging contexts remains stable.

(51) **old analysis** – lexical 'part of' noun:
A are a lot_{old} of F:
The A are a proper mereological part of the F. ← truth conditions
The intersection of the A and the F is larger than n. ← (contextually) entailed
Not all F are A. ← entailed

(52) **new analysis** – quantifier:
A lot_{new} of F are A:
The intersection of the A and the F is larger than n. ← truth conditions
Not all F are A. ← scalar implicature

Of particular interest in the present context is the shift in the origin of the meaning component 'not all'. It was an entailment of the truth conditional content of the source construction. In the goal construction, it is an implicature.

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[6] The entailment puts us on the right track, but it does not tell us anything about the size of *n*. Intuitively for PDE *a lot*, *n* has to be large for the context. What exactly that is, is highly variable (e.g. for (48'b) the number doesn't have to be very large in absolute terms). We think that this issue relates to the observations in the preceding footnote concerning the extent to which a successful analysis of *many* can be transferred to *a lot*. We leave it to future research.

[7] An anonymous reviewer asks whether we can be sure that in *X is a part of Y*, X is a proper part of Y. One reason to think that this does need to be the case is the oddness of *#X is the part of Y*. If 'be a part of' included non-proper parts, the sentence should mean that X = Y, but it is instead unacceptable.

A reviewer points out to us that in cardinal interpretations of examples like (48'c), the implicature systematically fails to arise (e.g. in (48'c) there is no implicature 'there aren't all apples'). This is compatible with our analysis, because for PDE *a lot* the meaning component is simply an implicature and doesn't always have to be there. The implicature is relevant for the application of Constant Entailments in the bridging contexts at the time of the change: In those contexts, Constant Entailments will be met if the implicature is present. This is the case for proportional interpretations.

The proportional interpretation is one possible interpretation of the newly emerging quantifier. In the source construction where *lot* is still non-quantificational, it lexically conveys 'part of a whole' (in combination with the *of*-NP2-phrase). Simplifying a bit, 'a lot of NP2' originally meant something like 'a part of NP2', as shown in (45), (51). This type of part-of-reading is interpretively close to the proportional reading of the quantifier cf. (48), (52). The readings have similar truth conditions and therefore lead to bridging contexts with stable common ground updates containing the meaning component 'not all'. The crucial difference is that in the original construction, this component is part of the assertion, whereas in the newly emerging quantifier construction[8] it is an implicature triggered by the quantifier, a new functional item that stands in paradigmatic relations with other quantifiers (*some*, *all* etc.) and has come to lexicalize a position on the Horn scale in (39).

If Penka's (2018) analysis is right that the cardinal reading and the proportional one can be derived compositionally from the same lexical entry, we would expect that the reanalysis of *a lot* as a quantifier also enables uses with cardinal interpretations, but of course in different types of co- and contexts. And this is what the diachronic studies by Traugott (2008a,b) and Brems (2011; 2012) indicate: Their examples for unambiguously quantificational uses are the ones with cardinal interpretations, cf. (43a) above. And those are attested no earlier than the proportional readings in the bridging contexts. cf. (41b) – which is what our analysis predicts.

While we have pointed out some interesting issues in this change that call for further investigation, our case study provides a plausible example of the shift from truth conditional content to implicature, (23;1b).

A further issue we want to briefly address is the following: The development of 'size' nouns into quantifiers can also be regarded as a case of grammaticalization as it involves the evolution

[8] This development must have been flanked by a syntactic reanalysis, of course. In the binominal source construction, *lot* was a lexical noun of category N. In the quantifier construction, however, it must arguably be merged in or interact with the functional layer of the former second noun. As mentioned above, we do not want to focus syntactic developments here. The syntax of quantifiers, notably of multiword items like *a lot of*, *a heap of* etc., is discussed very controversially. For example, Keizer (2007: 149) proposes a flat syntactic analysis, where *lot* is still a noun and *a* a determiner, but they syntactically form a complex quantifier (*of* is a linking element). Klockmann (2020) discusses some shortcomings of such an analysis and proposes an account according to which *lot* is a root that is embedded under a QP (= quantifier phrase) and *a* is not an article, but a default cardinality marker.

of a functional from a lexical element. There is a lot of controversy concerning the semantic developments in grammaticalization. In functionalist approaches, grammaticalization is often taken to be characterized by a 'weakening' or 'bleaching' of meaning or the like. We cannot do justice to this discussion here, but cf. Eckardt (2006: 33–34) for a critical evaluation of some widely-used terms and conceptuatlizations. Alternatively, it has been proposed by von Fintel (1995: 185) that in grammaticalization the sentence as a whole "remains (largely) constant in meaning" and that "Grammaticalization is a re-arrangement of meaning, not a change of meaning. Many examples of grammaticalization have always been analyzed in a similar, 'musical chairs' kind of way. Jespersen's famous cycle of negation is a prime example." (p. 186). This is an important predecessor to our proposal that reanalysis may be enabled by Constant Entailments.

As outlined above, we would argue that meaning changes (along with morpho-syntactic changes) are reanalyses that occur in acquisition (=imperfect acquisition'). In usage-based accounts, by contrast, it has been claimed that frequency of use and routinization may affect the meanings of expressions.[9] As objected by Haspelmath (1999), however, "semantic bleaching or generalization that is so often observed in the development from a lexical to a functional category […] does not seem to be a consequence of routinization, unlike the phonological and syntactic changes of grammaticalized items, but a pre-requisite for it." (p. 1062). Applying this argumentation to our case study on the development of quantifiers, for example, Haspelmath would probably argue that *a lo*t must have first undergone a shift from a more concrete lexical meaning to a pure quantificational meaning to enable to fulfill a "basic discourse function" (ibid.), which is in turn the prerequisite for habituation or routinization. We would argue that this shift occurs through imperfect acquisition in bridging contexts with stable common ground updates.

4.4 From assertion to presupposition

Presupposition is another 'conventional' meaning component (in the sense of Grice and Levinson above) besides truth conditions. The role of presuppositions has not received much explicit attention in research on meaning change (but see Eckardt 2001; 2009).[10] Beck & Gergel

[9] Haspelmath (1999) proposes a theory which is essentially based on the assumption that grammaticalization is driven by the speakers' tendency to use new more 'extravagant' expressions. They do this to attract attention in order to be socially successful. What propels change initially is thus not a stability in the overall interpretation or pragmatic equivalence, but quite the opposite, i.e. the fact that speakers choose a new lexical item with a more 'extravagant' meaning. Through habituation of frequency of use, the expression may then come to lose its "pragmatic salience": For example, the anaphoric self-pronouns in English have developed from emphatic reflexive elements that have lost their "emphatic" value (p. 1062).

[10] Eckardt (2009: 23) explicitly states that "implicatures are not enough" to cover all types of meaning change and focuses on the role of presuppositions. She studies the diachronic development of intensifying particles in German, English and Italian and argues that in these cases the tendency to *Avoid Pragmatic Overload* must have triggered reanalysis. By accident, the source lexemes of these particles have come to be used by speakers in contexts that give rise to "pragmatic overload" in the sense that the hearer cannot accommodate the presuppositions and only makes

(2015) analyze the diachronic development of English *again* and view one of its transitions as an instance of pathway (23;2b) (from truth conditional to presuppositional) in our taxonomy above. It would be an interesting question for future research whether the transition of truth conditional into presuppositional meaning is typical for the diachronic development of **iterative expressions**. **Discourse particles** have been argued to be a further class of lexical elements that trigger presuppositions (cf. Kratzer 2004; Grosz 2020 for presuppositional analyses). In German, which has a very rich inventory, discourse particles derive from various diachronic sources. Many have been shown to go back to adverbially used adjectives (e.g. *wohl* 'well'*, ruhig* 'calm'*, eben* 'even' etc.) and their development would thus be a further typical example for pathway (23;2b). Besides iteratives and discourse particles, **focus particles** (FPs) such *nur* 'only', *allein* 'solely' or *also* or *too* or German *auch* 'also' are widely considered to be classical cases of lexical presupposition triggers. According to the standard analysis, they associate with the focused constituent in the sentence (Rooth 1985; 1992, a.m.o). This is the instance of interpretive change we will concentrate on here. We investigate, concretely, the CE *allein* 'alone'.

The source of the change is the adverbial use of the adjective *allein* 'by oneself, alone, sole, solitary, without company/assistance', which goes back to Middle High German *all + ein(e/alein(e),* lit. 'all one' (Pfeifer et al. 1993). The adjective is attested from the 12th century onwards. The focus-particle meaning use develops almost simultaneously (DWB2, lemma ALLEIN). A modern German example for the adjectival use is given in (53).

(53) weil die Intendantin gestern [$_{VP/IP}$ [$_{AdjP}$ allein] zu Hause gesessen ist].
because the director yesterday alone at home sat is
'because the director sat at home alone yesterday.' (adjective)

In this use, the adjective can be modified by intensifiers as in *ganz allein* ('all alone') or by a FP like *auch* 'also' or *sogar* 'even' (cf. *Die Intendantin kann auch/sogar allein arbeiten* 'The director can also/even work alone').

The target of the change is the focus particle with the meaning of *only/solely*, as exemplified by the modern German example in (54a). When used as an FP, *allein* cannot be intensified (*#ganz allein* 'all/very only'). In the sentence in (54b) *allein* can thus only be interpreted adjectivally and not as the focus particle. (Syntactically, the change arguably involves a reanalysis of the syntactic category of the CE from Adj > F(ocus) P, but this is not what interests us here).

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sense of the critical utterance by resorting to "implausible" presuppositions. Semantic reanalysis happens because hearers prefer a simpler interpretation of the utterance with less pragmatic overload. By contrast, we will focus here on cases where the target expressions give rise to more presuppositional components than the source. This is not in contradiction to Eckardt's work as she does not claim that there is a general tendency to avoid presuppositional meaning. The avoidance of pragmatic overload in Eckardt's account only relates to implausible presuppositions triggered by pragmatic accidents.

(54) a. weil [die Intendantin]$_F$ [$_{FP}$ allein] gestern zu Hause gesessen ist.
because the director only yesterday at home sat is
'because only the director sat at home yesterday.' (FP)

b. weil die Intendantin ganz allein gestern zu Hause gesessen ist.
because the director all alone yesterday at home sat is
'because the director sat at home all alone yesterday.' (adjective)

We hypothesize that the bridging context for this change (see section 3) are ambiguous sentence structures. The version of the example given in (55) is such a context. The ambiguity exists because the FP can syntactically occur in a post-posed position relative to their associate.

(55) weil die Intendantin allein zu Hause gesessen ist.
because the director alone at home sat is
'because only the director sat at home/because the director sat at home alone'
(adjective or FP)

Let us examine (55), the bridging context, semantically. The two readings – adjective and focus particle reading – are paraphrased in (56).

(56) a. The director sat at home,
and the director was not part of a group that sat at home.
b. The director sat at home,
and no alternative 'that x sat at home' ($x \neq$ the director) is true.

Once more, the lexical contribution of the adjective and that of the focus particle are strikingly different. We sketch a standard semantics for both in (57) (see e.g. Lasersohn 1995; Rooth 1985; 1992, a.m.o).

(57) a. $[[\text{allein}_{Adj}]] = \lambda x.\lambda P.\lambda e.P(x)(e) = 1 \;\&\; \neg\exists y[x < y \;\&\; P(y)(e) = 1 \;\&\; \text{together}(y,e)]$
with P = 'sat at home': x sat at home, and there is no group that x is part of that sat at home together

b. $[[\text{allein}_{FP}]] = \lambda C.\lambda p.\lambda w{:}p(w) = 1.\neg\exists q[C(q) \;\&\; \neg(p = > q) \;\&\; q(w) = 1]$
with p = 'the director sat at home': the director sat at home, and there is no alternative proposition that is not entailed by 'the director sat at home' that is true

Things make more sense in the overall sentence context. The interpretations of (55) according to the two analyses (57a) and (57b) are compared in (58) and (59).

(58) **old analysis** – *allein* as adjective:
  a. the director sat at home ← assertion
  b. no one sat at home together with the director ← assertion

(59) **new analysis** – *allein* as focus particle:
  a. the director sat at home ← PSP
  b. no alternative proposition 'that x sat at home' is true, for relevant individuals x ← assertion

Assuming that the context provides a group of relevant individuals – say, the director, the manager and the sponsor – then to say that the director sat at home without the other two amounts to the same thing as saying that out of the three alternatives {that the director sat at home, that the manager sat at home, that the sponsor sat at home}, the single true one is that the director sat at home. So contextual information can make (58) and (59) pragmatically equivalent – in line with Constant Entailments.

But let's also consider the status of the meaning components, in particular (58a), (59a). It is asserted in the old analysis, but presupposed (e.g. Rooth 1985) in the new analysis. (60a) vs. (60b) demonstrate that this is accurate for *allein* specifically.

(60) a. Es stimmt nicht, dass die Intendantin alleine zu Hause gesessen ist.
  it is not the case that the director alone at home sat is
  'It is not the case that the director sat at home alone.'

  (i) Sie war tatsächlich in einer Kneipe.
    she was actually in a pub
    'She was actually at a pub.'

  (ii) Es waren andere Leute dabei.
    it were other people there-with
    'There were people with her.'

  b. Es stimmt nicht, dass allein [die Intendantin]$_F$ zu Hause gesessen ist.
  it is not the case that alone the director at home sat is
  'It is not the case that only the director sat at home.'

  (i) ??Sie war tatsächlich in einer Kneipe.
    she was actually in a pub
    'She was actually at a pub.'

  (ii) Andere Leute sind auch daheim geblieben.
    other people are also at home stayed
    'Other people stayed at home, too.'

Hence this is an example of interpretive change involving change of a meaning component from truth conditional content to PSP. The boldfaced meaning component in the source meaning of *allein* in (57a) (repeated below) changes its status from assertion to PSP.[11]

(57) a. $[[\text{allein}_{\text{Adj}}]] = \lambda x.\lambda P.\lambda e.\mathbf{P(x)(e) = 1} \;\&\; \neg\exists y[x < y \;\&\; P(y)(e) = 1 \;\&\; \text{together}(y,e)]$

4.5 From presupposition to assertion

This subsection considers the source of the English complementizer *whether* and its diachronic trajectory. Etymologically, *whether* comes from the Old English indeterminate pronoun *hwæþer* 'which of the two' (Eckardt & Walkden 2022). This pronoun had interrogative uses (61a), but also quantificational uses (61b).

(61) a. **Hwæðres** ðonne ðara yfela is betere ær to tilianne, buton
wh-either then (of) the evils is better earlier to attend unless
swæðres swæðer frecenlicre is?
such (of two) as (of two) more dangerous is
(cocura,CP:62.457.21.3299) (*interrogative*)
'**Which** then of the evils ought rather to be attended to, if not the most dangerous?' (Sweet 1958)

c. Ðonne is micel ðearf, ðonne him mon **ðissa tuega hwæðer** onðrætt
then is much need when him one (of) these two wh-either dreads
suiður ðonne oðer, & wið ðæt wienð, ðæt he sua suiðe wið
more than other and against that strives that he so much against
ðæt winne sua he on ðæt oðer ne befealle, ðe he him ær
that strive so he in the other not fall that he him earlier
læs ondred.
less dreaded
(cocura,CP:27.189.9.1260) (*existential*)
'And it is very necessary, when a man dreads **either of these two** more than the other, and strives against it, that he strive not so earnestly against it as to fall into the other, which he formerly dreaded less.' (Sweet 1958)

The semantics of phrases with *hwæþer* (like *which of the evils* in (61a)) is given in (62) (Hamblin 1973; Kotek 2019; Beck 2020 and specifically Eckardt & Walkden 2022). The phrase can only be used appropriately if the restrictor property P is true of exactly two entities (e.g. there are

[11] We remain silent on some interesting smaller changes also involved in this development. For example, according to the analyses assumed, there would have to be a change from 'P(x)(e)' to 'p(w)' (but see Beaver & Clark 2008). A more fine-grained analysis of the micro-steps of change in developments like that of *allein* 'only' might be revealing. We leave this for another occasion.

exactly two evils). Then, the phrase denotes the set of alternative entities that have the property P. Note that the semantics is presuppositional. (62') sketches a standard Hamblin/Karttunen question semantics of (61a) (Hamblin 1973; Karttunen 1977). According to such a semantics, a question denotes the set of its possible answers. The *hwæðer*-phrase contributes a set of alternatives (62'b). In the example, the two alternatives are entities (type <e>), but other types of alternatives are possible as well.[12] Those alternatives project to the propositional level, (62'c). The propositional alternatives are the possible answers to the question, i.e. the question meaning.

(62) [[hwæþer P]] = {x:P(x)} if card({x:P(x)})=2
[[hwæþer P]] is undefined otherwise.

(62') a. hwæðer ðara yfela is betere to tilianne?
b. [[hwæðer ðara yfela]] = {evil1, evil2}
(if there are exactly two evils, undefined otherwise)
c. [[hwæðer ðara yfela is betere to tilianne]]
= {it is better to attend to evil1, it is better to attend to evil2}
'Which of the two evils is it better to attend to?'

We follow Eckardt & Walkden (2022) in how they trace the diachronic development of the OE indeterminate pronoun *hwæþer* to the marker of Yes/No-questions. Their case study provides an example of interpretive change of the type (23, 2a): from PSP to truth conditional content. In addition to well-understood examples like (61a) on the one hand (the source of the interpretive change), and data like (63) on the other hand (the goal of the change, parallel to PDE *whether*), Eckardt & Walkden observe less expected occurrences like (64) and (65):

(63) ðry weras … axodon … hwæðer se halga Petrus þær wununge hæfde
three men asked whether the holy Peter there dwelling had.SUBJ
'Three men asked whether Saint Peter lived there'
(coaelive,+ALS[Peter's_Chair]:109.2346) (cited from Eckardt & Walkden 2022: ex. 5)

(64) hwæðer þu woldest cweðan þæt he wære unwyrðe anwealdes and
whether you wanted say that he be.SUBJ unworthy power.GEN and
weorðscipes
honor.GEN
'would you say that he was unworthy of power and honour?'
(OE Boethius 27: 40–41) (cited from Eckardt & Walkden 2022: ex. 4)

[12] An anonymous reviewer asks if propositional alternatives are possible as well, since this is what the goal analysis uses. Alternative propositions are possible with *hwæðer*. An example is given in (i).

(i) & sie on cyninges dome, hwæðer he lif age þe nage.
& be in king's judgement whether he life keep that not keep
(colawine,LawIne:6.19)
'be it the king's decision whether he keeps his life or not.'

(65) Wenst þu hwæðer he mæge yfel don?
think you whether he may.SUBJ evil do?
'Can he [= God] do evil, do you think?'
(OE Boethius 35: 150) (cited from Eckardt & Walkden 2022: ex. 20)

Eckardt & Walkden show how (64) and (65) may pave the way towards the analysis of *hwæðer* as the interrogative complementizer for polar questions, i.e. the semantics of PDE *whether*, given in (66) (Hamblin 1973; Karttunen 1977).

(66) new analysis – Yes/No-question complementizer as in (63):
a. [[whether]] = $\lambda p.\lambda q.q = p \vee q = \neg p$
b. [[whether Peter lived here]] = {Peter lived here, ¬Peter lived here}

Simplifying their discussion somewhat, an analysis of (64) is sketched in (64'). Two assumptions are crucial: first, the domain of the indeterminate pronoun *hwæðer* is the embedded proposition and its negation (with the negated proposition elided or not explicitly given at all), as shown in (64'b). *Hwæðer* is interpreted in its underlying position in the embedded clause, not in its surface position in the matrix clause, cf. the structure in (64'a). Secondly, the alternatives calculated in this way in (64'b) project beyond the level of the embedded clause and into the matrix, making (64) a matrix question, cf. (64c).

(64') a. [hwæðer$_i$ þu woldest cweðan [t_i þæt he wære unwyrðe […]]]
b. [[hwæðer þæt he wære unwyrðe]] = {he is unworthy, he is not unworthy}
c. [[þu woldest cweðan hwæðer þæt he wære unwyrðe]] =
{you would say that he is unworthy, you would say that he is not unworthy}
'Would you say that he was unworthy of power and honour, or that he is not unworthy?'

Association with an embedded proposition enables reanalysis to complementizer *whether*, which has the two alternatives {p,¬p} built in. Example (65) takes us another step closer to the goal analysis. In (65), *hwæðer* occurs in embedded position. The embedded clause may thus be analyzed as in (65'b) using the complementizer meaning in (66a). The example is still unusual in that this question meaning occurs in the position of the argument of a belief – ininterpretable by way of continuing projecting the alternatives beyond the embedding verb to the matrix, yielding the matrix question in (65'c).

(65') a. [wenst þu [hwæðer he mæge yfel don]]
b. [[hwæðer he mæge yfel don]] = {he may do evil, he may not do evil}
c. {you believe that he may do evil, you believe that he may not do evil}
'Do you believe that he may do evil, or that he may not do evil?'

In a last step, the original embedding structure with belief-type verbs is lost. The structures with *hwæðer* may then fully take on their present day syntactic and semantic properties, already attested in (63). See Eckard & Walkden (2022) for details.

For present purposes, we are particularly interested in the change in the word *hwæðer* itself. The two analyses are put side by side in (67).

(67) a. old analysis – interrogative pronoun:
[[hwæþer P]] = {x:P(x)} if card({x:P(x)}) = 2
[[hwæþer P]] is undefined otherwise.

b. new analysis – Yes/No-question complementizer:
[[whether]] = $\lambda p.\lambda q.q = p \vee q = \neg p$

It is immediately obvious that the PSP from the source analysis is lost in the goal analysis. It is slightly less obvious that it is shifted to the level of truth conditional content because of the detour that the PSP takes: the two alternatives are identified, in bridging contexts like (64), (65), as $\{p,\neg p\}$ by Eckardt & Walkden (2022). By way of this identification the former PSP shows up in the truth conditional contribution '$q = p \vee q = \neg p$' in the complementizer meaning.

In (68) and (69) we demonstrate that Eckardt & Walkden's (65) is indeed a bridging context in that the old and the new analysis, applied to the embedded clause, lead to the same interpretation. The change is in line with a reanalysis relying on a combinatory ambiguity under Constant Entailments.

(68) **old analysis** – indeterminate pronoun:
[[hwæþer he may do evil]] =
[[hwæþer]] $\oplus$ {[λw.he may do evil in w], [λw.he may not do evil in w]}
= {that he may do evil, that he may not do evil}

(69) **new analysis** – interrogative complementizer:
[[whether]] ([[he may do evil]]) = [$\lambda p.\lambda q.q = p \vee q = \neg p$]($\lambda$w.he may do evil in w)
= {that he may do evil, that he may not do evil}

In sum, Eckardt & Walkden's analysis presents us with an example of an interpretive change from PSP to truth conditional content. This is an indication that the pathway (23; 2a) may be available too.

5 Conclusions

Starting from the hypothesis that meaning change is most likely to occur in contexts with interpretative stability, we have presented several case studies and provided explicit analyses of the meaning changes involved with the help of compositional semantics and formal pragmatics.

Interpretative stability has been argued to obtain in contexts where the entailments triggered by the source and the target expression remain constant. In the present paper we have proposed an extended definition of Constant Entailments in terms of pragmatic equivalence, defined as identical context updates: Meaning change is facilitated when the common ground update that an expression causes to be performed is the same for the source analysis and the goal analysis. The 'bridging' contexts where this type of pragmatic equivalence holds and which thus open the space for diachronic change show combinatorial ambiguity in the sense that the source and target expression differ in the division of labor between semantic composition and pragmatic components (along with possibly differing syntactic structures). We have demonstrated that different types of pragmatic meaning can give rise to combinatorial ambiguity. While much of the previous literature has concentrated on changes through which implicatures become conventionalized, we have also discussed the opposite type of change where a truth conditional component develops into a (generalized) conversational implicature. Furthermore, we have investigated the role of presuppositions in interpretive change and discussed case studies where presuppositional meaning components develop into truth conditional meaning and vice-versa.

It should be noted that we have not claimed that reanalysis under Constant Entailments is the only mechanism of meaning change and we do not intend to suggest that diachronic theories which posit developmental steps not characterized by this type of pragmatic equivalence are wrong. It has to be left to future research to come up with a comprehensive theory of interpretive change which also addresses the questions which types of changes are propelled by which mechanisms. Our paper sketches a research program in which further types of meaning components and shifts can be investigated. It is also an invitation to reexamine instances of interpretive language change using the tools of compositional semantics and formal pragmatics. We hope that our taxonomy of types of change is just the beginning.

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