Hèh? [hɛ↗], and *hé!* [he:↘] in Dutch - Synchronic Linguistic Competence or Convergent Cultural Evolution? - A reply to Dingemanse *et al.* 2014.

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1. Introduction

Repair initiators[1], like English *what?*, are words that trigger the conversation partner to repair his last utterance, for instance, if the utterance was received by the hearer with some flaw. Repair initiators form an instance of the prototypical pairing of utterances in human conversation, as studied in conversation analysis. In a fictive conversation between the persons G and E as given under (1ab), E signals with his utterance *what?* or *huh?* that something was wrong with the previous utterance.

(1) a. 1. G. *It's not too bad*   b. 1. G. *It's not too bad*
         2. E. *What?*   2. E. *Huh?*
         3. G.   *'S not too bad*   3. G.   *'S not too bad*

Dingmanse *et al.* (2013), henceforth DEA, identify two types of such repair initiators. One type is represented by English *what*, French *quoi,* Chinese *sheme*. The form of these items differs greatly across languages. The relation between their form and their meaning is arbitrary. The other type are interjections, such as English *huh?* and Dutch *hèh?*, which have quite similar workings. Dingemanse *et al.* show that there is much less variation in the latter type. An excerpt of their data, taken from 21 languages, is represented in (2) (Enfield *et al.* 2013: 352).

(2) *Repair initiators*

Language	Type 1	Type 2
English	what?	[huh↗]
Chinese	sheme?	[hã: ↗]
Chintang (Sino-Tibetan, Nepal)	them?	[hã: ↗]

DEA claim that "Huh?" is a universal word, i.e. there is a (partly) non arbitrary relationship between its meaning (*signifié*) and its form (*signifiant*). The argument is twofold: they show that like its type 1 counterpart (*what?*), type 2 repair initiators (*huh?*) are integrated in the phonological system of the language: rather than an interjection standing outside of the grammatical system, it is a *word*. They then demonstrate that (part of) its phonological shape is *universal*. A summary of the universal properties of type 2 repair initiators that DEA (2013: 3) isolate is given under (3).

(3) Properties of "Huh?"
   a. Its meaning must be described as a "repair initiator".
   b. Its phonological shape is /(C)v(C)/ with C∈{h, ʔ} and V∈{e, i, ə, .. nonback)} plus a (rising) question intonation.
   c. There is a universal and an arbitrary part
       1. what is universal is the CvC structure and the (rising) question intonation
       2. what is arbitrary is the segmental choice from the consonant/vowel sets

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[1] *Repair* is a technical term from conversation analysis (Sacks *et al* 1975), and stresses the turn taking properties in the conversation.

We are thus in presence of a universal non-arbitrary association of a *signifiant* (CvC with the restrictions mentioned on the choice among Cs and Vs) and a *signifié* (repair initiator). DEA (2013: 3) argue that this is evidence against the Saussurian arbitrariness of the sign, i.e. against an arbitrary form-meaning relation. The question, then, is where the universality comes from. DEA (2013: 7) consider two options: type 2 repair initiators may either be innate grunts, or they are due to convergent cultural evolution. In case the former scenario is correct, they do not belong to language; rather, like laughs and screams they have an innate biological basis and therefore occur in all languages: speakers with the same biology produce the same kind of laughs, screams and repair initiators. DEA level a number of objections against this explanation and abandon it. Arguments that are brought to bear are, among others, the fact that there is no known phylogenetic precursor and that unlike grunts, repair initiators are not an involuntary and inescapable response to a specific stimulus but rather chosen over a larger set of repair initiators. Also, the authors point out that interjections of the Huh? type are acquired like normal words, i.e. only at age 2,5 erratically and fully at age 5 by American English children. This is unlike laughs and screams, which are not subjected to this kind of acquisition. Dingemanse *et al.* (2013: 6) indeed show, convincingly in our view, that *huh?* etc. are words, i.e. belong to language and are under grammatical control. This result alone is enough to reject the grunt scenario: trivially grunts are not under grammatical control.

The alternative that DEA believe to be correct is what they call convergent cultural evolution. Drawing on the explanation for independent but convergent evolution of species (such as similar body plans in sharks and dolphins), they argue that the universal properties of *huh?* etc. are the result of identical environmental pressure both regarding the *signifié* (conversational situation made of communicative moves between speakers) and the *signifiant*. The latter converges, DEA argue, because all speakers of all languages are exposed to the pressure created by speaker change in a conversation, which most often takes only 100 to 300 milliseconds and thus forces speakers to plan a next turn well before the end of the preceding turn. Given the communicative importance of indicating trouble in this process, the relevant signal should be minimal and easy to deploy. This is why, according to DEA, *huh?* etc. are made of items that require minimal effort: "the codaless monosyllable is the least marked syllable type across languages […], glottal stops or fricatives are "simply some constriction at the narrowest place in the vocal tract, and the unrounded low front central vowel is close to the neutral state of the articulators" (p.7).

In this article we show that there is an alternative interpretation of the findings of Dingemanse *et al* (2013), one where the invariable characteristics of *huh?* etc. follow from universal properties of language, i.e. Universal Grammar, and hence are ultimately biological (since UG is coded in the human genome). It is not biological in the sense of grunts, though, since grunts do not fall inside language and, therefore, are not governed by grammar. Building on what we believe is the central insight of DEA, i.e. the fact that *huh?* etc. are words and hence governed by grammar, we demonstrate that type one (*what* etc.) and type two (*huh?* etc.) repair initiators share core properties and behaviour. This is entirely unexpected by DEA since *huh?* is inherently universal and *what* etc. are inherently arbitrary. These shared properties can only be revealed by linguistic analysis: both *what* etc. and *huh?* etc. are embracing structures where a phonetically expressed item in a higher hierarchical position relates to a phonetically unexpressed item of the same kind that occurs lower in the hierarchy. While *what* etc. exhibit this embracing structure in syntax, in the case of *huh?* etc. it is manifested in the phonology.

We illustrate this parallel in a case study of Dutch *heh?* [hɛ(:)↗] and *wat?* [wɑt↗] and argue that both explanatory options considered by DEA miss this linguistic generalization and therefore do not strike close to the mark. We conclude that the reason for the universal properties of *huh?* etc. can only be linguistic or else the embracing parallel is accidental. In case the explanation is linguistic, though, it needs to be *universally* linguistic (following DEA's discovery

that *huh?* etc. has universal properties), hence supports the existence of UG in the Chomskyan sense.

Finally, we adduce positive evidence that DEA's cultural convergence analysis is on the wrong track. As was mentioned, it makes the invariant phonological properties of *huh?* etc. follow from communicational needs: *huh?* etc. "should be minimal and easy to deploy". One central trace of this minimal effort, they argue, is the fact that *huh?* etc. are always codaless monosyllables, i.e. follow the shape CV, which is unmarked. By contrast we show that in Dutch the surface [hɛↄ] is in fact /hɛhↄ/: the phonology of Dutch enforces the presence of a coda after [ɛ] since this vowel only occurs in closed syllables in this language (in open syllables only [e] is found). Also, the least marked and most effortless vowel in Dutch is schwa, but this is not the vowel that is used in *huh?*-type repair initiators. Dutch thus contradicts the minimal effort analysis of the *signifiant* of *huh?* etc. in two central areas.

The roadmap is as follows. We first discuss a possible linguistic correlate of cultural convergent evolution: grammaticalization. We show that it occurs within syntax and is prepared by syntax (section 2). In section 3, we discuss the grammaticalization pathway of interrogation. This is necessary as both repair initiators are interrogative. Section 4 elaborates a possible diachronic pathway of Dutch evidence repair *hèh?* from world repair *hée!*. In section 5, we discuss the *syntactic* structure of the "lexical" repair initiator *what/wat/quoi...* etc. Section 6 discusses the *phonological* structure of the "interjective" repair initiator *huh? hèh?...* etc. This is possible because of DEA's hypothesis (which we share) that the "interjective" repair initiators are part of the linguistic system. On these grounds, we show that the syntactic and phonological structures are parallel to a high extent. Finally, section 7 shows that the relation between world and evidence repair in the Dutch *hèh?-hé!* pair is not accidental but a structural pattern of the language, and beyond. The cross-linguistic nature of this relation then provides a linguistic reason for the convergent behaviour of the repair initiator. The paper closes with the discussion of some predictions and prospects.
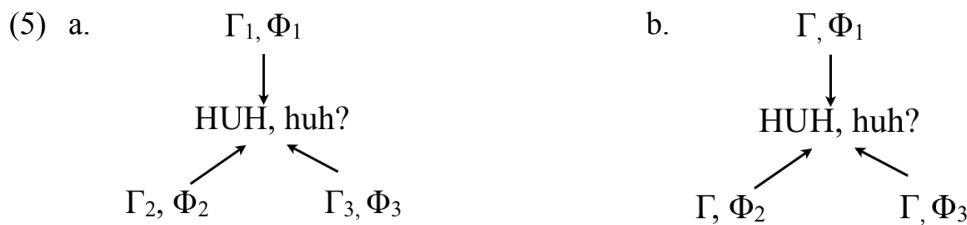
2. Bleaching

DEA suggest that only a non-linguistic process such as convergent cultural evolution can produce an output that violates Saussurian arbitrariness. This scenario does not take into account that linguistic theory has devised purely linguistic mechanisms which may produce an output with reduced Saussurian arbitrariness due to their universal character. This is slightly more abstract than the surface phonological level Saussure had in mind: it is tied to the *structure* of surface strings rather than to the string itself. For instance, Chomsky's (1968) Universal Base Hypothesis assumes that word order is universal underlyingly and may then be altered by language-specific transformations during syntactic derivation. Baker's (1988) Universal Thematic Alignment expresses the hypothesis that there is a universal thematic hierarchy. Cinque (1990)'s universal "cartography" assumes that the scope ordering of adverbs is universal. Finally, Diesing's (1992) Mapping Hypothesis ties particular sentential domains to particular semantic interpretations, cross-linguistically. In all these cases, a semantic content and a linguistic form project in a non-arbitrary way. Although various of these universals have been challenged and defending them is not our point here, the fact that they have been proposed shows a shared conviction that formal grammar can produce cases of reduced arbitrariness, be they basic or derived.

Below we investigate two cases of reduced arbitrariness, one in the phonological domain, the other in the semantic domain. Let us first look at the latter: so-called grammaticalization, or "bleaching", is known to systematically produce reduced phonology and a prototypical set of formal meanings (Meillet 1912, Lehmann 1992, Fisher 2007). That is, in case an item undergoes grammaticalization, both its phonological shape and its meaning are or can be affected in a

systematic way – so-called *pathways* (Kemmer 1993). The process works on a sound-meaning *pair*. WH elements for instance follow a diachronic pathway in (at least) three steps: lexical item => existential ($\exists$) => interrogative (Q) on the semantic side, accompanied by changes of the phonological shape. In Italian for example, the present day interrogative WH item *cosa* as under (4)c has a precursor with existential meaning under (4)b, which itself comes from *una cosa*. That is, *una cosa*, a regular NP interchangeable with any other NP, was grammaticalized in a first step under (4)b, a process that made it non-interchangeable with other NPs and made *cosa* acquire an existential interpretation. The second evolution from (4)b to (4)c where *cosa* acquires an interrogative interpretation manifests itself on the surface as a word order change where *cosa* is fronted across other lexical material, indicated by xxxx. This fronting is synchronic in nature, produced by online grammatical computation (Heim 1982, Cheng 1991, Postma 1995).

(4) a. Regular NP   b. Existential   c. WH

       Gianni comprò una cosa $\rightarrow$ Gianni comprò cosa $\rightarrow$ Cosa comprò Gianni ~~cosa~~

       John bought a thing   John bought something   what did John buy?

       Γ_1= 'a thing' $\rightarrow$ $\Gamma_2 = \exists$ $\rightarrow$ Γ_3= Q

       Φ_1= xxxx [una][kosa] Φ_2= xxxx [kosa] Φ_3= [kosa]xxxx[~~kosa~~]

Given this background information, i.e. the fact that grammaticalization targets both form and meaning, Dingemanse *et al.*'s analysis of *huh?* may be represented as under (5)a. The sound-meaning pair {HUH, huh?} in three languages is the result of an evolution whereby three meanings (Γ_1, Γ_2, Γ_3) and three sound shapes (Φ_1, Φ_2, Φ_3) converge. Grammaticalization pathways are reported to be universal or at least cross-linguistically extremely regular (Haspelmath 1991, Kemmer 1993, Fisher 2007), especially near the endpoint of the pathway. It is therefore safe to assume that the hypothetical pre-stage of {HUH, [huh?]} is as under (5)b where $\Gamma_1=\Gamma_2=\Gamma_3$, i.e. a uniform Γ.

(5) a. Γ_1, Φ_1 b. Γ, Φ_1

                      $\downarrow$ $\downarrow$

            HUH, huh?   HUH, huh?

           $\nearrow$ $\nwarrow$ $\nearrow$ $\nwarrow$

     Γ_2, Φ_2 Γ_3, Φ_3 Γ, Φ_2 Γ, Φ_3

Under (5)b, then, Γ has grammaticalized to HUH, while its arbitrary phonological shapes $\Phi_{1/2/3}$ have reduced to *huh?* and its variants.

A well-known example of reduced phonology is the grammaticalization of the numeral *een* [e:n] 'one' to the indefinite article *'n* [ən] 'a(n)' in Dutch (and English). We observe that semantic bleaching, i.e. a widening of the use, goes hand in hand with phonological reduction. Semantic bleaching/widening (rather than shift) presupposes a constant core meaning, which may ultimately be universal. Of course an arbitrary part remains, and the researcher's onus is to disentangle the arbitrary and the universal parts within the grammaticalization process.

3. The shape of interrogative meaning: embracing structure

Let us now consider a cross-linguistically resident fact about the relationship between existential and interrogative meanings of identical items (i.e. which have the same phonological shape). In Dutch for example, in case the item *wat* occurs in the initial position of the utterance as under

(6)b, a question interpretation arises. If, on the other hand, *wat* remains in its base position as under (6)a, it receives an existential interpretation ("something/anything").

(6) a. Er   gebeurde wat   (existential reading)
          PRT happened what
          'something happened'
     b. Wat gebeurde er?   (interrogative reading)
          what happened PRT
          'what happened?'

This is not an isolated property of Dutch, as was already evidenced under (4), but rather a cross-linguistically recurring pattern (Haspelmath 1991). It is found for instance in German, Russian, Latin, Chinese, etc. This suggests that it is not the sound *wat/cosa* per se that carries the interrogative meaning, but rather the *structure* C xxxx C, where C is a WH item that occurs twice in the structure (but only once phonetically) and embraces other lexical material (xxx). Also note that WH items are semantically bleached cross-linguistically: they realize open variables (Heim 1982, Diesing 1992) without meaning of their own (a "defective sign").

In sum, (4) and (6) show that it is really the embracing structural relationship of two copies of the bleached dummy that is responsible for the interrogative meaning: /WH xxxx W̶H̶/ in the Dutch and Italian examples. This is also true for languages like Chinese, Korean and Japanese where the same pattern is found, except that there is no overt movement of the WH item, as shown under (7). For those languages, it is standardly assumed that the movement occurs covertly in the case of interrogatives (Cheng 1991). The structure is thus embracing /W̶H̶ xxx WH/ as before, except that the lower, rather than the higher copy of the WH item is spelled out.

(7) a. Yani xiang mai **sheme**   (Mandarin, Zhang 2013: 126)
          Yani want buy what
          'what does Yani want to buy'
     b. Ruguo Yani xiang mai **sheme**...
          if   Yani want buy what, ...
          'If Yani wants to buy something, ... '

Given what we have seen thus far, a relevant generalization is that the phonological shape of the WH item does not contribute to the interrogative meaning: it is only the embracing structure of a (universal) open variable that is responsible for the interrogative reading. The phonological shape is merely mnemonic. It is therefore misguided to believe, as DEA do, that the *signifiant* of interrogation is the surface phonological shape of WH items. This insight is made explicit under (8) below.

(8) a. The *signifiant* of interrogation is an embracing structure, not the phonological shape of WH items themselves.
     b. Interrogation only arises with certain bleached lexical items.

In sum, the meaning of many quantitative items (e.g. Dutch *wat,* either "what?" or "something") is an interplay of its arbitrary phonological matrix and a universal embracing configuration.

4. A diachronic pathway for *huh?*
4.1 Grammaticalization of *huh?*

In our study of Dutch below, we build on two insights that were introduced above. On the one hand, in the domain of quantification, meaning is carried by structural relations, rather than by the lexical items themselves (Heim 1991, Diesing 1992, Postma 1994, 1995). On the other hand, two quantificational meanings (e.g. interrogation and existential quantification) may entertain a diachronic pathway relation (see the Italian example under (4)). If we use these insights in order to probe the universal properties of *huh?* that DEA have revealed, we expect ...

(9) a. that there is a lexical item that is slightly different from *huh?* (*hèh* in Dutch) both phonologically and semantically, which entertains a systematic diachronic pathway relation with *huh?* (i.e. corresponding to the first step under (4)).
     b. that there is another use of *huh?* which is created by an operation based on *huh?* that modifies its structural relation (i.e. corresponding to the second step in (4)).

If we find such a case, what looks like non-arbitrariness of *huh?* may in fact be a result of universal processes that work on Γ and produce *huh?*. We show that the pattern described under (9) is indeed found in Dutch. That is: a formal item can be traced from which HUH? is structurally derived by a bleaching operation. We argue that this bleaching operation follows standard phonological reduction patterns (debuccalizaton, centralizing vowel reduction, etc.), as well as a systematic semantic projection: semantic reduction to open variables. These operations are synchronically present in the competence of native speakers.

Our findings confirm DEA's conclusion that *huh?* is a *word* and as such fully integrated in the linguistic system, rather than being merely an interjection with deviant phonology. However, our analysis calls into question DEA's claim that convergent cultural evolution is involved: instead of evolutionary pressure for convergence, the "repair meaning" HUH? as well as the phonology [huh?] synchronically derive from related arbitrary items through operations of phonological reduction and semantic bleaching.

4.2. The meanings of Dutch *heh?*

Dutch HUH? is realized as *hèh?* [hɛː↗]. The usage of this item with a rising interrogative intonation is at least threefold, as shown under (10).

(10) a. A: Dat klopt, want 284567+4567= 289134   (string repair)
          'that is correct because 284567+4567= 289134'
       B: **Hèh?**
      b. A: Tussenwerpsels maken deel uit van het taalsysteem   (evidence repair)
          'Interjections are part of the language system'
       B: **Hèh?**
      c. A: Hèh, waar ligt die schaar nou weer?
          'shit, where are those scissors again'

The case in (10)a expresses amazement about what is said, with the implicit request to repeat the string. It is typically followed by the repetition of the previous expression. It can be rendered as "what are you saying?". This is the repair initiator discussed in Dingemanse *et al.* (2013). The case in (10)b is slightly different. It expresses amazement about what is said, *without* the implicit request to repeat it. It is not followed by what was previously said, but the first speaker responds with something like: "Yes it is strange but true". This type of *hèh* can be paraphrased as "are you not amazed about what you are saying?". Finally, *hèh* under (10)c

expresses amazement about some phenomenon or event. It also expresses irritation: in this context *hèh* can, by some speakers, be replaced by *hech* [hɛx]. It may be described as a rhetorical question and be uttered without previous linguistic material, or even without any conversation partner around. Therefore, *hèh/hech* in this context is not conversational. Moreover, it can be integrated into a bigger utterance, as (10)c demonstrates. The discussion is summed up under (11) below.

(11)   Dutch *hèh* has (at least) three usages, of which only one is DEA's repair initiator. The shared meaning of these usages does not have conversational *repair* as its core meaning, but amazement.

In what follows, we call (10)b utterances of *evidence repair*, and contrast it with the traditional "repair initiator" that we call *string repair* (10)a.

4.3. The meanings of Dutch *hee!*

Dutch also features the item *hee!* [hee↘]*,* which is phonologically and semantically closely related to *hèh?*. Its behaviour is described under (12) below.

(12)   a.   Hééee!, (Jan,) leuk dat ik je zie!   greeting
             Hay, (John), nice to see you
       b.   hee jij daar, ga van mijn land!
             Hay you, go off my land
       c.   hee, wat is dat?
             Hay, what is that?

Under (12)a, *hee!* is used when meeting a person unexpectedly; it expresses amazement. It is enriched with overlength and a falling intonation, [heee↘]! If a vocative follows (e.g. *Jan*), the overlength may be maintained. This usage is also closely related to *haa*!, which expresses an extra component of (implicit) joy. Under (12)b, *hee!* is used when seeing a person unexpectedly that should not be there. This use does not go with overlength in case the utterance continues, as in *hee jij daar!* ('hay you there'). Finally, (12)c is used upon seeing something unexpected. This usage does not display overlength either if the utterance continues.

In this study we only consider cases where two participants are involved, i.e. cases that are conversational. Moreover, we concentrate on those usages that are not integrated into a bigger utterance. This defines the following subset of cases discussed: [hɛɛ] under (10)a,b and [hee] under (12)a,b. Their properties are recalled under (13) below.

(13)   a.   hee!   [hee↘]   amazement about your presence   (world repair)
       b.   hèh?   [hɛɛ↗]   amazement about [x saying y]   (string and evidence repair)

We call the greeting usage under (13)a *world repair*[2], while referring to the usage under (13)b as *string* or *evidence repair*. The three categories of repair initiators that were introduced on the grounds of Dutch may thus be defined as under (14).

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[2] According to the ethological tradition (Kendon & Ferber 1973, Eibl-Eibesfeldt 1977), greetings downplay aggression. We here follow the linguistic anthropological conception of greetings as restoring the friendly world setting which is breached by a person's intrusion of the greeter's *space* (Duranti 1992, 1997). In conversation analysis, greetings are purely functionally defined by their boundary occurrence in an utterance pair (Sacks *et al.* 1975).

(14)   Repair initiators
    a.   string repair initiator
      word or phrase requesting repair of the *phonological string* of the speech act that precedes it (string repair, i.e. the case described by DEA).
    b.   evidence repair initiator
      word or phrase requesting repair of the *evidence* as it was before the (speech) act that precedes it (evidence repair).
    c.   world repair initiator
      word or phrase establishing repair of the *world setting* as it was before the (speech) act that precedes it (world repair, "greeting").

Since utterances typically function as initiators for the interlocutor's speech, we will usually omit the "initiator" part and speak of "string repair", "evidence repair" and "world repair".

5. The syntax of the repair initiator *what?*: copying mechanisms

It was shown in section 2 that interrogative meaning is carried by the embracing occurrence of a bleached item. Hence the structure of the phrasal repair initiator *what did you say?* has the representation as under (15): there are two instances of *what*, of which only one receives phonological exponence.

(15)   A: I resign
      B: what did you say ~~what~~?
      A: I resign

The simple repair initiator *what?* has this embracing structure as well, albeit in a slightly more abstract fashion. Consider the conversation under (16)a where *what* represents the standard interrogative pronoun. It has the structure under (16)b, where the unexpressed fragment <Peter has bought> in B's utterance is recoverable from the content of A's preceding utterance (its TP in technical terms). Without recoverability, ellipsis is ill-formed.

(16)   a.   A: Peter has bought something   b.   = [something [Peter has bought]]
          B: What?   = [what   [~~Peter has bought~~]]
          A: A car   = [a car   [~~Peter has bought~~]]

Now if we assume a similar mechanism in the case of the repair initiator *what?* and if we assume that it means "what do you say?", the question arises what the elided part <do you say> can be recovered from. At this point, Ross's (1970) performative hypothesis becomes relevant. According this hypothesis, any utterance is headed by a silent clause which represents the speech act, more specifically <I say to you > in the case of an informative statement, where 'I' carries the index of the speaker A and 'you' the index of the hearer B.

(17)   A: <I$_A$ say to you$_B$> I$_A$ resign
      B: what <you$_A$ say to me$_B$> ?   (string repair)

From this perspective, the repair initiator reading of *what?* comes about by copying the *speech act part* instead of the *content part*, as was the case in (16). We conclude that in the case of the repair initiator *what?*, its meaning derives from it being a WH-item with speech act scope.

(18)   B: what <you$_A$ say to me$_B$ > ~~what~~   (string repair)

It is also possible to copy the entire preceding utterance <you$_A$ say to me$_B$ I resign> in order to resolve the elided part. Then *what* cannot realize the object position but copies an adjunct position. Adjunct extraction of *what* produces a different, exclamative interpretation (Bennis 1995). Moreover, in addition to the exclamative effect, it now questions the cause of the speech act (= "How come you say that you resign"). That is, it questions the evidentiality and asks for evidence repair

(19)   B: what <you$_A$ say to me$_B$ that you$_A$ resign> ~~what~~   (evidence repair)

We conclude that both the repair initiators *what do you say?* and *what?* as well as the evidence repair reading of *what?* ("How come you say that") represents the embracing structure of a WH-item, which is typical for questions. Putting aside the standard constituent interrogation, the structure allows for two readings (string and evidence repair), depending on which part of the previous utterance is copied. In section 6, we argue that the phonology of the repair initiator *hèh?* has a similar embracing structure of dummy material and similar interpretations.

6. The phonology of the repair initiator *hèh*?

In this section we argue that there is a systematic phonological relationship between world repairs and evidence repairs. That is, the latter are a phonologically reduced variant of the former. In Dutch, this amounts to saying that *hèh?* [hɛɛ↗] (evidence repair) is derived from hee! [hee↘] (world repair). In order to see that, let us first look at the distribution of tense (or long) and lax (or short) vowels in Dutch. It is a well-known fact that while the former may occur in both open and final closed syllables, lax vowels are only found in closed syllables. This is illustrated under (20) below.[3] For further reference, we add [ə] to the data set, which patterns with tense vowels.

(20)

|		CV#	CVC#
+tense	i	*die* 'that one'	*dief* 'thieve'
	y	*nu* 'now'	*fuut* 'a type of bird'
	u	*doe* 'I do'	*voet* 'foot'
	e	*zee* 'sea'	*keet* 'barn'
	ø	*reu* 'male dog'	*leut* 'pleasure'
	o	*zo* 'so'	*doop* 'baptizing'
	a	*la* 'drawer'	*knaap* 'lad'
+lax	ɪ	—	*big* 'youg pig'
	ʏ	—	*brug* 'bridge'
	ɔ	—	*toch* 'yet'
	ɛ	—	*heg* 'fence'
	ɑ	—	*knap* 'smart'
-tense, -lax	ə	*(maak)t[ə]* 'made'	*(twin)t[ə]g* 'twenty'

The question whether length or tenseness is the phonologically relevant characteristic is a much debated issue in the literature (e.g. van Oostendorp 1995: 23ff). Since nothing in our demonstration hinges on the answer, we only mention the lax-tense dimension under (20) for the

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[3] Note that we only talk about native vowels: items such as [ɛɛ], [œœ] and [ɒɒ] are considered to be "loan segments" for they almost exclusively occur in loan words from French and English (see e.g. van Oostendorp 1995: 23, 94ff).

sake of exposition. This is also consistent with the fact that the items of interest, [hee] and [hɛɛ], both display long vowels: in their phonology, length cannot be the distinctive characteristic. The elimination of length from the analysis is further supported by the obvious fact that it may have another source: pragmatics. The phonetic description earlier in the article reports overlength for both [hee] and [hɛɛ]. In case length is the phonologically relevant characteristic that distinguishes the two sets of Dutch vowels under (20), its distinction is binary: short vs. long. Additional (over)length of pragmatic origin will then neutralize the phonological length contrast, leaving us only with the tense-lax marker of the phonological distinction. In any case, overlength has no phonological status and may be safely disregarded for the purpose of phonological analysis.

We may thus reduce [hee] (or [heeee]) and [hɛɛ] (or [hɛɛɛɛ]) to the phonologically relevant /he/ and /hɛ/. Given the distribution under (20), the world repair /he/ is well-formed, but the evidence repair /hɛ/ should not exist. If /hɛ/ were just an interjection and hence lied outside of grammar, nothing would be wrong with it since it would escape grammatical restrictions such as those shown under (20). As was argued by DEA, however, there is reason to believe that repair initiators, e.g. Dutch *hèh?* [hɛ], are real words and therefore integrated into the grammatical system of the languages where they occur. Therefore /hɛ/ cannot be what is suggested by its surface form: its true phonological identity must be one where the vowel occurs in a closed syllable. This is shown under (21).
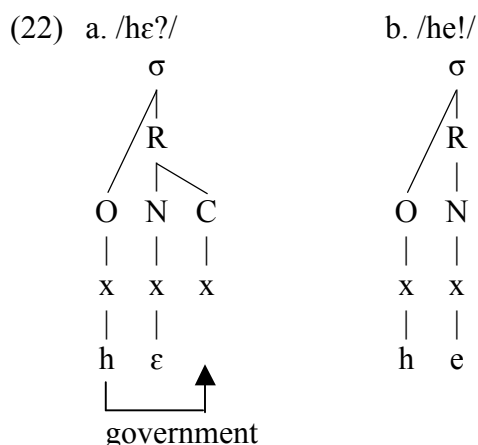
(21) /hɛ/ must have a coda
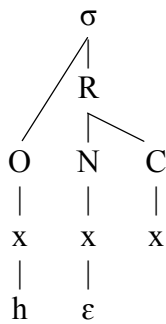
The parallel with the syntactic situation is as follows: in syntax, the embracing structure WHxxx~~WH~~ creates the interrogative meaning out of the existential. On the phonological side, (21) shows HxxxZERO where ZERO is the empty coda constituent. In order for the parallel to be complete, we need to show that there is a structural relation between H and ZERO. This is precisely what is assumed in a specific theory of syllable structure, so-called Lateral Phonology (or strict CV, an outgrowth of Government Phonology, see Lowenstamm 1996, Scheer 2004). Within this framework, Carvalho (2002: 127ff, see also Luo 2013) argue that there is a structural relation (government) which relates a contentful and an empty consonantal position. Government is a lateral relation defining syllabic properties of the string, and in Carvalho's system it applies from left to right. Its purpose is to satisfy the phonological ECP: just like empty nuclei, Carvalho argues, empty consonantal positions also need to be the target of a lateral relation in order to be able to remain empty.

Applying Carvalho's insight to (21) leaves us with (22)a, the parallel of the syntactic interrogative structure.[4]

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[4] For the sake of exposition, the syllabic structure shown does not follow CVCV (where codas are onsets that occur before an empty nucleus): nothing hinges on these CVCV-specifics, and the standard onset-rhyme-coda structure is certainly familiar to a larger audience than the CVCV-equivalent.

(22) a. /hɛ?/   b. /he!/

```
      σ                        σ
     /|                       /|
    / R                      / R
   /  /\                    /  |
  O  N  C                  O   N
  |  |  |                  |   |
  x  x  x                  x   x
  |  |                     |   |
  h  ɛ  ↑                  h   e
     |__|
   government
```

We therefore submit that the interrogative meaning of both syntactic WHxxx~~WH~~ and phonological HxxxZERO is the result of an embracing structure. Recall that only the string and evidence repair /hɛ?/ is interrogative: the world repair /he!/ is not. This follows from the fact that /he!/ has a tense vowel and hence lacks the (empty) coda: as shown under (22)b, there is no embracing relationship and, therefore, no interrogative meaning.[5]

7. The systematic relation between *world repairs* and *evidence repairs*

In this section we present independent evidence for a systematic relation of world and evidence repairs, which we encountered in Dutch *hee!* and *hèh?*. World repairs or "greetings" can be synchronically transformed into evidence repairs. Consider the paradigms in (23) and (24).

(23) a. Goedemorgen, meneer Janssen   world repair (hee!)
        good morning, mister Johnson
     b. Goedemorgen? Wat zeg je nu?   evidence repair (hèh?)
        Jesus, what are you saying now?

(24) a. Hallo, wie is daar?   world repair (hee!)
        hello, who is there?
     b. Hallo? wat zeg je nu?   evidence repair (hèh?)
        Jesus, what are you saying now?

While *goedemorgen* 'good morning' is a standard polite greeting in Dutch with a lexical meaning under (23)a. It is only felicitous if it reflects the part of the day (*morgen* 'morning'/*middag* 'midday'/*avond* 'evening'), but nevertheless can be used in a kind of bleached sense as a utterance of amazement as in (23)b, independently of the current part of the day. The relation between the two uses of *goedemorgen* is parallel to the *hee/hèh* pair. An even more interesting case is *hallo* 'hello'. It is used as a popular greeting in (24)a, i.e. in the sense of *hee!*, but can also be used in a bleached version under (24)b with a question intonation and then has

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[5] The presentation is actually simplified. The world repair *hé!* is *exclamative* in nature (not existential) and is to be compared to the *exclamative* use of WH items, not with existential WH. Exclamative WH items also move to the sentence periphery, but not to a structural position (cf. *How stupid is John?* versus *How stupid ø John is!*), not triggering verb inversion. Hence we should speak of a *structurally embracing* configuration, rather than simply of embracing structure which is tied to interrogation (Bennis 1995, Postma 1996). The same is true for the phonological analysis, where only codas of lax vowels (e.g. /p/ in *knap* 'smart') are in a structural position, while the codas of tense vowels (e.g. /p/ in *knaap* 'lad') are in an adjunct position (van Oostendorp 1995). Both the syntactic and the phonological representations are slightly more complex, but this does not affect the parallelism.

the reading of *hèh?,* the evidence repair. In this case, *hallo* is also phonologically interesting as its first consonant and vowel belong to the set of Cs and Vs that characterize "Huh?".

This relation between *world repairs* and *evidence repairs* is not limited to Dutch. Consider an example from (Brazilian) Portuguese.

(25) a. Oi, amigo! Tudo bem? world repair
          Hi, dear friend, is everything ok?
     b. Oi? Eu não te entendi. evidence repair
          Huh? I did not understand you.

In (25) the popular counterpart *oi* of the more formal greeting *olá* in (Brazilian) Portuguese is a common world repair. However, in some registers, it can also be used with a question intonation. This is typically the case when a person suddenly addresses an interlocutor, who then gives way to the speaker. The pattern is thus as under (26).

(26)

		world repair	→	evidence repair
a.	Dutch	lexical *goedemorgen!*		bleached *goedemorgen?*
		hallo!		*hallo?*
		hee!		*hèh?*
b.	Portuguese	*oi!*		*oi?*

The systematic relationship between world repair and evidence repair suggests that there is a diachronic pathway from one to the other. We suggest that the direction is from world repair to evidence repair, as indicated under (26). The direction is motivated by the fact that the movement from world to evidence repair involves bleaching. If the direction were the other way round, we would expect enrichment in meaning. The diachronic evolution at hand corresponds linguistically to a grammaticalization process, which affects the semantics (bleaching) and the phonology: the intonation and – in the case of *hée!-hèh?* – the phonological matrix. As we saw in section 6, the CxxxC pattern in the case of *hèh?* is a segmental reflex of its interrogative nature, in addition to its intonational setup.

8. Conclusion and predictions

In the previous sections, we have worked out a formal parallelism between two types of repair initiators: the seemingly arbitrary set of *what?/wat/...* and the universal class of *huh?/hèh?/....* Both types of repair initiators encode an embracing structure, which is fundamentally tied to their quantificational status. While the *what?/wat/... class* encodes this configuration by syntactic structure, the *huh?/hèh?/... class* does so in phonological structure. This is why the former shows lexical variation, while variation of the latter is much more reduced. At the relevant level of analysis, though, they show equally reduced arbitrariness. This is not a deep property but a mere consequence of the encoding strategies.

We have suggested an interpretation of the two interesting observations made by Dingemanse *et al.*: 1. the universality of *huh?* and its variants, and 2. the fact that *huh?* and its variants have regular workings in the phonology of the languages at hand. Our analysis builds on Dingemanse *et al*'s findings but does not invoke speculations of a hypothetical convergent cultural evolution. Instead, it is grounded in well-established language-internal mechanisms. This enables us to make compare the two approaches and to evaluate which explanation is superior, both theoretically and empirically.

Let us start with some empirical predictions of our model. The first prediction is that the other languages quoted by Dingemanse *et al.* will be like Dutch in the sense that there is some kind of *hé!* which functions as a precursor and source of *hèh?*. For the Germanic languages, this seems to be correct, but certainly more research is needed. Secondly, we predict that, upon closer scrutiny, there will be some kind of embracing structure in all these cases, be it in abstract syntactic representation or in a slightly less abstract phonological representation. For the sake of illustration, let us have a look at the rather problematic case of Cha'palaa, the first language considered by Dingemanse *et al.* (2013:3, table 1, row 1). In this language, the lexical repair initiator is *ti*, while the interjection is [ʔaː↘]. At first glance, the latter repair initiator seems to fit well into the universal sequence of *huh?* and *hèh?*, since this interjection begins with a glottal stop, which is a member of the set of typical consonants used by HUH? words (cf. (3)). However, the glottal stop does not occur in the onset of regular Cha'palaa words (Floyd 2010): it is only found in the coda, as may be seen e.g. in the name of the language [tʃaʔpalaː]. At first glance, this appears to be evidence against the generalization that interjective repair initiators are *words*. Our approach has two ways to tackle this issue. If the embracing structure is the crucial pattern, a language can establish this relation according to all syntactic strategies available. Now consider that the glotal stop is a morpheme in Cha'palaa: it encodes the fact that two positions have the same referent (SR), as shown in (27).

(27)   ....   ka?   fi   fi   ke-la   (Floyd 2014: 86)
      (they)   grab-SR   eat   eat   do-COL
    'They grabbed and (they) ate'

Interestingly, the SR-marker is located on the highest predicate, i.e. where the antecedent would reside, rather than in the anaphoric position. As [ʔ] in [ʔaː↘] cannot be a normal phoneme, it must be a SR *morpheme*, which encodes the fact that there is a lower position that is coindexed with it. The interjection therefore identifies as /C$_i$ V ø$_i$/. Notice that this only follows if we assume DEA's hypothesis that interjective repairs are fully integrated in the language's linguistic system. Another alternative is to assume that [ʔ] cannot be base generated in the onset in [ʔaː↘] and therefore must have been moved to this position. In that case the embracing structure of [ʔaː↘] is not produced by phonology but by syntax. More research is needed in this case, but we would like to record that our analysis at least allows us to approach the issue with some operational tools, and is therefore superior to the convergent evolution approach, which does not predict this form.

Although our approach builds on the two insights of DEA mentioned, it proposes a different analysis: instead of convergent cultural evolution, the shape of HUH? is produced by language-internal mechanisms that are active to enable (or even to enforce) the embracing structure. Consider the following positive empirical arguments against Dingemanse's cultural evolution analysis, which is based on the idea that speakers minimize effort, rather than on structural arguments. It was shown in section 6 that the vowel of Dutch *hèh?* [hɛ↗] must sit in a closed syllable (because lax vowels only occur in closed syllables in this language). This violates DEA's claim that unmarked CV-pattern are expected. Moreover, we encounter a marked [ɛ] instead of unmarked [ə], as DEA would expect. Our approach, on the other hand, makes correct predictions. Note that [ə] in Dutch patterns with tense vowels, as shown under (20): it occurs both in open and closed syllables. In other words, a /Cə/ structure does not impose the presence of an empty coda consonant /CəC/. Contrary to DEA, we make the prediction that in languages such as Dutch and German where [ə] can occur in open and closed syllables alike, it cannot be used as the vowel of a repair initiator that is CV on the surface. By contrast in a language such as English where /Cə#/ is disallowed, schwa is possible. In sum, our analysis predicts a marked

vowel in Dutch and German repair initiators [hɛ↗], but an unmarked vowel in English *huh?* [hə↗]. This prediction appears to be correct.

We conclude that Dingemanse *et al.* (2013) open new perspectives in analyzing interjective repair initiators by the hypothesis that these interjections are *words* and hence root in the linguistic system. However, their analysis falls short when it comes to the mechanism proposed. For one thing, convergent cultural evolution is vague and a concept that is not yet operational. But more importantly, it does not make any predictions regarding the actual forms that we expect to find across languages. On the other hand, it makes incorrect predictions. We therefore conclude that the grammaticalization approach laid out in the article offers better prospects in understanding these new facts.

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