Some notes on phonemes and allophones in synchronic and diachronic descriptions

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Abstract

A review of the traditional procedures in analysing phones leads to the conclusion that in some cases it is the systemic distinctions and not the lexical context which are decisive in establishing phonemes. The phoneme should therefore be defined as the smallest phonological unit which is contrastive at a lexical level and/or distinctive at a systemic level. It is further argued that a new phone can acquire phonemic status when it becomes distinctive in the phonological system of the language irrespective of the context in which it occurs at a lexical level.

> It is hard to imagine what linguistic description would be like without a phoneme concept of some sort
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> (Dresher 2011: 243).
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> [...] rejection of a particular definition of the phoneme does not amount to rejection of the phonemic principle itself
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> (Dresher/van der Hulst 2022: 15).

1 Phonemes and allophones in synchronic descriptions

It is a well-known fact that since the early 1960s the approach to phonology has become more and more abstract.[1] However, the 'classic' approach is still frequently adopted by writers who wish to describe the sound system of a particular language or reconstruct its historical development. The present discussion is intended as a contribution to the classic, more realistic phonological tradition, which is still an inescapable premise even for those who challenge it.

In the traditional phonemic approach to phonology, the phoneme is defined as the smallest contrastive unit and the phone as the smallest perceptible segment in the phonology of a particular language. A phoneme may include several phones, which are known as allophones, contextual variants, or conditioned variants, since their occurrence in the lexical context is restricted by conditioning factors.

The traditional procedure in deciding whether the phones of a particular language should be analysed as phonemes or allophones is distribution. If two phones never occur in the same phonetic environment, they are said to be mutually exclusive and since they complement each other, they are said to be in complementary distribution. If two phones are in complementary

[1] It would be pointless here to mention all the theories that have been developed in the wake of discontent over the traditional phonemic approach to phonology. Summary accounts can be found in Clark/Yallop/Fletcher (2007); Dresher (2011) and in other works on phonology, but the most comprehensive treatment of the subject is that of the recently published *Oxford History of Phonology*, edited by B. Elan Dresher and Harry van der Hulst (2022).

distribution, they are analysed as allophones of the same phoneme. And since they are conditioned by the context in which they occur, they are also said to be conditioned variants of the same phoneme. On the other hand, if two phones do occur in the same phonetic environment, they are said to be in contrastive distribution and are analysed as two independent phonemes.[2]

Thus, for example, initial (strongly) aspirated [pʰ], as in *pan*, and final unaspirated (or weakly aspirated) [p], as in *nap*, are analysed as allophones of the same phoneme /p/, whereas [m], as in *map*, and [n], as in *nap*, are analysed as two distinct phonemes: /m/ and /n/.

Distribution is a very logical and productive criterion, since by experimenting with a whole series of commutations it is possible to establish an inventory which includes all the phonemes (or most of the phonemes) of a particular language. Thus, by experimenting with all the possible vowel commutations in English, we find that, for example, the [e] of *pet* and the [æ] of *pat* should be analysed as two distinct phonemes (/e/ and /æ/) and that the slightly nasalized [ẽ] in *pen* and [æ̃] in *pan* should be analysed as allophones of /e/ and /æ/, respectively.

Obviously, the relevant commutations should be carried out in all word positions, not only in initial and final position. Thus, for example, we can establish an English phoneme /ʒ/ by comparing words like *leather* and *leisure* (/ð/ ↔ /ʒ/) or *Caesar* and *seizure* (/z/ ↔ /ʒ/). In these instances, /ʒ/ occurs word medially. Yet if we analyse the two pairs by syllable, we find that in the latter the phoneme /ʒ/ occurs in initial position, whereas in the former it occurs in both initial and final position, since the /ʒ/ of *leisure* (like the /ð/ of *leather*) is ambisyllabic, that is, it belongs to both the first and the second syllable.[3]

1.1 English and German [h] and [ŋ]

A well-known ‘exception’ to what has been said so far, is offered by the English phones [h] and [ŋ], which never occur in equivalent or nearly equivalent phonetic environments. The former occurs only in prevocalic position (as in *hat* and *behave*), the latter is to be found only in postvocalic position, as in *bank*, *finger* (with /-ŋg-/), *thing*. A parallel case is that of German prevocalic [h] (as in *Hut* ‘hat’ and *behalten* ‘keep’) and postvocalic [ŋ], as in *Bank* ‘bank’, *Finger* (with /-ŋ-/) ‘finger’, *Ding* ‘thing’.

In either case, no one would be prepared to set up a phoneme /X/ with the two allophones [h] and [ŋ] simply because the two phones are in complementary distribution. The traditional solution to such an ‘exception’ is to analyse the two phones as two independent phonemes /h/ and /ŋ/, on the grounds that they are not phonetically similar (see, for example, McMahon (2002: 53–55) and Cruttenden (2014: 46f.)).

Now, apart from the fact that phonetic similarity or dissimilarity are somewhat vague criteria, it is obvious that in such cases even those who insist on mere oppositions without regard to phonetic features must have recourse to the phonological inventory of the language. When we speak of phonetic similarity, we are not referring to the merely impressionistic perception that

[2] The procedures in question are well known and are amply discussed in the literature and in textbooks. See, for example, Fromkin/Rodman/Hyams (2018); Cruttenden (2014); Roach (2009); Giegerich (1992) and the literature there given. For a review of the early attempts to define the phoneme see Twaddell (1935).

[3] For the term “ambisyllabic” and a discussion of ambisyllabicity see Kahn (1976: 33–35) and the literature there given.

[h] and [ŋ], for example, are phonetically dissimilar. What we have in mind is the phonological inventory of a language (English and German in this case), in which we find a systemic distinction between fricative and nasal consonants, and it is on this basis that we assign the glottal phone to a fricative phoneme /h/ and the velar phone to the nasal phoneme /ŋ/. This solution is practically uncontroversial, since [h] and [ŋ] have no feature in common: [h] is voiceless, oral, glottal, and fricative, whereas [ŋ] is voiced, nasal, velar, and frictionless (cf. Kohler (1995: 90f.).[4]

Since all the English and German consonant commutations produce distinctive sets which include a fricative series and a nasal series, we can establish that the phones [h] and [ŋ] are, so to speak, in contrastive distribution on the systemic level. On the lexical level, we can only find oppositions within the two contrastive series of fricatives and nasals, such as /h/ ↔ /f/ (as in English *hat* ↔ *fat* and German *halten* 'hold' ↔ *falten* 'fold') and /ŋ/ ↔ /n/, as in English *sing* ↔ *sin* and German *singen* 'sing' ↔ *sinnen* 'meditate'.

An inescapable consequence of this logical solution is that in these cases the systemic situation becomes prominent. Once we have set up the two phonemes /h/ and /ŋ/, their restricted occurrence (prevocalic position for [h], postvocalic position for [ŋ]) will be relevant only with regard to distribution.

1.2 German [ç] and [x]

A different distribution which nevertheless deserves attention when discussing phonemes and allophones is offered by German [ç] and [x].[5] The phonological interpretation of these two phones has always been controversial: one phoneme or two? Werner (1972: 47–50) gives a detailed account of the controversy up to 1971 and appears to favour the one phoneme solution /ç ~ x/ (1972: 47). In subsequent discussions of the subject the two opposing interpretations remain more or less unchanged: some would set up a single phoneme (e. g. Eisenberg 1998: 87; Becker 2012: 19; Fox 2005: 48–50; Kleiner/Knöbl 2015: 23; *Duden* 2016: 34);[6] others prefer the two phoneme solution (e. g. Cercignani 1979: 49–54; Kohler 1995: 80f.; Krech et al. 2009: 30).

Those who prefer the one phoneme solution base their choice on the distribution of the two phones in question: [x] occurs only after back and central vowels, as in *Buch* 'book', *hoch* 'high', *Dach* 'roof', whereas [ç] occurs in other positions, namely after front vowels (as in *Stich* 'sting', *Küche* 'kitchen', *frech* 'saucy', *höchst* 'highest'), after consonants, as in (*horchen* 'listen', *manch* 'some', *Milch* 'milk', *Kelch* 'goblet', *Mönch* 'monk'), in the diminutive suffix *-chen* '-ling', '-let', and in words like *Chemie* 'chemistry' and *China* 'China', though in such instances initial [ç] may be replaced by [k] or [ʃ] in regional, non-dialectal types of speech.

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[4] Throughout this paper phonetic features are denoted with traditional terms, since in this context it would be pointless to enter into the merits or demerits of a particular version of the binary features approach or of those of the unary feature specifications.

[5] Following Krech et al. (2009: 29 et passim) I use [x] rather than [χ], although the uvular variant predominates in the German-speaking area in percentage terms. See the page "Aussprache von <ch> nach hinteren sowie tiefen Vokalen in *Buch*, *wuchern*, *Bruch* und *dachte*" in AADG (2011).

[6] In some of the older contributions (e. g. Trim 1951) the phoneme /x/ is supposed to include [h] as well as [ç]. But see Fox (2005: 50f.).

Those who would set up two phonemes argue that [ç] and [x] should be analysed as phonemes because [x] occurs initially in a word like *Chassidismus* 'Chassidism', or because the two phones occur in opposition in forms like *Kuhchen* 'little cow' and *Kuchen* 'cake' or *Tauchen* 'little rope' and *tauchen* 'dive'.

Before examining the question at a systemic level, it may be useful to deal with these and other cases that have been brought into the discussion.

The initial [x] in *Chassidismus* 'Chassidism' and in other learned loanwords is a mere prescriptive phone, which is normally replaced with [ç] or [k] by non-specialist native speakers. But the very fact that [x] can be prescribed as a standard phone could be adduced as an indication that the velar fricative cannot be regarded as a mere allophone.

As for diminutives like *Kuhchen* 'little cow', *Tauchen* 'small rope', *Frauchen* 'little lady' and the like (adduced, for example, by Krech et al. 2009: 30), it should be noted that they are all treated as compounds even when no pause is observable before *-chen*.[7] This appears to be confirmed by the fact that hypothetical forms like **Kühchen*, **Täuchen* and **Fräuchen* (Philipp 1970: 37) are not in standard use, and the same is true of forms like **Kühlein* and **Täulein*, whereas *Fräulein* is obviously something different from a 'little lady' or the 'mistress of a dog'. Moreover, the fact that [ç] is not assimilated to [x] in regional (though perhaps obsolete) forms like *Bachchen* = *Bächelchen* 'small brook', *Bauchchen* = *Bäuchelchen* 'little belly', etc.[8] tends to confirm that the sequence [xç] occurs only in forms that are treated as compounds.

But what about the systemic level? In addressing this point it is necessary to restrict the analysis of [ç] and [x] to a specific variety of Standard German, since the whole of the German-speaking area offers a great variety of pronunciations, as attested by the material published by the AADG (*Atlas zur Aussprache des deutschen Gebrauchsstandards*).[9] The choice here falls on the specific variety of Standard German recorded in Krech et al.'s pronouncing dictionary (*Deutsches Aussprachewörterbuch* 2009).

The fact that [ç] and [x] normally occur in complementary distribution would seem to imply that the two phones should be analysed as allophones of a phoneme /ç/. Yet this runs contrary to the observation that a native speaker regards the two phones as two distinct sounds, and that

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[7] Trubetzkoy (1939: 249) mentions the pair *Mamachen* (term of endearment) 'mama' and *machen* 'make' and concludes that the use of [ç] in the former represents a group boundary signal ("Gruppengrenzsignal").

[8] Grammont (1946: 238) writes: "[...] on dit aussi sans difficulté *stöckchen*, *säckchen*, *stickchen*, et de même dans la Prusse orientale *kuchchen*, *bachchen*, *bauchchen*, etc. parce que les points d'articulation sont fort différents, les *ck* des premiers exemples et le premier *ch* des derniers étant vélaires, tandis que le *ch* de *-chen* est prépalatal". Gast (1979: 52): "'In Bettchen nehmen, Bauchchen wärmen', hatte ihr Onkel gesagt [...] Liebevoll, im singenden Dialekt des Ostpreußen, der fast an jedes Wort ein '-chen' anhängte, 'Jungchen' und 'Kalbchen' und 'Bauchchen' und 'Onkelchen'".

[9] See Deppermann (2010) and AADG (2011). It should be noted that this great variety of pronunciations includes different areas and different types of speech, as can be seen, for example, from the page entitled "Aussprache von <ch> nach <r> – /r/ in *Architekt*, *Kirche*, *durchaus*, *gehorchen* und *Storch*", where free variation is recorded even in individual words. However, free variation in individual words cannot be adduced in favour of the one phoneme solution /ç ~ x/, since this phenomenon shows contamination between different types of speech, so that, for example, a speaker who would natively use [x] in *Kirche* may occasionally use [ç] because influenced by those who use the standard variety. Cf., for example, the free variation between the two phonemes /eː/ and /ɛ/ in *Erde* 'earth'.

the nouns *Ich-Laut* '[ç]-sound' and *Ach-Laut* '[x]-sound' are regular entries in German dictionaries, and not only in pronunciation dictionaries.[10] True, the two terms (like *Zischlaut* and so many others) may well have been coined by a linguist, but the fact remains that non-specialist speakers, who are normally unaware of allophonic variations, regard the two phones as two distinct sounds and recognize at once a different type of pronunciation in which, for example, [x] is used instead [ç]. These speakers (as well as other speakers) would never regard the devoiced allophone [ʁ̥], as in *krass* 'crass', and the voiced allophone [ʁ], as in *Gras* 'grass', as two distinct sounds.

Here one might counterargue that an objective analysis should not take account of a speaker's judgement, but if we turn to the phonological inventory of the type of speech recorded by Krech et al. (2009), we find that the layman's judgement is supported by a systemic distinction between the two phones (see Table 1).

Fricatives	Palatal	Velar
Fortis	[ç]	[x]
Lenis	[j̑][11]	[ʁ][12]

Table 1

Again, since the two phones [ç] and [x] differ by only one feature, one might object that the same is true, say, of aspirated [t^{h}] and unaspirated [t], as in *Tor* 'gate' and *rot* 'red', respectively. However, aspiration can easily be shown to be irrelevant in the German phonological system, whereas the difference between [ç] and [x] is distinctive, since it is paralleled by that of [j̑] and [ʁ] (cf. Krech et al. 2009: 30).

It is on the basis of this systemic distinction that the palatal fricative must be assigned to the phoneme /ç/ and the velar fricative to the phoneme /x/. Their restricted occurrence will be relevant only with regard to distribution.

All the controversial instances presented above (*Kuhchen*, *Tauchen*, *Frauchen*, etc.) have been included in this treatment because they appear in most discussions of German [ç] and [x]. However, they would all become uncontroversial if only we accepted (as indeed we should) that the systemic distinction between palatal and velar implies that the palatal fricative should be assigned to the phoneme /ç/ and the velar fricative to the phoneme /x/.

[10] Thus, for example, König (1989: 97) mentions only pronouncing dictionaries, but the two terms are regular entries in such dictionaries as Wahrig (1980: s. v. *Ach-Laut* and *Ich-Laut*) or Duden (1989: s. v. *Ach-Laut* and *Ich*).

[11] Following Krech et al. (2009: 29 *et passim*) I use [j̑] rather than [j], although the approximant variant [j] has been reported as more common than the fricative (Grassegger 2015: 50). It should be noted that even in a system exhibiting the approximant [j] (= [i̯]) instead of the fricative [j̑] the opposition palatal ↔ velar is relevant, as shown by the non-syllabic vowels [i̯] (as in *Nation*) and [u̯] (as in *Linguist*), which are in fact variant representations of the consonants [j] and [w]. In such a system the distinction between [ç] and [x] is paralleled by that of [i̯]/[j] and [u̯]/[w].

[12] Note that [ʁ] (the IPA uvular fricative) here stands for the IPA velar fricative [ɣ], as in *rot* 'red'.

1.3 Russian [i] and [ɨ]

Another distribution which deserves attention when discussing phonemes and allophones is offered by Russian [i] and [ɨ]. Here we have two opposing phonological schools: the Moscow school, which advocates the one-phoneme solution /i ~ ɨ/, and the Saint-Petersburg (Leningrad) school, which prefers to set up two distinct phonemes: /i/ and /ɨ/. Reformatskij (1970) gives a detailed account of the controversy, while Chew (2003) presents the main opposing arguments (60–62) and opts for /i ~ ɨ/ as "the more minimal approach" (66) in view of his computational aims. Generally speaking, the majority of scholars is in favour of the one-phoneme solution (see, e. g. Jones 1971: 157; Padgett 2003: 39; and Timberlake 2004: 40), which rests on the assumption that distribution is decisive: [i] occurs after palatalized consonants (as in бить [bʲitʲ] 'to beat'), whereas the high central unrounded [ɨ] occurs after non-palatalized consonants (which are normally velarized), as in быть [bɨtʲ] 'to be'.

Now, the fact that [i] and [ɨ] are in complementary distribution would seem to imply that the two phones should indeed be analysed as allophones of a phoneme /i/. Yet this runs contrary to the observation that native speakers (who are normally unaware of allophonic variations) regard the two phones as two distinct sounds, a feeling that is confirmed by the existence of ы́кать [ˈɨkətʲ] 'to pronounce the ⟨ы⟩-sound' and и́кать [ˈikətʲ] 'to pronounce the ⟨и⟩-sound', two verbs which, as can be seen, constitute a minimal pair. Additional confirmation comes from the pronunciation of the letters ⟨ы⟩ and ⟨и⟩, which proves that Russians can easily articulate [ɨ] in isolation (cf. Ščerba 1912: 177). In reciting the alphabet, native speakers normally use [ɨ] for the letter ⟨ы⟩ and [i] for the letter ⟨и⟩. Occasionally, however, they use [i] for the letter ⟨ы⟩ and [ɨ] for the letter ⟨и⟩ because [ɨ] does not normally occur initially, although it is pronounced in closely bound sequences like в Ита́лию [v ɨˈtalʲɪju] 'to Italy' – cf. Ита́лия [ɪˈtalʲɪjə] 'Italy'.[13]

The assumption of a systemic distinction between front and central is thus supported by the lexical level, so that we are compelled to set up a phonological inventory in which [ɨ] is systemically distinct not only from [i], but also from [u], as indeed the pronunciation of the three corresponding letters (и, ы, and y) clearly confirms (see Table 2).

	Front	Central	Back
Close	/i/	/ɨ/	/u/
Mid	/e/		/o/
Open		/a/	

Table 2

As in other cases discussed above, the restricted occurrence of /i/ and /ɨ/ will be relevant only with regard to distribution.

[13] Examples of these quasi-minimal pairs are given in Padgett (2003: 44), with references to Gvozdev (1949), Reformatskij (1957), and Halle (1959).

2 Defining the phoneme

The three cases discussed above have been purposely chosen from well-known languages, so that anyone can see that distribution cannot be adopted as the only criterion in deciding whether two phones should be analysed as allophones or phonemes. Further examples might perhaps be adduced from other languages, but care should always be taken to ensure that they are reliable and properly documented, with special attention to the speech habits of the speakers of the language and their idiosyncrasies.

Having established that distribution cannot be adopted as the only criterion in deciding whether two phones should be analysed as allophones or phonemes, it is now possible to suggest a new definition of the phoneme which takes into account the two interdependent levels, namely the lexical and the systemic level.

To define the phoneme as the smallest contrastive unit at a lexical level is not enough, and to define it as a unit of sound that can distinguish one word from another in a particular language is entirely misleading, since the occurrence of minimal pairs is by no means a prerequisite in deciding the status of a phone. A nearly equivalent context, not necessarily an equivalent context, is sufficient to establish an opposition. Thus, for example, a pair like *lachen* /ˈlaxə/ ‘to laugh’ and *vlaggen* /ˈflaɣə/ ‘flags’ is decisive evidence in establishing the contrast /x/ ↔ /ɣ/ for those Standard Dutch speakers who distinguish between a fortis velar fricative and a lenis velar fricative.

True, quasi-minimal pairs, symmetries in the phonetic system as well as phonetic similarity have been taken into account in the past (as in, for example, Pike 1947: *passim*), but the generally accepted definition of the phoneme with its stress on the lexical level has often been used – as will be shown also in section 3 below – to deny the status of independent unit to phones that had a right to it.

On the basis of what has been said above, it is suggested that a more accurate definition of the phoneme could be this: the phoneme is the smallest phonological unit which is contrastive at a lexical level and/or distinctive at a systemic level. When analysing a particular case the two levels should always be considered together. Thus, for example, English and German [m] and [n] are both contrastive at a lexical level and distinctive at a systemic level, whereas English and German [h] and [ŋ] are distinctive at a systemic level, though not contrastive at a lexical level. On the other hand, German [ç] and [x] are distinctive at a systemic level and only marginally contrastive at a lexical level. Russian [i] and [ɨ] provide a different case, in that they are only marginally contrastive at a lexical level and consequently interpreted as distinctive at a systemic level.

All this shows that absolute generalizations are impossible and that in deciding whether or not a phone should be interpreted as a phoneme one must necessarily consider the characteristics of the particular language under examination. Thus, for example, it would be absurd to analyse Russian [ɨ] as a mere allophone, since it is deliberately pronounced as the name of the letter ⟨ы⟩ in the same way that [i] is used for the letter ⟨и⟩, and [u] for the letter ⟨y⟩. Nor would it be reasonable to claim that German [x] is not a phoneme distinct from [ç], since native speakers are well aware of the difference between the two sounds, for which they have the names *Ich-Laut* ‘[ç]-sound’ and *Ach-Laut* ‘[x]-sound’.

With regard to the conditioning factor of an allophone, one might get the impression that it must necessarily reside in the syllable, since in discussing the phoneme it is customary for phonologists to adduce monosyllabic examples or to refer to particular syllables within polysyllabic words.[14] This is the usual practice, at least when phonologists are analysing a particular language on the synchronic level. Things are different when linguists employ the concepts of phoneme and allophone in diachronic descriptions.

3 Phonemes and allophones in diachronic descriptions

When we turn to the phonological history of a language, we find that in some cases the conditioning factor of an allophone is supposed to have resided in a different syllable from the one in which the allophone is supposed to have developed. This can be illustrated with an example from the well-known case of *i*-umlaut (*i*-mutation) in English and German. The Proto-Germanic plural form */mu:siz/ appears as Old English *mȳs* 'mice' and as Old High German *mūsi*, *miusi* (with /y:/) > *Mäuse* 'mice'.[15] Under the influence of an [i]-sound (/i/, /i:/, /j/) in the following syllable, the phoneme /u:/ is supposed to have developed a somewhat advanced back allophone [ụ:], which was eventually fronted to [y:].

This is the generally accepted reconstruction of a distance assimilation change. However, difficulties arise when the concepts of phoneme and allophone are employed to describe the phonologization of a new allophone. The traditional explanation with regard to *i*-umlaut is that the new allophone came to be analysed as an independent phoneme when the conditioning factor in the following syllable changed or disappeared (see, for example, Twaddell 1938: Penzl 1949; Moulton 1961; and Fox 2015: 55).[16] A serious objection to this view is that the change or loss of the conditioning factors would result in the loss of the relevant allophones. For if a phone is actually conditioned, the change or loss of the conditioning factors results in its reversal to the main phonetic features of the phoneme to which it belongs (cf. Erdmann 1972: 22).

The obvious corollary is that if an alleged allophone does not disappear, it is because the relevant phone has already attained phonemic status. Moreover, it is important to note that the factors which trigger off a change can be adduced to explain a diachronic phenomenon, not necessarily as conditioning factors in the synchronic analysis of the new situation created by the change itself. We should therefore distinguish between two aspects of phonological change:

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[14] In most cases one might even speak of proximity contexts within a syllable. In a case-specific discussion with a colleague, Robert P. Stockwell once recalled that distribution has to do with sounds "occurring in positions before and after other sounds" (Stockwell/Kiddle (1956: 325)).

[15] The diphthong in today's *mice* reflects the Middle English (East Midland) variant *mīs* beside *mēs* from Old English *mȳs*. The diphthong in today's *Mäuse* 'mice' from Old High German *mūsi* reflects a complex development of the original umlauted vowel (/y:/ > /ʏy/ > /øy/ > /œʏ/ > /ɔɪ/). The *ä* in *Mäuse* 'mice' is due to the analogy of the *a* in *Maus* 'mouse', the historical spelling of the plural being *Meuse* (see DWDS s. v. *Maus*).

[16] For different theoretical approaches to the notion of phoneme and phonological change see *Historical Phonology* (2015), which provides numerous cross-references throughout the volume. The Old High German *i*-umlaut is frequently cited in discussions on phonologization. See, e. g., Kiparsky (2015: 563 et passim), who uses the "Stratal Optimality Theory" framework. For a psychophysical phonetic interpretation of the Old High German umlaut see Schulze (2010).

the diachronic phenomenon, which is triggered off by specific factors, and the resulting synchronic situation, which is determined by new systemic distinctions and new oppositions at a lexical level.

With regard to the *i*-umlaut of the Old High German back vowels we cannot, of course, reconstruct all the intermediate stages of the change, but we may assume that at an early stage the new phones would be somewhat advanced back vowels, a series of allophones that may be rendered with [ụ:], [ụ], [ọ:] and [ọ]. However, at a later stage the new phones would be front rounded vowels ([y:], [y], [ø:], [ø]), which would be clearly distinct from a whole series of unrounded front vowels (/i:/, /i/, /e:/, /e/) in the phonological system of the language. It was at this point that the new phones became phonemes, since in the front area there now was a systemic distinction between rounded and unrounded vowels. All this may be summarized as in Table 3.

Early stage Final stage	**OHG examples[17]**
/u:/ →[ụ:]→→→/y:/ ↔ /i:/	*lūten* (> *läuten*[18] ‘to ring’) and *līta* (> *Leite* ‘slope’)
/u/ → [ụ] →→→/y/ ↔ /i/	*lüggī* (> *Lüge* ‘lie’) and *liggen* (> *liegen* ‘to lie’)
/o:/ →[ọ:]→→→/ø:/ ↔ /e:/	*ōri* (> *Öhr* ‘needle eye’) and *ērī* (> *Ehre* ‘honour’)
/o/ → [ọ] →→→/ø/ ↔ /e/	*hölī*[19] (> *Höhle* ‘cavern’) and *helī* (> *Hehl* ‘secrecy’)

Table 3

This is a specific case, but the same principle applies, not only to the other Old High German umlauted vowels and diphthongs, but also to similar cases in which a new allophone becomes distinctive in the phonological system of a language.

We thus come to the general conclusion that a new phone can acquire phonemic status when it becomes distinctive in the phonological system of the language irrespective of the context in which it occurs at a lexical level. With regard to *i*-umlaut we may observe that 1) when the gradual change reached its final stage, the original triggers ceased to be conditioning factors; 2) the phonemicization of *i*-umlaut occurred when the triggering factors were still present, not when they changed or disappeared.

All this presupposes that *i*-umlaut was a gradual phonetic process which eventually resulted in the phonemicization of an allophone. However, since *i*-umlaut is a kind of ‘vowel harmony’, it

[17] When not otherwise stated, all the examples cited in this article are taken from AWB (1952); Köbler (2014); and MWB.

[18] The *ä* in *läuten* (< OHG MHG *liuten* = *lūten* < **hlūdjan*) ‘to ring’ is due to the analogy of the *a* in *Laut* ‘sound’, the historical spelling being *leuten* (see DWDS: s. v. *läuten*]), which has *eu* representing earlier /øy/ (/y:/ > /ʏy/ > /øy/ > /œʏ/ > /ɔɪ/). Cf. *Leute* ‘people’ (OHG *liuti*, MHG *liute*), with /y:/ from /iy/ (umlauted /iu/), and *heute* ‘today’ (OHG *hiutu*, MHG *hiute*) with /y:/ from /iu/.

[19] The OHG form *hölī* ‘cavern’ (originally **hulī*- > MHG *hüle* > *hūle*) appears to derive from a new formation **holī*- on the analogy of **hola*- < **hula*- (OHG *hol* ‘cavern, hole’). Both OHG *hölī* (> MHG *hōle*) and OHG *helī* (> MHG *hēle* ‘secrecy’), as well as OHG *lüggī* (> MHG *lūge* ‘lie’), OHG *liggen* (> MHG *līgen* ‘to lie’) underwent open syllable lengthening in Middle High German. The same applies to OHG *hol*, in which lengthening occurred in oblique forms: OHG *hol*- > MHG *hōle* ‘cavern, hole’.

could also be argued that the change in question operated without intermediate stages, and that the umlauted vowels became phonemes as soon as the influence of an [i]-sound in the following syllable affected the original vowels. Now, vowel-harmony may exploit a pre-existing vowel or create a new one. Whether the new vowel should be analysed as an allophone or as a phoneme depends on distribution at a lexical level and/or distinctiveness at a systemic level. In the case presented above, the creation of the new rounded front items by vowel harmony would have resulted in the rise of the new series /y:/, /y/, /ø:/, /ø/, which would be systemically distinct from the pre-existing series /i:/, /i/, /e:/, /e/.

Irrespective of whether or not we assume a gradual phonetic process, the final stage of the development exhibited the series /y:/, /y/, /ø:/, /ø/ from earlier /u:/, /u/, /o:/, /o/. Taking as example the change /o:/ > /ø:/ in the antecedents of Present Standard German *schön* ‘beautiful’, *Schöne* ‘beauty’ and *[ver]schönen* ‘beautify’, we may present the consequences of *i*-umlaut on distribution as in Table 4.

	Occurrence of /ø:/ before an [i]-sound				
Stage 1	restricted occurrence	preliterary	**skōni*	**skōnī*	**skōnjan*
Stage 2	partially restricted occurrence	OHG	*skōni*	*skōnī*	*skōnen*
Stage 3	unrestricted occurrence	MHG	*schöne*	*schöne*	*schönen*
		PSG	*schön*	*Schöne*	*schönen*

Table 4[20]

That *i*-umlaut belongs to the preliterary period is shown by forms like OHG *skōnen* (written *skonen*, *sconen*), in which the triggering factor [j] was lost before the literary period (cf. Braune/Heidermanns (2018: 158, fn. 2)). The triggering factors [i] and [i:] were weakened to approximately [ə] by the end of the Old High German period at the latest (cf. Braune/Heidermanns (2018: 87f.).

4 Conclusions

A review of the traditional procedures in analysing phones has led to the conclusion that in some cases (examples from English, German, and Russian) it is the systemic distinctions and not the lexical context which are decisive in establishing phonemes (Sections 1–1.3). The phoneme should therefore be defined as the smallest phonological unit which is contrastive at a lexical level and/or distinctive at a systemic level (Section 2). Moreover, a new phone can acquire phonemic status when it becomes distinctive in the phonological system of the language irrespective of the context in which it occurs at a lexical level (Section 3).

[20] Abbreviations: MHG = Middle High German, OHG = Old High German, PSG = Present Standard German.

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