

Seminar 3

Sounds and scribbles – then and now

Contents

A	What is a sound system?	1
B	Sounds vs. spellings	3
C	Examples of reasonable historical conjectures	5
D	A taxonomy of sound changes	7
E	Sound change: the Neogrammarian view	9
F	Review	10
G	Further reading	11

A What is a sound system?

§1 Human speech is a continuous acoustic signal which only carries information when it is **parsed** into meaningful units. Different languages carry out this parsing in different ways, resulting in different sound systems.

§2 The basic building blocks of sound systems are phonemes. A **phoneme** is a minimal meaningful linguistic unit in the sense that it serves to separate at least one word from at least one other word. Thus in English the vowel sounds in the words *pan* and *pin* correspond to different phonemes. Using the International Phonetic Alphabet (IPA), we can represent the vowel in the first word as /æ/ and the vowel in the second word as /ɪ/ (assuming British RP, “Received Pronunciation”).

§3 It is important to note that phonemes are mental representations, not sounds *per se*. When speech is produced, a string of phonemes is first fed through a sort of pre-processor that turns the phoneme sequence into what is called a **surface phonetic representation**. This surface phonetic representation is then fed through the articulatory mechanism, and an actual physical acoustic signal results. At the listener’s end, this acoustic signal must again be “unpacked” to recover the phonemes.

An example: the phonemic representation of the English word *pancake* is /pænkeɪk/. When this word is actually pronounced, it is first transformed into the phonetic representation [pænkeɪk], where the alveolar nasal /n/ **assimilates** (becomes more similar) to the following segment /k/, turning into the velar nasal [ŋ]

(the [k] sound itself has a velar place of articulation).¹ This phonetic form is then fed through the articulatory organs to produce the acoustic signal.

§4 In more advanced treatments of phonology, phonemes are equated with sets of phonological features, quite independently of their actual phonetic realization. For our purposes, it is enough to think of a phoneme as a phonological element giving rise to at least one minimal pair and having a “target” articulatory realization in phonetic space, represented by its IPA symbol. Having said that, individual realizations of a single phoneme vary tremendously. This can happen because of assimilation, as in the *pancake* example above, or just because of random variation/noise in the articulatory process.

§5 Different realizations of one and the same phoneme are known as its **allophones**. E.g. [p^h] and [p] in English: *pin* [p^hɪn] and *spin* [spɪn].

§6 Phonetically and articulatorily, vowels vary along a number of dimensions:

1. position of the tongue in the forward–backward dimension in the mouth (**vowel advancedness**)
2. position of the tongue in the low–high dimension in the mouth (**vowel height**)
3. whether lips are rounded or not (**lip rounding**)
4. whether air escapes through the nose as well as through the mouth (**vowel nasalization**)

See the vowel chart in the IPA.

§7 Consonants are also classified along a number of dimensions:

1. **place** of articulation (again, position of the tongue)
2. **manner** of articulation (the precise way in which the airstream is modified during pronunciation of the consonant)
3. **voicing** (a consonant is **voiced** if the vocal folds vibrate during its production; otherwise, it is **voiceless**)

Again, see the IPA.

§8 A sound system does not only give the set of phonological elements (phonemes) of a language, it also contains information on what combinations of sounds are possible and which aren't. Both English and German, for instance, have the phonemes /p/ and /f/, but only German allows the combination /pf/ (e.g. *Pferd* ‘horse’ /pfe:t/).

Phonological grammar also includes rules which apply across the board. E.g. in German all word-final obstruent consonants (as well as obstruents immediately followed by voiceless consonants) are devoiced (become voiceless): therefore *sagen* ‘to say’ /za:gn/ but *sag!* ‘say!’ [za:k] and *sagte* ‘said’ [za:ktə].

¹We know that the underlying phonemic representation of *pancake* does not contain the velar nasal /ŋ/ since it is put together from *pan* (and *cake*), and the phonemic representation of *pan* is /pæn/. Also, a word such as *panhandle* does not become [pæŋhændəl] but [pænhændəl].

§9 In historical linguistics, we are mainly interested in how sound systems change (even when we do *synchronic* historical linguistics and try to reconstruct some past language, for example, we usually rely on information on sound changes in its descendant languages, as we will later see in Seminar 5). Sound systems can change in a number of ways:

1. A phoneme's target realization may change. E.g. in certain parts of North-East USA, the /æ/ vowel is as high as [ɛ], and *mat* sounds the same as *met*.
2. A language's phoneme inventory may change. For example, Middle English did not have the /ʌ/ vowel in words like *blood* or *cut*.
3. The mapping between underlying phonemic form and surface phonetic representation may change. For example, in present-day Manchester English, non-word-initial /t/ is often glottalized, so *mat* is underlyingly /mæt/ but on the surface [mæʔ], similarly *matter* /mætə/ [mæʔə]. This is not the case with older speakers, so we are dealing with a change in progress.
4. Which phoneme combinations are allowed may change. For example, Middle English permitted the consonant cluster /kn/ as in *knight* /kniçt/, but Modern English doesn't.

B Sounds vs. spellings

§10 Question: Which of the following is a word?

<linguistics>

/lɪŋ'gwɪstɪks/

Answer: the one on the right is a word, and the one on the left is the *written manifestation* of that word.



From Seminar 1, recall that slashes // indicate phonemic representations, square brackets [] indicate phonetic representations, and angle brackets <> indicate written (graphemic) representations. Thus /kæt/, [k^hæʔ], <cat>, for example.

§11 Writing is a very recent innovation, in comparison to speech: sophisticated writing systems have existed for about 5,000 years, even though human language in its modern form has been spoken for about 100,000 years (Bickerton, 2007), and Neandertals, too (500,000 years ago), could speak, though their languages may not have been anything like modern human language. Many advanced civilizations also never had a writing system (e.g. the Incas), and it is estimated that roughly half (!) of the 6,500 currently spoken languages do not have a (native) writing system (Lewis et al., 2016).

§12 And even when a writing system exists, its relation to the spoken language may be nebulous. In a **logographic** writing system, words are represented by pictures (e.g. Chinese). In this case, it is very difficult if not impossible to say anything about how such a language sounded like a long time ago. But even in the case of **phonographic** writing systems, where sounds are represented by letters or strings of letters, the mapping between spelling and pronunciation may be extremely complicated. Just consider the English word *knight*, which is pronounced /naɪt/. The initial <k> is not represented in the pronunciation, the vowel is a diphthong despite there being no such indication in the written form, and the grapheme pair <gh> is not part of the pronunciation in any way.

§13 Now, the only means of studying past states of languages is through written records. How can we, then, know anything about the phonologies of these past language states? What if the spelling–pronunciation mapping of Old English was just as confused as that of Modern English? Can anything then be said about what Old English sounded like?

§14 The best way of making sense of the spelling–pronunciation mapping seems, in fact, to be through the following assumptions (we’re only focussing on phonographic systems here):

1. A phonographic writing system, such as the Latin alphabet, tends to have a one-to-one mapping between phonemes and graphemes when the writing system is first introduced. E.g. <p> corresponds to /p/ wherever it occurs; the phonemic value of <p> does not change depending on its environment.
 - Motivation: this is the “least effort solution” to the spelling–pronunciation mapping problem. Any other mapping would be more complicated and therefore go against the general human principle of cognitive laziness that says “spend as little effort in achieving goal X as is possible without sacrificing the attainment of goal X”.
2. A writing system is inherently conservative in the sense that there is a pressure to keep the spelling of individual words fixed over time and over geographical regions.
 - Motivation: communication through written means would become impossible if the graphemic representation of words did not stay constant.
3. Sound systems, on the other hand, change due to various reasons: language contact, or purely phonetically motivated language-internal processes.
 - This is a fact (we will see some examples later, and many more in next week’s reading).
4. From the above points it follows that the grapheme–phoneme mapping may become less and less one-to-one over time. Spelling lags behind pronunciation.

- English is, again, an extreme case: *knight*, for example, is now pronounced /naɪt/ but is assumed to have been pronounced /kniçt/ in Middle English.
- Fun fact: some people have suggested that the English word /fɪʃ/ ought to be spelled (or could be spelled) <ghoti>. This is because
 - <gh> represents /f/ in words like *enough*, *rough*
 - <o> represents /ɪ/ in *women*
 - <ti> represents /ʃ/ in *nation*, *creation*

§15 Sometimes we are lucky to have more direct evidence of the spelling–pronunciation mapping in past languages in the form of the writings of **contemporary grammarians**. E.g. the 4th-century CE Roman grammarian Marius Victorinus describes /b/ as *exploso e mediis labiis* ‘ejected from the middle of the lips’, i.e. effectively as a labial stop (Allen, 1978, 95). But such testimony is rare, and often of poor (linguistic) quality.

§16 There is also **comparative evidence**. Italian, Spanish, Portuguese and French all have native speakers, and the spellings and phonemic representations of the word for ‘father’ are as follows:

- Italian: <padre> /padre/
- Spanish: <padre> /padre/
- Portuguese: <pai> /pai/
- French: <père> /pɛʁ/

Now, in Latin texts we find the written form <pater> for this word. Since the phoneme corresponding to <p> in each of the four descendants is /p/, it is reasonable to suppose that it was /p/ in Latin as well.

§17 Sometimes poetry helps. E.g. in Chaucer (Middle English poet writing in the second half of the 14th century) we never find *white* and *knight* in a rhyming pair, presumably because the two words didn’t rhyme in Middle English (Ringe and Eska, 2013, 284). Similarly, we know that Latin poetry conformed to a strict metrical pattern, and this is the source of evidence for most of our information about vowel length in (Classical) Latin.

C Examples of reasonable historical conjectures

§18 Phonographic writing systems tend to map phonemes, not allophones. E.g. Spanish has the phoneme /s/, a voiceless alveolar fricative. In many Latin American dialects, this phoneme is realized differently in different positions in the word:

- as the voiceless glottal fricative [h] in a syllable coda:

- <patas> ‘feet’ [patah]
- <costa> ‘coast’ [kohta]
- as [s] in other positions:
 - <sapo> ‘frog’ [sapo]
 - <enseguida> ‘immediately’ [ense‘yiða]

So what is represented in writing is the phoneme, not the allophonic variation.

Now, in Modern English, /s/ and /z/ are phonemes, i.e. they serve to distinguish minimal pairs such as:

- *niece* /ni:s/ vs. *knees* /ni:z/
- *face* /feɪs/ vs. *phase* /feɪz/
- *sip* /sɪp/ vs. *zip* /zɪp/

Was this always the case in English? Assuming that writing systems map phonemes but not allophones, we can try and answer this question.

Now, In Old English, one only tends to find the grapheme <s>, not <z>, e.g.:

- <stæf> ‘letter’
- <stafas> ‘letters’
- <hus> ‘house’
- <husian> ‘to house (to accommodate)’

So there is no reason to believe that a phonemic distinction existed between /s/ and /z/. However, there *is* reason to believe that these were allophones in Old English. This is because in Modern English *house* (noun) and *house* (verb) preserve the contrast:

- *house* (noun) /haʊs/
- *house* (verb) /haʊz/

So we would expect something like the following in Old English:

- <hus> (noun) /hu:s/
- <husian> (verb) /hu:zian/

In fact, the consensus among OE scholars is that the fricatives /f θ s/ were systematically voiced to [v ð z] in OE whenever they occurred intervocalically. This hypothesis is also supported by the fact that such intervocalic lenition processes occur in many other languages of the world.

§19 This kind of reasoning is known as **internal reconstruction** (reconstructing the earlier state of a language based on its later stages). Here’s another example: most (all?) scholars of OE agree that the language had a phonemic contrast between short and long vowels, *even though the contrast is not marked in OE texts in any way*, i.e. OE scribes did not use anything to mark long vowels.²

Now consider the following data, from Lass (1997, 52):

²Many languages do it, e.g. Finnish uses letter doubling, so that <tuli> /tuli/ ‘fire’ but <tuuli> /tu:li/ ‘wind’, while Hungarian uses an acute accent on top of the vowel graph: <fut> /fut/ ‘run’ but <kút> /ku:t/ ‘well’.

A			B		
OE <>	ModE <>	ModE //	OE <>	ModE <>	ModE //
<writan>	<(to) write>	/ɪɑrt/	<writen>	<written>	/ɪrtən/
<metan>	<(to) meet>	/mi:t/	<settan>	<(to) set>	/sɛt/
<hælan>	<(to) heal>	/hi:l/	<ræt>	<rat>	/ɪræt/
<hus>	<house>	/hɑʊs/	<bucca>	<buck>	/bʌk/
<fod>	<food>	/fu:d/	<god>	<God>	/gɒd/
<ban>	<bone>	/boʊn/	<catte>	<cat>	/kæt/

The important generalization to notice here is that in each word in group A, ModE has either a long vowel or a diphthong, while in the words in group B, ModE has a short vowel. Thus, internal reconstruction leads us to assume that the short–long distinction was already present in OE and has come down to ModE (with the added complication that some originally long vowels have turned into diphthongs – more on this later). As a result, modern editions of OE texts usually mark the long vowels with a macron (over-line): so <ræt> but <hǣlan> and <catte> but <bān>.

Note that if we do *not* accept this, then we need to come up with a story about how and why English at some point between OE and ModE developed long vowels/diphthongs in words such as *write* and *meet* but not in words like *written* and *set*.

D A taxonomy of sound changes

§20 Looking at how the sound systems of languages change, it is useful to have some terminology for classifying different kinds of sound change. Here are a few distinctions we will be employing.

§21 Firstly, a sound change can be **segmental** or **supra-segmental**. In the first case, individual sound segments (i.e. phonemes or phones) are targeted; the second case covers changes which involve the sound system on a level above the segments (rhythm, stress, intonation).

- Example of a segmental change: ME *kniht* /kniçt/ > ModE *knight* /naɪt/, e.g. the vowel segment has changed: /i/ > /aɪ/.
- Example of a supra-segmental change: so-called declarative rising intonation in certain varieties (Australia, New Zealand, some North American) English. Consider these data from Radford et al. (2009, 71), where the italicized phrases mark rising intonation:

FRANK: These guys I met were in a fairly cheap sort of cabin — all they had was a porthole and I looked out of this porthole *and it was black. And a fish swam past.* [laughs]

HUGH: [laughs]

FRANK: *They were actually that low down.*

This is a change in progress: in these varieties of English, rising intonation was originally only used for questions (as it is in most varieties of English).

§22 Secondly, a sound change can be **conditioned** (by phonological environment) or **unconditioned** (the sound changes regardless of its position in the word). Examples:

- Conditioned: the so-called *pin–pen* merger, in which the vowels /ɪ/ and /ɛ/ are merged whenever they precede a nasal consonant (but not otherwise). E.g. *pin* and *pen*, *windy* and *Wendy* are homophone pairs. (This is widespread in the Southern US.)
- Unconditioned: most dialects of Spanish have lost the palatal lateral approximant /ʎ/, merging it with the palatal fricative /j/; e.g. *caballo* ‘horse’ /kaˈbaʎo/ > /kaˈbajo/. This happens regardless of the phonological environment, so the change is unconditioned.
- An example of a segmental change conditioned by a supra-segmental feature: in certain Savonian dialects of Finnish, long low vowels have become diphthongs but only if they are in a stressed syllable; if in an unstressed syllable, the vowel has raised. E.g.:
 - Standard Finnish *kääntää* ‘to turn’ /ˈkæːn.tæː/ > Savonian /ˈkiæn.teː/
 - Standard Finnish *maalaa* ‘he/she paints’ /ˈmaː.laː/ > Savonian /ˈmuɑ.loː/.

§23 A conditioned sound change may be **assimilatory** (making two sounds more similar to each other) or **dissimilatory** (making them more different).

- Assimilation: e.g. Latin *septem* /septem/ > Italian *sette* /sette/
- Dissimilation: e.g. Latin *purpura* > ME *purpul* > ModE *purple*

§24 Sound change can be **regular** (affect all lexical items in the language) or **irregular** (affect just a selection of words).

- Regular: e.g. ME /i/ > ModE /aɪ/
- Irregular: e.g. OE *brid*, *hros* have turned into ModE *bird*, *horse*. This is an example of **metathesis** (two segments swap place). The English case is irregular, since *not all* instances of /rV/ have turned into /Vr/ (V here stands for any vowel). E.g. OE *rose*, ModE *rose*.

§25 **Lenition** is a common type of change whereby a sound becomes “less strong” (more sonorous, i.e. more vowel-like) along the **sonority hierarchy**:

- (1) voiceless stop > voiced stop > voiceless fricative > voiced fricative > nasal > approximant > high vowel > low vowel

Example: Latin /k/ became voiced in Portuguese whenever it occurs between sonorants: Latin /akwa/ ‘water’ first became /agwa/ (this is the modern-day Brazilian Portuguese pronunciation). Continental Portuguese later underwent a further lenition of the voiced stop into a fricative: [aywa].

E Sound change: the Neogrammarian view

§26 The Neogrammarians (German: *Junggrammatiker*) were a group of German scholars (working mostly on Indo-European languages) at the end of the 19th century. They were interested in explaining similarities between languages such as English and German, or Spanish and Portuguese, by formulating “laws of sound change”.



The term “sound law” (German: *Lautgesetz*) is not exactly appropriate, as many authors have noted. The “laws” the Neogrammarians formulated only apply to particular languages in particular historical circumstances, not universally to all human languages. (Cp. physical laws, which apply universally.) We should, in fact, cease to talk about sound laws (and simply talk about sound changes instead), but unfortunately the term survives in the names of certain important sound changes (Grimm’s Law, Grassmann’s Law, Verner’s Law).

§27 One of the phenomena that can be explained along Neogrammarian principles is the alternation in English of *foot* /fʊt/ and *feet* /fi:t/. Note that there is no synchronic explanation for the irregular plural — from a synchronic point of view, all we can say is that most English words have a “regular” plural (formed by the addition of /s/ at the end of the word) but that some words do not follow this pattern and hence are “irregular”.

We can, however, have a historical explanation. The Neogrammarians argued for the following kind of historical evolution of *foot/feet* (here, * indicates a reconstructed form, *not* ungrammaticality; more about this in Seminar 5):

	<i>foot</i>	<i>feet</i>
pre-Old English	*/fo:t/	*/fo:ti/
after i-mutation	*/fo:t/	*/fø:ti/
Old English	/fo:t/	/fe:t/
after the Great Vowel Shift	/fu:t/	/fi:t/
Modern English	/fʊt/	/fi:t/

The change known as i-mutation here means that a back vowel (such as /o/) in a syllable is fronted (becomes /ø/) if the following syllable has the high vowel /i/. (This is a kind of long-distance assimilation in the sense that front vowels are more similar to the front vowel /i/ than back vowels.) Later, the inflectional ending -i was lost, yielding the Old English forms /fo:t/ and /fe:t/. And finally further changes (which we will look at in more detail next week) served to produce the ModE forms.

Essentially, the story then goes as follows:

1. *foot* used to be entirely regular, in the sense that its plural was indicated by the Proto-Old English suffix -i;

2. when i-mutation occurred, the vowel in the first syllable became fronted;
3. later the suffix -i got lost and the first vowel lost rounding (became /e/);

It is crucial to notice that i-mutation is a regular conditioned change: it affected all words satisfying the relevant condition (polysyllabic with a later syllable containing /i/). Nothing about i-mutation was “targeted” at turning the plural of *foot* irregular.³

§28 This leads us to the **Neogrammarian (Regularity) Hypothesis**, or the hypothesis on the regularity of sound change. It can be stated in three parts:

1. Sound change always has a phonological motivation (example: relevant phonological environment in the case of i-mutation).
2. Sound change is exceptionless: it affects all words in the lexicon satisfying the relevant phonological condition.
3. Sound change proceeds with ‘blind necessity’, i.e. without regard for possible morphological consequences such as the fact that some word forms become irregular.

§29 The Neogrammarians realized, however, that the results of regular sound change are sometimes offset by a different kind of change process, **analogy** or **analogical levelling**. In analogical levelling, an irregular form becomes regular: e.g. in some dialects of English, *throw/threw/thrown* has become *throw/throwed/throwed*.

Now consider the following data:

	singular	plural
Old English	<boc> /bo:k/	<bec> /be:k/
Modern English	<book> /bʊk/	<books> /bʊks/

Based on the historical explanation for *foot/feet*, we would expect *beek* /bi:k/ to be the ModE plural of *book*. Why is this not the case, if sound change is regular?

The answer is that sometime after the Old English period, the plural of *book* got levelled into *books* by analogy with regular nouns such as *stone/stones*, *house/houses*, and so on. Note that analogy, unlike sound change, is not regular or exceptionless – it is not the case the *all* English nouns were regularized, just some of them.

§30 Thus regular sound change and analogy work in opposite directions. Their relation is famously summarized by **Sturtevant’s paradox** (after the American linguist Edgar Sturtevant):

- (2) Sound change is regular but gives rise to irregularity; analogy is irregular but gives rise to regularity.

F Review

§31 After this seminar, you should be able to explain what the following terms mean:

³I-mutation happened in all early Germanic languages except Gothic; it is not an Old English peculiarity.

phoneme	assimilation
allophone	dissimilation
phonemic representation	regular sound change
phonetic representation	irregular sound change
phonographic writing system	sonority hierarchy
internal reconstruction	lenition
segmental sound change	i-mutation
supra-segmental sound change	The Neogrammarian Hypothesis
conditioned sound change	analogy
unconditioned sound change	Sturtevant's paradox

G Further reading

§32 The best, though very technical, discussion of the spelling–pronunciation mapping and the epistemology of historical phonology in general is Lass (1997, ch. 2), on which I have relied heavily here; also see the appendix in Ringe and Eska (2013). McMahon (1994, ch. 2) provides a very comprehensive, if sometimes slightly condensed, treatment of sound change and the major theoretical frameworks in which sound change has been explained, beginning with the Neogrammarians. A more comprehensive taxonomy of sound changes than the one here presented can be found in Campbell (2013, ch. 2).

References

- Allen, W. S. (1978). *Vox latina: the pronunciation of Classical Latin*. Cambridge: Cambridge University Press.
- Bickerton, D. (2007). Language evolution: a brief guide for linguists. *Lingua* 117, 510–526.
- Campbell, L. (2013). *Historical linguistics: an introduction* (3rd ed.). Edinburgh: Edinburgh University Press.
- Lass, R. (1997). *Historical linguistics and language change*. Cambridge: Cambridge University Press.
- Lewis, M. P., G. F. Simons, and C. D. Fennig (Eds.) (2016). *Ethnologue: languages of the World* (19th ed.). Dallas, TX: SIL International. <http://www.ethnologue.com>. Accessed 23 October 2017.
- McMahon, A. M. S. (1994). *Understanding language change*. Cambridge: Cambridge University Press.
- Radford, A., M. Atkinson, D. Britain, H. Clahsen, and A. Spencer (2009). *Linguistics: an introduction* (2nd ed.). Cambridge: Cambridge University Press.
- Ringe, D. A. and J. F. Eska (2013). *Historical linguistics: toward a twenty-first century reintegration*. Cambridge: Cambridge University Press.