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Sound changes from Proto-Indo-European to Early Modern English

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7 Sound changes from Proto-Indo-European to Early Modern English

The survey of sound changes from Proto-Indo-European to Early Modern English presented in this chapter is based on a selection of the most important changes described in the sources listed in the Bibliography. It outlines the main tendencies in the development of the English sound system, however, it is not an exhaustive list of all changes that have shaped Modern English phonology.

7.1 Sound changes from Proto-Indo-European to Old English

7.1.1 Proto-Indo-European system of consonants

		voiceless stops	voiced stops		
			non-aspirated	aspirated	
labials	s < satem {	p	b	b ^h	} centum
dentals		t	d	d ^h	
palatals		k´	g´	g ^h	
velars		k	g	g ^h	
labio-velars		k ^w	g ^w	g ^{wh}	

In addition to the stops listed above, PIE contained the following consonants:

voiceless spirant	s
liquids	l, r
nasals	m, n
semivowels	j, w

According to further developments of the PIE stops, *centum* and *satem* languages are distinguished. The expressions *centum* and *satem* correspond to the reconstructed PIE numeral hundred: *kʷntóm*. In *centum* languages, palatal plosives merged with velar plosives (**k' > k*). In *satem* languages, velar plosives merged with labio-velar plosives; and palatal plosives changed into sibilants (**k' > s/ś/š*).

PIE **kʷntóm* > Latin *centum* [kɛntum]

PIE **kʷntóm* > Slavic *stoto*

7.1.2 Consonant changes from Proto-Indo-European to Proto-Germanic

Grimm's Law (First Germanic Sound Shift)

1	2	3	>	1	2	3
p	b	b ^h	}	f [f]	p	þ [v]
t	d	d ^h		þ [θ]	t	ð [ð]
k'	g'	g' ^h		χ [x]	k	ʒ [ʁ]
k	g	g ^h		χ ^w [x ^w]	k ^w	ʒ ^w [ʁ ^w]
k ^w	g ^w	g ^{wh}				

Stages of Grimm's law:

- 1 PIE voiceless stops changed into voiceless spirants (fricatives). This shift did not take place in a position after *s*.
- 2 PIE unaspirated voiced stops changed into unaspirated voiceless stops.
- 3 PIE aspirated voiced stops changed into unaspirated voiced spirants.

Examples:

1

- p > f Lat. *piscis*/OE *fisc* (ModE *fish*)
- t > þ Lat. *trēs*/OE *þrī* (ModE *three*)
- ǵ > χ Gr. *kládos*/OE *holt* (ModE dial. *holt*)
- k > χ Gr. *kardia*/OE *heorte* (ModE *heart*)
- k^w > χ^w Lat. *quod*/OE *hwæt* (ModE *what*)

2

- b > p Lat. *labium*/OE *lippa* (ModE *lip*)
- d > t Lat. *duo*/OE *twā* (ModE *two*)
- ǵ > k Lat. *ager*/OE *æcer* (ModE *acre*)
- g > k Lat. *iugum*/OE *ǵeok* (ModE *yoke*)
- g^w > k^w PIE. *ǵ^w*i*wos/Lat. *vīvus*/OE *cwicu* (ModE *quick*)

3

- b^h > ʔ (initially and after nasals: ʔ > b) Sans. *bhrātar*/OE *brōþor* (ModE *brother*)
- d^h > ʔ (initially and after nasals: ʔ > d) PIE **bhendh-*/OE *bindan* (ModE *bind*)
- ǵ^h > ʒ Sans. *hárta-* (ModE *gold*/R. *zóloto*)
- g^h > ʒ PIE **steigh-*/OE *stīzan* (ModG *steigen*)
- g^{wh} > ʒ^w PIE **sneig^{wh}-*/Gr. *níp^ha*/OE *snāw* (ModE *snow*)

Verner's Law

Proto-Germanic voiceless spirants in medial and final positions underwent another shift when the preceding syllable did not carry the main stress. Through this shift, referred to as Verner's law, the voiceless spirants *f*, *þ*, *χ*, *χ^w*, and *s* changed into voiced spirants *ǰ*, *ð*, *ʒ*, *ʒ^w*, and *z*.

Proto-Indo-European and Early Proto-Germanic word stress (denoted in examples by an accent, e.g. **we-wórt-e*) was not fixed to one particular position; it occurred on different syllables within the paradigm of a particular word. Shifts of word stress together with Verner's law explain for example the alternation of PG and OE voiceless and voiced spirants within some verb paradigms, e.g.

PIE **we-wórt-e* 'he has turned' > Sans. *vavárta*, PG **wárþi*, OE *wearþ*

PIE **we-wrt-i-mé* 'we have turned' > Sans. *vavrtimá*, PG **wurðumí*, OE *wurdon*, infinitive *weorðan*.

7.1.3 Consonant changes from Proto-Germanic to Old English

ʒ^w > ʒ before *u*

ʒ^w > w

ʒ > ʒ in a velar surrounding

ʒ > ġ [j] in a palatal surrounding

ʒ > g in initial positions; after *n*; in gemination

ʒ > χ in final positions (spelled as ʒ, *h*, and later *gh*)

ḅ > b in initial positions

ḅ > b in a voiced surrounding

ḅ > f in a voiceless surrounding

ḏ > d

χ > h the consonant *h* disappears between vowels

χ > χ in final positions and before a voiceless consonants (spelled as *gh*)

z > r in medial positions

z disappears in final positions

c > ċ in a palatal surrounding

sc > sċ in all positions

7.1.4 Proto-Indo-European system of vowels

The PIE system of vowels according to the Neogrammarians (also referred to as Young Grammarians) included two mixed vowels, denoted as *schwa primum* (ə₁) and *schwa secundum* (ə₂). (The latter was discovered later than the latter, hence the use of the names *primum* and *secundum*.) In Hebrew grammar, the term *schwa* denotes a vowel reduced due to lack of stress. According to the Neogrammarians, *schwa primum* developed from unstressed long vowels *ē*¹, *ā*, and *ō*; and *schwa secundum* from unstressed short vowels *e*, and *o*. Modern approaches based on the laryngeal theory have eliminated *schwa secundum* and reinterpreted *schwa primum* as a laryngeal, which was vocalized in a position between two consonants.

Neogrammarian system (Brugmann 1897)

Short vowels

i	ə₂	u
e	ə₁	o
	a	

Long vowels

ī		ū
ē (=ē ₁)		ō
	ā	

Laryngealistic system (Beekes 1995)

*H*₁, *H*₂, and *H*₃ are PIE laryngeals that affected the neighbouring sounds in different ways.

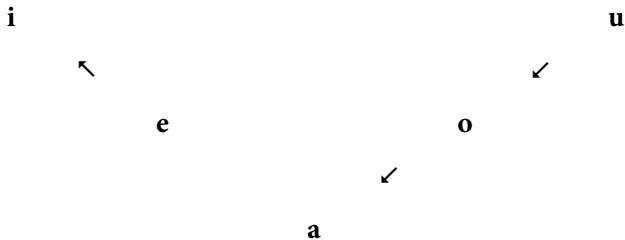
Short vowels

i		u
e- < H₁e- -e-		o- < H₃e- / H_{1/2/3}o- -o-

H̄ = ʔ > G., Gr., Lat. **a**

Long vowels $\bar{i} < iH_{1/2/3}$ $\bar{u} < uH_{1/2/3}$ $\bar{e} < eH_1$ $\bar{o} < eH_3/oH_{1/2/3}$ $\bar{a} = eH_2$ **Diphthongs (Brugmannian system)**

ei, ai, oi, eu, au, ou
 ēī, āī, ōī, ēū, āū, ōū

7.1.5 Vowel changes from Proto-Indo-European to Proto-Germanic**Short vowels**

$i > i$ (PIE **piskos*, PG **fiskaz*, OE *fisc* ‘fish’)

$e > e$ (PIE **edonom*, PG **etanan*, OE *etan* ‘eat’)

$a > a$ (PIE **agros*, PG **akraz*, OE *æcer* ‘acre’)

$u > u$ (PIE **sunus*, PG **sunuz*, OE *sunu* ‘son’)

$o > a$ (Lat. *quod*, PG **χwat*)

$u > o$ except before a nasal followed by another consonant (e.g. OE *gebunden*); this new *o* replaced the original *o*, which had changed into *a*.

$e > i$ before a nasal followed by another consonant (Lat. *ventus*, PG **windaz*) and before *i*, *ī*, and *j* in the next syllable (Lat. *est*, OE *is*)

Long vowels

ī

ū

(ēi >)

ē₂

ō

ē₁

↗

(anχ- >)

ā

- ī > ī (Lat. *sīmus*, OE *sīen* ‘let us be’)
- ē > ē (= ē₁) (Lat. *sēmen*, OE *sæd* ‘seed’)
- ō > ō (Greek. *pōs*, OE *fōt* ‘foot’)
- ū > ū (Lat. *mūs*, OE *mūs* ‘mouse’)
- ā > ō (Lat. *māter*, OE *mōdor* ‘mother’)
- *anχ- > ā (PG **panχtō* > Gothic *pāχta*); *anχ- developed from *aχ-; this new ā replaced the original ā, which had changed into ō.
- ēi > ē₂ (Greek *e-keī-nos*, OE *hēr* ‘here’)

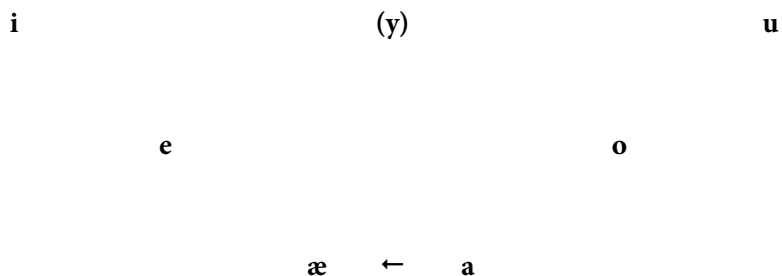
Diphthongs

Proto-Indo-European long diphthongs merged with short diphthongs; the further development of diphthongs resembles the development of short monophthongs, except the change ei > ī.

- ai > ai (Lat. *aes*, PG *aiz*, OE *ār* ‘metal’)
- oi > ai (Old Latin *oinos*, Goth. *ains*, OE *ān* ‘one’)
- au > au (Lat. *auris*, Goth. *ausō*, OE *ēāre* ‘ear’)
- ou > au (PIE **roud^hos*, PG **rauðas*, OE *rēād* ‘red’)
- ei > ī (PIE **steig^h-*, OE *stīzan* ‘to ascend’)
- eu > eu (PIE **b^heud^h-*, PG **beudan*, OE *bēōdan* ‘to offer’)
- eu > iu before *i*, *ī*, and *j* in the next syllable (PIE **leuk-*, PG **leuχ*, *Goth. *liuhtjan* ‘give light’, OE *lēōht*)

7.1.6 Vowel changes from Proto-Germanic to Old English

Short vowels



PG a > OE æ (PG **daʒaz*, OE *dæg*)

PG a > OE a before velar vowels (a, o, u) in the following syllable and before *n*
(PG **manwuaz*, OE *mann*)

Long vowels



PG ā > OE ō (Goth. *þāχta*, OE *þōhte*)

Diphthongs

ai > ā (Goth. *ains* – OE *ān*, Goth. *stains* – OE *stān*)

au > ēā (PG **auzon*, Goth. *ausō*, OE *ēāre*)

eu, iu > ēō (PIE **bheudh-*, PG **beudan*, OE *bēōdan* ‘to offer’)

7.2 Sound changes from Old English to Early Modern English

7.2.1 Vowel changes in Old English

During the Old English period, several complex changes within the system of vowels took place. The most influential of the changes affecting stressed vowels was the palatal umlaut, which is responsible for various alternations within different forms of Modern English nouns, verbs, and adjectives, for example *mouse* – *mice*, *foot* – *feet*, *tooth* – *teeth*, *brother* – *brethren*, *strong* – *strength*, *food* – *feed*, *old* – *elder*.

Palatal umlaut

Palatal umlaut, also referred to as (i-mutation), is the palatalization of stressed vowels caused by the occurrence of *i* or *j* in the following syllable. Through palatal umlaut, back vowels were fronted and the low vowel *a* was fronted and raised.

a > e	(OE Sg. <i>mann</i> , Pl. <i>menn</i> , PG * <i>manniz</i>)
æ > e	(OE <i>betra</i> , Goth. <i>batiza</i>)
o > e	(OE Nom. <i>dohtor</i> , Dat. <i>dehter</i>)
u > y	(OE <i>fyllan</i> , PG * <i>fuljan</i>)
ā > ē	(OE <i>lāran</i> , PG * <i>laizjan</i>)
ō > ē	(OE Sg. <i>fōt</i> , Pl. <i>fēt</i> , PG * <i>fōtiz</i>)
ū > y̆	(OE Sg. <i>mūs</i> , Pl. <i>mȳs</i> , PG * <i>mūsiz</i>)
ea > ie	(OE <i>eald</i> , comp. <i>ieldra</i>)
eo, io > ie	(OE <i>ic weorþe</i> , <i>þū wierst</i>)

Other complex changes that took place during the Old English period were the velar umlaut, breaking, and changes due to the influence of nasals.

Velar umlaut

Velar umlaut, also referred to as u-mutation or back mutation, is the diphthongization of *e* and *i* before *v*, *l*, and *r*, followed by velar vowels.

e > eo (Old Sax. *heban*, OE *heofon*)
 i > io (Early OE *hira*, OE *hiora/heora*)

Breaking

Breaking took place before the following groups of consonants:

r + consonant
 l + consonant
 h [x] + consonant

i > io (OSax. *irri*, Angel. *iorre*)
 e > eo (G. *Herz*, OE *heorte*)
 æ, a > ea (G. *alt*, OE *eald*, G. *wachsen*, OE *weaxan* 'grow')
 ī > iō > ēō (OE *līht* > *lēht*, Goth. *lihts*)

Influence of nasals

Nasals prevented the fronting of PG *a* into *æ* (e.g. OE *cann*) and nasalized and rounded the preceding *a*, which explains the variation in spelling in such words as *manig* – *monig*, *cann* – *conn*, *swamm* – *swomm*.

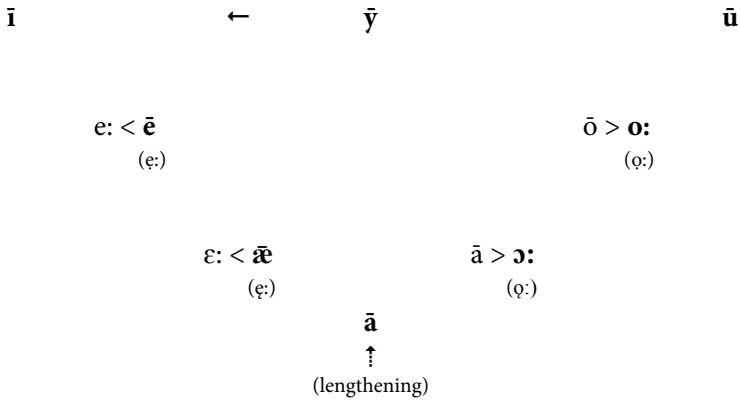
7.2.2 Vowel changes from Late Old English to Middle English

Short vowels

i	←	(ü)	y		u
		e			o
		æ	→		a

OE *fyrsta* > ME *furst*, *first*
 OE *þæt* > ME *that*

Long vowels



OE *stān* > ME *stone* [stɔ:n] (in Northern dialects ā > ε: (written *ai*) *stān* > *stain* [ste:n])

Diphthongs

- ea > æ > a (OE *eall*, *heard* > ME *all*, *hard*)
- eo > ö > e (OE *heorte* ‘heart’, *seofon* > ME *herte*, *seven*)
- ie > i (OE *čiele* ‘chill’ > ME *chile*)

Lengthening and shortening of stressed vowels

In Late Old English and Early Middle English, short stressed vowels were lengthened and long stressed vowels were shortened in certain positions. Lengthening took place especially in open syllables and in closed syllables before lengthening consonant clusters (e.g. *ld*, *rd*, *nd*, *mb*). Other than lengthening clusters (e.g. *st*, *ft*) caused shortening. Unstressed vowels underwent reduction into a mixed vowel and in final positions disappeared completely.

- OE *bacan* > ME *bāken*
- OE *nama* > ME *nāme*
- OE *čild* > ME *čīld* ‘child’
- OE *grund* > ME *grūnd* ‘ground’
- OE *dūst* > ME *dust*
- OE *sōfte* > ME *soft*

The final letter *-e*, which indicated a reduced vowel (*nama* > *nāme*), became a signal of the long pronunciation of the preceding stressed syllable and was therefore added to OE words consisting of one long syllable (*hām* > *home*, *mūs* > *mouse*, *lif* > *life*).

Other combinatory changes

e before tautosyllabic <i>r</i> > a	(OE <i>steorra</i> > ME <i>sterre</i> > LME <i>star</i>)
e before [ŋk], [ŋg], [ndʒ], [ntʃ] > i	(OE <i>þencean</i> > ME <i>thinken</i>)
ri > ir	(OE <i>þridde</i> > ME <i>third</i>)

Formation of new diphthongs

The monophthongization of OE diphthongs (see above) was accompanied by the development of new diphthongs in the Middle English period. After the reduction of endings, new diphthongs developed from vowels followed by *ġ* [j], *w* [w] and *ʒ* [ɣ], which changed into corresponding vowels. Another type of diphthongs developed from vowels followed by *h* (later spelled *gh*).

Examples:

æ + <i>ġ</i> > ai	(OE <i>dæg</i> > ME <i>dai</i> , ModE <i>day</i>)
ō + <i>w</i> > ou	(OE <i>grōwan</i> > ME <i>growen</i> , ModE <i>grow</i>)
ī + <i>w</i> > iu	(OE <i>Tīwesdæg</i> > ME <i>Tiwsdai</i> , ModE <i>Tuesday</i>)
a + <i>ʒ</i> > aw > au	(OE <i>draʒan</i> > ME <i>drawe(n)</i> , ModE <i>draw</i>)
u + <i>ʒ</i> > uw > uu	(OE <i>fuzol</i> > ME <i>fowel</i> , ModE <i>fowl</i>)
eh > eigh	(OE <i>ehta</i> > ME <i>eight</i>)

Reduction of unstressed vowels

From earliest stages of development, Old English displayed a strong tendency towards a reduction of unstressed syllables. As a result of quantitative reduction, Old English unstressed syllables contain only short vowels, although in Proto-Germanic, both short and long vowels could occur in unstressed positions. The process of reduction of vowels in unstressed syllables continued in Middle and Modern English periods, e.g.

OE *lufu*, ME *luve* [luvə] > [luv], ModE *love*
 OE *nama*, ME *name* [nɑ:mə] > [nɑ:m], ModE *name*

7.2.3 Vowel changes from Late Middle English to Early Modern English

Short Vowels

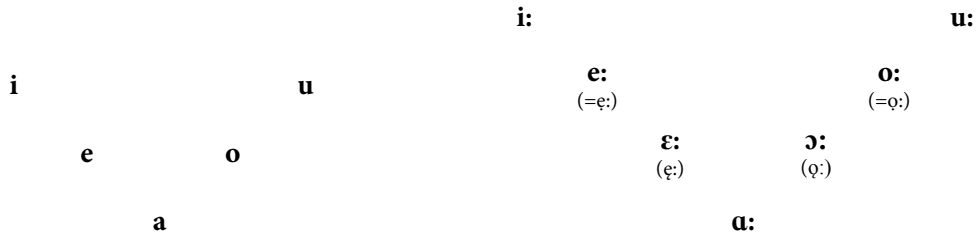
- [a] > [æ] (*glad, cap*)
 [a] > [ɔ:] when followed by *l* (*call, also*)
 [a] > [æ] > [æ:] > [ɑ:] when followed by a voiceless fricative or *r* (*ask, bath, art*);
 Modern American and some ModE dialects have kept the [æ:] stage.
 [u] > [ʌ] (*cup, hundred*); the change did not take place after initial *p-*,
b-, *f-*, *w-*, before final *-l*, *-sh* (*pull, bull, full, wolf, push*), and in
 northern dialects.

Long vowels

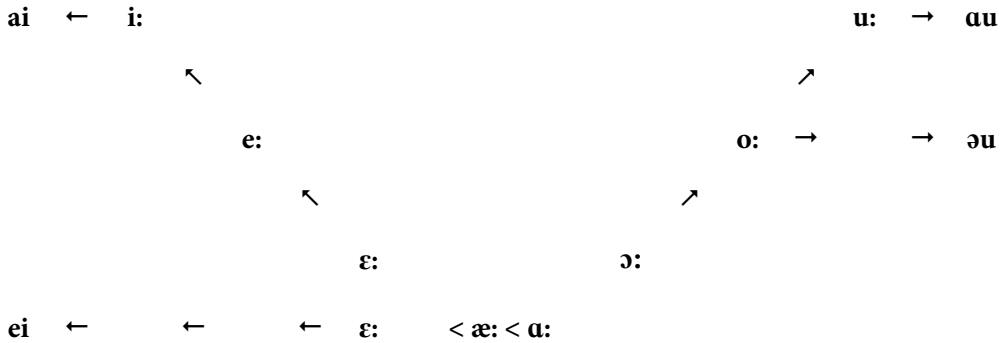
The system of Middle English long vowels underwent a complex of changes denoted as the Great Vowel Shift. These changes shaped the pronunciation of Modern English and are responsible for the discrepancy between Modern English pronunciation and spelling. The sound shifts started probably before 1400 and continued for several centuries. One of the first scholars, who studied this complex change was Otto Jespersen, who coined the term the Great Vowel Shift (Labow 1994, p. 145).

Below is a chart illustrating the Middle English systems of short and long vowels before the Great Vowel Shift. There were five short and seven long vowels. The long vowels *i:* and *u:* did not have a counterpart within the system of short vowels. Through the Great Vowel Shift the balance between the two systems was restored. The tendency to achieve systemic balance was considered to be the cause of the Great Vowel Shift by Trnka (1959). Other hypotheses are the *pull* or *drag-chain* theory (the higher vowels started leaving their positions and pulled/dragged the lower vowels) and the *push-chain* theory (the lower vowels were raised first and pushed the higher vowels out of their positions).

The system of Middle English short and long vowels before the Great Vowel Shift



The Great Vowel Shift



Stages of the Great Vowel Shift

[i:] > [ii] > [ei] > [əi] > [ai]	(ca. 1400 – 1750)	(<i>time, sky</i>)
[u:] > [uu] > [eu] > [əu] > [au]	(ca. 1400 – 1750)	(<i>house, now</i>)
[e:] > [i:]	(ca. 1400 – 1500)	(<i>see, degree</i>)
[o:] > [u:]	(ca. 1400 – 1500)	(<i>do, goose</i>)
[ε:] > [e:] > [i:]	(ca. 1500 – 1700)	(<i>sea, lead</i>)
[ο:] > [o:] > [ou] > [əu]	(ca. 1650 – 1950)	(<i>stone, home</i>)
[α:] > [æ:] > [ε:] > [e:] > [ei]	(ca. 1400 – 1800)	(<i>name, make</i>)

Diphthongs

[ai] > [ei]	(<i>may, they, train</i>)
[au] > [ɔ:]	(<i>law, autumn</i>)
[iu], [eu], [ɛu] > [ju:]	(<i>Tuesday, knew, few</i>)
[ɔu] > [ou]	(<i>blow, dough</i>)
[ɔɪ], [ui] > [ɔɪ]	(<i>choice, poison</i>)

7.2.4 Consonant changes from Old English to Middle English

Below is a survey of the most important changes that took place in Late Old English and during the Middle English period.

ċ [k̠]	> [tʃ]	(OE <i>cild</i> > ME <i>child</i>)
sc̠ [sk̠]	> [ʃ]	(OE <i>fisc</i> > ME <i>fish</i>)
ġ [j]	> [j]	(OE <i>ĕāġe</i> > ME <i>eye</i> , ModE <i>eye</i>)
g [ɣ]	> w [w]	(OE <i>fugol</i> [fuyol] > ME <i>fuwel</i> , ModE <i>fowl</i>)
hl-	> l-	(OE <i>hlāford</i> > ME <i>lōrd</i> , ModE <i>lord</i>)
hr-	> r-	(OE <i>hræfn</i> > ME <i>raven</i>)
hn-	> n-	(OE <i>hnutu</i> > ME <i>nute</i> , ModE <i>nut</i>)
hw- [xw]	> wh- [hw]	(OE <i>hwæt</i> > ME <i>what</i>)

7.2.5 Consonant changes from Middle English to Early Modern English

The survey below presents only the most important consonant changes. A number of other minor changes took place during the Middle and Early Modern English periods.

Voicing of [f], [θ], [s], and [tʃ]

[f], [θ], [s], [tʃ] became voiced in unstressed positions. This change, sometimes referred to as the New English Verner's Law, occurred for example in the following cases:

- final *-s* in plural and possessive nominal forms (e.g. *tables, pictures*) and in 3rd person singular verbal forms (e.g. *he calls, he knows*). The voicing started in the second half of the 14th century before the unstressed *-e-* was dropped. When the *-e-* disappeared, the final *-z* was unvoiced when preceded by a voiceless consonant (*books, he speaks*).

- the definite article and the initial *th-* in personal and demonstrative pronouns (*th-* is the ME spelling of OE *þ-* and *ð-*)

Disappearance of [x]

The sound [x] changed into [f] or disappeared in final positions and before final *t*.

[x] > [-f] (*cough, enough, laugh, rough; draught, laughter*)

[x] > [-0] (*dough, through, borough, thorough; caught, taught, fought, nought, ought*)

Disappearance of [b] from [-mb]

The final [b] disappeared in pronunciation after [m] in Early New English but was preserved in spelling e.g. *climb, comb, dumb, lamb, womb*. In some cases the letter *b* was added in spelling to words, in which its presence is not etymologically justified, e.g. *crumb* (OE *crūma*), *limb* (OE *lim*), *thumb* (OE *þūma*).

Assibilation of [tj], [dj], [sj], and [zj]

[tj] > [tʃ] (*question*)

[dj] > [dʒ] (*soldier*)

[sj] > [ʃ] (*nation*)

[zj] > [ʒ] (*vision*)

Changes of the final [-ŋg]

The final [-ŋg] underwent a transformation into ME [-ŋ] and Early ModE [n]; in the 19th century, [-ŋ] was restored.

[-ŋg] > [-ŋ] > [-n] > [-ŋ] (*coming* [kumɪŋg] > [kʌmɪŋ] > [kʌmɪn] > [kʌmɪŋ])

Bibliography

The chapter above draws on the following sources:

- Baugh, Albert C. and Cable Thomas (1993). *A history of the English language*. Routledge.
- Beekes, Robert S. P. (1995). *Comparative Indo-European Linguistics: An Introduction*. Benjamins.
- Blažek, Václav (2011). *Staré germánské jazyky: historický a gramatický přehled*. 1. vyd. Brno: Masarykova univerzita.
- Brugmann, Karl (1897). *Grundriß der vergleichenden Grammatik der indogermanischen Sprachen*.
- Campbell, Lyle (2004). *Historical linguistics* (2nd ed.). Cambridge: MIT Press.
- Freeborn, Dennis. (1992). *From Old English to Standard English: A Course Book in Language Variation Across Time*. Ottawa, Canada: University of Ottawa Press.
- Hladký, Josef (2003). *A Guide to Pre-Modern English*. Brno: Masarykova univerzita.
- Hladký, Josef (1983). *Diachronní slovník k čítance pro seminář z historického vývoje angličtiny*. Brno: Filozofická fakulta brněnské univerzity.
- Jespersen, Otto (1949). *A Modern English grammar on historical principles*. Part I: *Sounds and spellings*. London: George Allen & Unwin.
- Labov, William (1994). *Principles of Linguistic Change*. Blackwell Publishing.
- Luick, Karl (1914). *Historische Grammatik der Englischen Sprache*. Stuttgart: Tauchnitz.
- Ringe, Donald A. (2006). *From Proto-Indo-European to Proto-Germanic. Linguistic history of English*, v. 1. Oxford: Oxford University Press.
- Svoboda, Aleš (2005). The development of English: handouts for lectures on the historical development of the English language. Prešov: Filozofická fakulta Prešovskej univerzity.
- Trnka, Bohumil (1959). A phonemic aspect of the Great Vowel Shift. *Mélanges de linguistique et de philologie*. Paris: Didier, pp. 440–443.
- Vachek, Josef. (1994). *Historický vývoj angličtiny*. Brno: Masarykova univerzita.
- Vachek, Josef (1978). *A Brief survey of the historical development of English*. Praha: SNP.