In these pages, we will trace the historical development of the study of human natural language (now known as 'linguistics') up to the start of the generative approach, with an emphasis on the contributions made in earlier scholarship to generative linguistics. Because of this emphasis, the historical overview to follow does not strive for exhaustive coverage. Readers interested in further details are encouraged to consult the standard works on the history of linguistics (for some references see p. 17).

Socrates and the natural or conventional nature of names

In the European philosophical tradition, reflections on language (not grammar) date back to Plato — in particular, to his Socratic dialogue *Cratylus* (ca. 360 BCE). The questions addressed in this dialogue (involving, besides Socrates, the eponymous Cratylus and his opponent Hermogenes) are:

Q1 Is language **natural** or **conventional**?
Q2 Is language based on a principle of **regularity**?

Hermogenes takes the '**anomalist**' point of view (Greek *anōmalía* means 'exception, anomaly'): naming is purely conventional, the volitional act of individuals (as opposed to speech communities). Cratylus represents the '**analogist**' perspective (after Greek *analogía* 'regularity'), holding the view that naming is *natural*. Cratylus' central argument with Hermogenes is that his opponent's name could not properly be 'Hermogenes', which literally means 'born of Hermes'. As is his wont, Socrates takes a middle ground:

(a) Socrates finds Cratylus' emphasis on **etymology** and **naturalness** scientific — yet at the same time he admits that he 'cannot help laughing' at such abstruse etymologising as is characterised by the following account of why *psyche* means what it means: *psyche* comes from *he physin exei* 'what holds nature', which 'refined away into *psyche*'. Socrates admits in the end that there must be a limit to all etymologising: there are certain irreducible atoms in language, whose forms and meanings are not connected by nature. But, says Socrates, those atoms are not named by convention — so Socrates does not land on the side of the anomalists here: instead, he holds that the names of the irreducible atoms are given to things by 'the name-maker' (cf. the Tower of Babel story in the Bible) and are largely *mimetic* — the 'name-maker' knew 'how to embody in the sounds and syllables that name which is fitted by nature for each object'.

At this point in the dialogue, Socrates' interim conclusion is that 'Cratylus is right in saying that things have names by nature, and that not every man is an artificer of names, but he only who looks to the name which each thing by nature has, and is able to express the true forms of things in letters and syllables.' Yet Socrates ultimately undermines Cratylus' analogist stance in an argument that takes as its focal point **sound symbolism** (the **naturalness** of sounds in words; cf. **ideophones**):

(b) If (as Socrates and Cratylus readily agree) the sound [l] is to denote 'gliding movement' (as in English *glide* and *slide*), then how can the word *sklēron*, which has an [l] in it, mean 'hard'? This question posed by Socrates forces Cratylus to admit that the word for 'hard' is *sklēron* purely 'by custom', in other words, *conventional*, as the anomalists would have it.

Socrates' ultimate conclusion is as follows: 'I myself prefer the theory that names are, so far as is possible, like the things named; but really this attractive force of likeness is, as Hermogenes says, a poor thing, and we are compelled to employ in addition this commonplace expedient, convention, to establish the correctness of names.'

It will not have escaped you that the discussion in Plato's *Cratylus* is not ultimately about language: it is about **truth** (the word 'etymology' derives from Greek *etymos* 'true' and *logia* 'knowledge'), and the bearers of truth. The analogists looked for truth in **words**, not **sentences**. The sentence plays no role at all in the dialogue. Plato gives recognition to the role of the sentence in his later dialogue *Sophist*, but the word continues to be central throughout the European linguistic-philosophical tradition, well into the late Middle Ages.

Aristotle and the subject/predicate dichotomy

With Aristotle, the sentence not only becomes the locus of truth, but receives a rudimentary grammatical analysis, anchored in the distinction between **subject** and **predicate**.

The origin of the terms 'subject' and 'predicate' lies in Aristotle's *Poetics* (Gr: *Peri poeitikes*, La: *De poetica*), ca. 335 BCE:

(1) THREE ARISTOTELIAN OPPOSITIONS

a.	*ousia* (Latin *essentia*, *substantia*) 'being/substance/entity' (< *einai*)	~	*symbebekos* (Latin *accidens*) 'quality/property'
b.	*hypokeimenon* (Latin *subiectum*) 'underlying element' (cf. topic)	~	*kategoroumenon* (Latin *praedicatum*) 'statement' (cf. comment)
c.	*onoma* (Latin *nomen*) 'noun'	~	*rhema* (Latin *verbum*) 'verb'

Terminological distinctions between the subject and the predicate are made at three different levels: meaning (semantics) (3a); use in discourse (pragmatics) (3b),[1] and form (morphosyntax) (3c). Of these three levels, the middle one is the hardest to make sense of — yet, ironically, it is precisely from (3b) that modern linguistics has inherited the terms 'subject' and 'predicate' (via the Latin translations of the Greek terms introduced by Aristotle). Boethius (500 CE) introduced these Latin terms into logic, and in the late Middle Ages, they made their appearance in grammatical analysis.

The emergence of grammars

Predating any known grammatical analysis in Europe by a considerable margin, **Pānini**'s grammar (probably dating back to the 5th c. BCE) of Sanskrit (the language of Brahmin India) is the single oldest record of grammatical analysis that has come down to us. It contains a meticulous analysis of the morphology (word structure) of the language, including inflection, derivation and compounding, as well as some discussion of its syntax (sentence structure). Because the Graeco-Roman philosophical tradition in the Western world was unaware of its existence, it played no role in the development of Western linguistic thought until it was eventually rediscovered in Europe in the early 18th century, at which point it became an important model for linguistic analysis.

1 Appolonius Dyscolus, in the 2nd century CE, took *subiectum* to mean 'the entity which the sentence is about' — thus clearly taking a pragmatic (information-structural) approach to the term, equivalent to what the Prague School's Functional Sentence Perspective later called the **theme** (which there was opposed to **rheme**; cf. (3c)), aka **topic**.

The need to understand and teach ancient Vedic religious texts was a major motive for the production of grammars in Brahmin India. Similarly, the desire to understand Homeric Greek and the growing need for language teachers (to spread knowledge of Greek throughout the empire's rapidly expanding territory) triggered the emergence of the first grammars (Gr: *téchnē grammatikē*) of Greek under Alexander the Great (356–323 BCE) These grammars were, first and foremost, practical, technical tools to master the *grammata* 'letters'. Consonant with this, the *téchnē grammatikē* thought to have been produced by Dionysius Thrax (ca. 100 BCE) calls grammar 'the practical study of the usage of poets and prose writers'. Thanks mostly to its organisation, this grammar has become a model for European grammars for centuries to come:

(2) *(i)* letters and speech sounds
(ii) syllables
(iii) words and word classes
(iv) morphology

The word classes used by Dionysius Thrax were basically those recognised by Aristotle as the set of metaphysical categories: substance, quantity, quality, relation, place, time, position, state, action, affection. We need to wait until the 6th c. CE for *Institutiones grammaticae*, by the Latin grammarian Priscian (whose work strongly influenced grammatical analysis in the Middle Ages and the Renaissance), to formalise Aristotle's metaphysical categories into categories of grammar — the now familiar **part-of-speech categories** ('partes orationis', incl. verb, noun, adjective).

As is apparent from (2), in Dionysius Thrax's grammar is there no discussion of syntax: the word is still central. The 25 volumes of Varro's *De lingua latina libri XXV* ('On the Latin language in 25 books'; 2nd c. BCE) are supposed to have contained considerable discussion of **syntax** (sentence structure), in six of its volumes. But sadly, none of those six volumes have come down to us; volumes 5–10 are the only ones that survive, and these are not on syntax. It is impossible, therefore, to assess the merits of Varro's treatment of sentence structure.

In the six surviving volumes of Varro's grammar, there is throughout a strong echo of the 'analogist' tradition (recall Plato's *Cratylus*), with a concomitant preoccupation with etymology, much of it quite abstruse (e.g., *lucus* 'forest' is said to derive from *non lucendus* 'not shining, not having light'; as a matter of fact, there is a true etymological link between *lucus* and *lux* 'light', the latter used to designate an open space (a space where light penetrates) in a forest, then coming to designate the entire forest via metonymy), but some clearly sensible: thus, *equitatus* 'cavalry' is derived from *equites* 'cavalrymen', which in turn derives from *eques* 'cavalryman', which is rooted in *equus* 'horse'. The outlook on derivation employed in Varro's grammar features the processes of *deletion, addition, permutation* (aka *metathesis*) and *modification*, all assumed to target letters. By making a distinction between **derivation** and **inflection**, Varro's grammar is an ancestor of modern morphological analysis. The idea that via derivation and inflection, a relatively small number of primitives can give rise to an enormous number of words prefigures the emphasis in later work on the **productivity** of language — Humboldt's famous 'making infinite use of finite means' adage (early 19th c.).

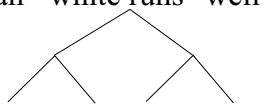
Though Varro reportedly featured syntax prominently in his 25-volume grammar, this appears to have had little influence on grammar writing in the following centuries, which reverted to words as the centre of attention. Apollonius Dyscolus (2nd c. CE) is an interesting exception. His four extant works (on syntax, adverbs, conjunctions, and pronouns) are noteworthy for the attention paid to sentences and their constituents.

Medieval *grammatica speculativa*

The 'speculative grammarians' (or ***Modistae***, so called because of their focus on the *modi significandi* 'modes of signification' of words in discourse) of the late Middle Ages continued the Greek philosophical tradition of viewing language as a *mirror* (Latin *speculum*) of (reality and) thought about reality, but contributed to this tradition by looking far beyond the word. Noteworthy for its first significant discussion of syntax is Thomas of Erfurt's *Tractatus de modis significandi seu grammatica speculativa* (pres. early 14th c.), which presents a precursor of the **Immediate Constituent Analysis** later promulgated by the American Structuralists in the early 20th century. In emphasising that 'in any one construction there are not several but as few as two constructibles because ... the construction is created from the dependence of one constructible on the other', Thomas of Erfurt brings the **binarity** of syntactic constructs sharply into focus. In his analysis of Latin (3), the sentence has two immediate constituents, *homo albus* and *currit bene*, each of which has two immediate constituents of its own. Anachronistically, we can represent this analysis of (3) arboreally, as in (4).

(3) homo albus currit bene
man white runs well

(4)



Thomas of Erfurt's work had no influence on post-medieval work. It was rediscovered only in the 20th century, at which point it fed directly into the approach to syntactic analysis practised by the American Structuralists. The sentence in (3) is syntactically entirely on a par with Bloomfield's (1933) simple example used to illustrate Immediate Constituent Analysis, *lean horses run fast*.

Renaissance

In the 16th century, Franciscus Sanctius Brocensis (also known by his name in his vernacular Spanish, Francisco Sánchez de las Brozas) published his *Minerva seu de causis linguae latinae* (1587) (where *causa* should be interpreted not as 'cause' but as 'origin'), which is remarkable not only for the fact that it is devoted entirely to syntax (*oratio sive syntax est finis grammaticae* 'the sentence is the goal of grammar') but also (despite the fact that it was written in Latin) for its recognition of the vernacular. Sanctius countenances the **variety of languages** and concludes from the surface variation between languages that the level at which language mirrors thought must be a more abstract one, shared by all languages. Thus, one can with some justification see in Sanctius' *Minerva* a forerunner of Noam Chomsky's **Universal Grammar**.

In his (informal) morphosyntactic analyses, Sanctius applies to words and parts of words some of the processes that Varro had earlier applied only to individual letters. He recognises, for instance, that Latin *mecum* 'me.with' derives from *cum me* via permutation (cf. Spanish *conmigo*, where the cognate of Latin *cum* is spelled out on both sides of the pronoun, as *con* and *-go*, resp.), and postulates that Latin *lunam et stellas quae Tu fundasti* 'the moon and stars which You made' results from deletion of *negatiae* 'things' from the *wh*-phrase *quae negotiae* (thereby elegantly solving the problem posed by 'naked' *quae* of apparently presenting a noun phrase without a head noun).

With the rise of the vernacular, and the invention of the printing press (15th c.), the Renaissance sees a need for regularisation and standardisation of the written language, which leads to the production of dictionaries and pedagogical grammars of European vernaculars and (adding significantly to the diversification of linguistic description) of the indigenous languages of recently discovered territories (such as Domingo de Santo Tomás's 1560 grammar of Quechua).

Variation, universalism and innateness: Port Royal grammar, Humboldt

The primary objective of the 17th c. grammarians of Port Royal Abbey (esp. Arnauld, Lancelot) is likewise pedagogical. Port Royal grammar took much of its grammatical inspiration from Sanctius (whose work Lancelot was familiar with), which explains the **universalist** perspective — as Beauzée (1767) puts it, 'la grammaire générale est donc la science raisonnée des principes immuables et généraux du Langage, prononcé ou écrit, dans quelque langue que ce soit' ('general grammar is therefore the reasoned science of the invariant and general principles of the language system, pronounced or written, in whichever language').[2]

The *Grammaire générale et raisonnée* (1660) is particularly noteworthy, however, because of its insistence on the **innateness** of the language faculty, inspired in this by the philosopher René Descartes' rationalism. It is for this reason that Noam Chomsky has frequently referred to the generative approach (which likewise assumes that humans are born with an innate language faculty) with the epithet 'Cartesian linguistics' (where 'Cartesian' is the adjective for Descartes). We can also find the notion of 'kernel sentence' (which played a central role in the work of Zellig Harris, Chomsky's teacher) prefigured in the Port Royal analysis of the complex sentence in (5), which was assumed to be the product of combining the three simple sentences in (5a–c) into one. Using Harris' terminology, we can say that Port Royal analysed (5) as composed out of the 'kernel sentences' in (6); using Chomsky's (1955, 1957) early generative terminology, the composition of (5a–c) to form the complex sentence in (5) involves the application of a 'generalised transformation'.

(5)	Dieu invisible a créé le monde visible	a.	Dieu est invisible
	God invisible has created the world visible	b.	Dieu a créé le monde
	'invisible God created the visible world'	c.	le monde est visible

This emphasis on the innateness of the language faculty is coupled by the German amateur philosopher-philologist Wilhelm von Humboldt (1767–1835) with an emphasis on **acquisition of language**: in his words, 'all children, under the most diverse conditions, speak and understand at about the same age, varying only within a brief time-span'. Acquiring a language is not a mere exercise in storing words in memory and reproducing them; rather, according to Humboldt, it involves the growth of the language faculty through age and practice.[3] This language faculty is a system of two types of **rules** — 'Regeln der Redefügung' (cf. Chomskyan 'phrase structure rules') and 'Regeln der Wortbildung' (morphological rules), taking a set of 'Grundwörter' (basic lexical items) as their input.

2 Note the parenthesis 'prononcé ou écrit' ('pronounced or written'): no longer is the emphasis uniquely on the written language; the spoken language is even mentioned first.

3 As Humboldt himself put it: 'das Sprechenlernen der Kinder is nicht ein Zumessen von Wörtern, Niederlegen im Gedächtnis, und Wiedernachlallen mit den Lippen, sondern ein Wachsen des Sprachvermögens durch Alter und Übung'.

Humboldt's interest in language acquisition (and, concomitantly, his subscribing to the idea that language is an innate capacity of **individual** language users consisting of items and rules), coupled with his interest in understanding **language variation** (he studied Basque and at the time of his death was working on a treatise on the Javanese language Kawi, to which his *Über die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluß auf die geistige Entwickelung des Menschengeschlechts*, published posthumously in 1836, had been conceived as the introduction), led Humboldt to capitalise on the **creativity** of the human language faculty ('von endlichen Mitteln einen unendlichen Gebrauch machen', i.e., 'making infinite use of finite means'). In an echo of Sanctius, Humboldt also made a distinction between 'inner form' ('innere Form') and 'outer form' ('äussere Form'), the former being **universal**: 'Since the natural disposition to language is universal in man, and everyone must possess the key to the understanding of all languages, it follows automatically that the form of all languages must be essentially the same'. Humboldt's motivation for postulating the inner/outer form distinction and universality is ultimately rooted in exactly the same considerations that led Sanctius the this conclusion: only the 'inner form' of language can be a proper reflection of the structure of thought.[4]

The birth of linguistics: Comparative philology and the Neogrammarians

While up to this point, thinking about human language had been the business of linguistic amateurs (mostly philosophers and theologians), the 18th century marks a whirlwind of more scientific language-related activity, continuing straight into the 19th century, and leading to the birth of linguistics as an academic discipline. Important catalysts for this are the following:

(6) a. the West's discovery of Sanskrit and Pāṇini's grammar of it (which the American linguist Leonard Bloomfield would refer to in his 1933 book as 'one of the greatest monuments of human intelligence') revolutionised the Europeans' perspective on grammar organisation and grammatical analysis, and heralded a strongly **comparative approach** to language study

b. though already started in the Renaissance, the 18th century Romantic period saw an upsurge of interest in different cultures and languages (the 'Noble Savage'), which eventually led to American **anthropological linguistics** (Franz Boas, *i.a.*)

c. the 18th century attack on the still prevailing idea that language is a gift of God (see Johann Gottfried Herder's idea that 'der Mensch ist zum Sprachgeschöpf gebildet' — 'humans are made for creating language') triggered an interest in the **history and origin of language**, from which sprang **comparative philology**, which in the words of Otto Jespersen is 'the chief innovation of the beginning of the nineteenth century'

4 Though there are in Humboldt's work clear echoes of late-medieval 'speculative grammar' and Port Royal, and though his emphasis on language acquisition matches that of the 20th c. generative approach to human language, it should be borne in mind that Humboldt's interests lay not so much in the study of language *per se* as in the exploitation of language for a different agenda (informed to a significant extent by his Romantic ideas about language as a vehicle for art): *(a)* proving, via the instrument of language, the superiority/inferiority of cultures, *(b)* language and thought as an inseparable union (no language without thought and no thought without language), and, relatedly, *(c)* linguistic determinism/relativity (language determines thought — the opposite of Cartesian rationalism, according to which thought determines language). This third prong of Humboldt's approach is was echoed later in American anthropological work by Edward Sapir and especially Benjamin Whorf. It is sometimes referred to as the Humboldt–Sapir–Whorf hypothesis.

The detailed analyses of Sanskrit in Pāṇini's grammar revealed the striking resemblance between Sanskrit and Ancient Greek/Latin, which ultimately led to the development of scientifically based genealogical relations between languages and the formulation of rules and laws regulating language, language change and language variation. It is at this point in our discussion that we can, at last, become more precise in our analyses of linguistic data.

One of the enduring insights of Pāṇinian grammar is the strong emphasis on **rule-based analysis** — a staple of modern linguistic theory, but essentially non-existent in the Western tradition until modern times (though we saw a budding awareness of the importance of rules in Humboldt's thinking). One of the signature insights of Pāṇini's is the idea that if, in a given context, two rules could each apply in principle, the one that is actually applied is the more specific of the two; the more general rule applies elsewhere, i.e., only where the more specific rule cannot apply. In modern generative grammar, this idea is known as **specificity** (aka the 'elsewhere condition').

We can illustrate the way in which specificity works by looking (anachronistically: obviously, Pāṇini's grammar does not talk about this particular set of data) at the forms of the English plural suffix in (7):

(7)	a.	*cad*	+	PL	=	*cads*	[kædz]
	b.	*cat*	+	PL	=	*cats*	[kæts]
	c.	*axe*	+	PL	=	*axes*	[æksəz]
	d.	*ox*	+	PL	=	*oxen*	[ɒksn̩]

To account for the distribution of the four plural suffixes seen in (7), we can draw up the rules in (8). But drawing up these rules is not itself sufficient: we also have to make sure that each rule applies just to the right words.[5]

(8) a. add [z] to the stem
b. add [s] to the stem if it ends in a *voiceless* consonant
c. add [əz] to the stem if it ends in a *sibilant* ('hissing') consonant
d. add [n̩] to the stem to form *ox<u>en</u>*, *children* and *brethren*

To (7c), rules (8a–c) could all apply: the final consonant of the stem *axe*, [s], is a voiceless consonant, and it is also, more specifically, a voiceless sibilant (a 'hissing' sound). The competition between the three plural rules in (8a–c) is won, in the case of (7c), by the most specific one that can apply to *axe*. There are evidently more voiceless consonants than there are sibilant consonants in English. So the feature [sibilant] defines quite a specific set of elements, more so than the feature [voiceless]. Rule (8c) is thus the most narrowly defined rule that can apply to *axe* — and for this

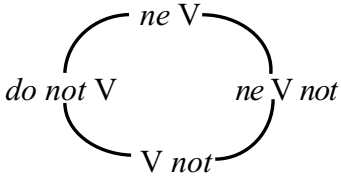
5 Not all English plurals involve the addition of one of the suffixes mentioned by the rules in (8): *(a)* there are plurals which do not differ in form from their corresponding singulars (*sheep* has the plural *sheep*), *(b)* there are plurals which differ from their corresponding singulars not in having a suffix attached to them but in having the vowel of the stem undergo a change (*goose~geese*, *mouse~mice*), and *(c)* one occasionally comes across a plural form that differs from the singular by bearing a suffix different from any of the suffixes covered by the rules in (8) (thus, the word *cherub* 'angel of the second highest order' has two possible plurals in English, *cherubs* and *cherubim*; the latter features the plural marker *-im* of Hebrew, the language from which this word originates). Since *-im* is not indigenous to English morphology (unlike *-en*), it is more natural to treat *cherubim* as an unanalysed plural form adopted wholesale from Hebrew. For *(a)* and *(b)*, the question of how best to deal with 'zero plurals' and 'umlaut (vowel-change) plurals' is a complex one, which we will largely sidestep here; suffice it to say that if we are to postulate rules that say 'add ∅ to the stem if the stem belongs to the set {*sheep*, *craft*, ...}' and 'change the stem vowel if the stem belongs to the set {*goose*, *mouse*, ...}', we will again rely on Pāṇinian specificity to ensure that the more general plural rules in (8a–c) do not apply.

reason it is the one that actually applies in the formation of the plural of *axe*, 'defeating' the rules in (8a) and (8b). The word *ox* in (7d) also ends in a sibilant consonant, like *axe*. So the condition for the application of rule (8c) is met once again. But in the case of *ox*, rule (8d) also applies. And since rule (8d) is obviously more specific than any of the rules in (8a–c), it is the one that must be applied in the case of *ox* — not because the more general rules in (8a–c) cannot apply (they actually could) but because rule (8d) is the most specific rule among the set of plural rules that can apply to *ox*.

Because the plural rule in (8d) is highly lexically restricted, it is not surprising that it is harder to learn than any of the more general rules, for which there is abundant evidence in the data. A learner of English can only discover that the plural of *ox* is *oxen* by being exposed to the latter form, which is not a high-frequency word. Not having come across the form *oxen* before, a learner of English will be excused for applying the appropriate member of the set of non-lexically restricted plural rules in (8a–c) to form the plural for *ox*. That would be rule (8c): *ox* ends in a sibilant consonant, so [əz] is the expected form of the plural marker. The only reason why rule (8c) does NOT apply to *ox* is that there is an even tighter fit between this stem and a particular plural marker in rule (8d). But if that rule were to drop out of the grammar of English at some point, nobody would miss it: the word *ox* would revert to forming its plural via rule (8c), yielding *oxes*. For *brother*, the regular plural rule has already taken over: though *brethren* (an archaic plural form that combines rule (8c) with a vowel change in the stem) lives on in highly specialised contexts, the application of the most general plural rule, (8a), to *brother* is the norm.

The 19th c. **comparative philology** movement led to the discovery of patterns (often thought to be of a cyclical nature — **cycle** or German *Kreislauf*) in the **historical development** of (Indo-European) languages, both in morphosyntax and in morphophonology. To start with the former, consider what has become known as 'Jespersen's Cycle', illustrated in (9):

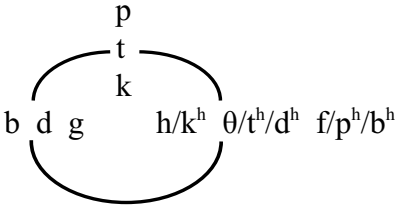
(9)	a.	he *ne* secgeþ ...	('classical' Old English)
	b.	he *ne* seiþ *not* ...	(Middle English)
	c.i	he says *not* ...	(late ME → late 17th c.)
	c.ii	he does *not* say ...	(15th c. →)
	d.	he does*n't* say ...	(Modern English)



Old English starts out with a single, immediately preverbal negation particle *ne* (a 'clitic', necessarily attached to the verb), which later gets reinforced by the free-standing negation marker *not*. In the late Middle English period, the clitic element *ne* falls into disrepair and *not* goes on to mark negation by itself. In the Modern English period, this negation marker eventually develops the recuded form *n't* — a clitic necessarily attached to the finite verb. This takes us full circle.

Such cyclical developments were also discovered in the realm of sound correspondences. Grimm's *Kreislauf* is perhaps the most prominent illustration:

(10)	a.	p (Latin *pes*)	– f (English *foot*)	b (Greek *kannabis*)	– p (English *hemp*)
	b.	t (Latin *tres*)	– θ (English *three*)	d (Latin *duo*)	– t (English *two*)
	c.	k (Latin *centum*)	– h (English *hundred*)	g (Latin *granum*)	– k (English *corn*)
	d.	b^h/p^h (Sanskrit *bhra:ta:*)	– b/v (English *brother*)		
	e.	d^h/t^h (Sanskrit *madhu*)	– d/ð (English *mead*)		
	f.	h/k^h (S *hansa*)	– g/γ (English *goose*)		



On the surface, Grimm's Cycle seems to be marred by numerous apparent exceptions, including the following:

(11) exception to (10a–c, left-hand column): *t* does not change in:

Latin *oct͟o*	[okto]	OEngl *eaht͟a*	[ɛɑxta]
Latin *noct͟em*	[noktɛm]	OEngl *niht͟*	[niːxt]
Latin *rēct͟us*	[reːktus]	OEngl *riht͟*	[riːxt]

The generalisation covering these apparent exceptions is that *t* does not change if, in Germanic (here, Old English), it is preceded by a voiceless fricative.

(12) exception to (10d–f): Germanic *b d g* are paralleled in Sanskrit/Greek not by the expected b^h/p^h d^h/t^h h/k^h but instead by 'plain' *b/p d/t g/k*:

English *b͟id*	Sanskrit *b͟ōd^{h}a:mi*
	Greek *p͟ewt^{h}omaj*

The generalisation (discovered by Grassmann 1862) that covers these cases is that in Sanskrit and Greek, two successive syllables never *both* have d^h/p^h etc. (aspirated stops) as their onsets; instead, in contexts where we would expect to find such sequences, the first of the two stops is unaspirated.[6]

(14) exception to (10a–c, left-hand column): *t* does not change to *θ* (cf. (2b)) but instead to *d* in the second and third examples below:

Skt *b^{h}rātar*	[ˈbʰraːtɑr]	OEngl *broðor*	[ˈbroːθɔr]
Skt *pit͟ar*	[pi ˈtɑr]	OEngl *fæd͟er*	[ˈfædər]
Skt *māt͟ar*	[maː ˈtɑr]	OEngl *mod͟or*	[ˈmoːdɔr]

The descriptive generalisation for these apparent exceptions to Grimm's Cycle is that *t* does not change to *θ* but to *d* instead if, in Sanskrit/Greek, it is the onset of a *stressed* syllable, and hence has an *unaccented* vowel preceding it (a generalisation known as 'Verner's Law').

It will be clear from their formulation that the generalisations that 'take care' of the surface exceptions to Grimm's Cycle are not random but principled. The cycle described in (10) can thus be upheld in general terms — indeed, (10) can be elevated to an absolute '**sound law**', one whose application, wherever it is not independently prevented from applying by the more specific laws laid down in the generalisations above, is exceptionless. The German **Neogrammarians** (*Junggrammatiker*, incl. Brugmann, Delbrück, Leskien, Osthoff) of the second half of the 19th century make it their business to conceive of historical change as governed by such absolute laws ('die absolute Ausnahmlosigkeit der Lautgesetze' – 'the absolute exceptionlessness of sound laws'), thereby elevating the study of language to a scientific standard.

6 Striking support for this generalisation comes from reduplication patterns, attested synchronically in both Sanskrit and Greek (Bloomfield 1933:349):

(i)	a.	Sanskrit *ad^{h}āt* 'he put'	→	*d͟ad^{h}āmi* 'I put', **d͟^{h}adhāmi*
	cf.	Sanskrit *adāt* 'he gave'	→	*dadāmi* 'I give'
	b.	Greek *t^{h}ēsō* 'I will put'	→	*t͟it^{h}ēmi* 'I put', **t͟^{h}ithēmi*
	cf.	Greek *dōsō* 'I will give'	→	*didōmi* 'I give'

The Neogrammarians take their inspiration from Darwin's *Origin of the Species* (1859), seeking to explain sound change on the basis of the physiology of the human speech organ, with certain pronunciations more 'fit' for survival than others. In doing so, they focus on the **synchronic** *status quo* of the Indo-European languages, rather than on historical reconstruction — while their predecessors (and some of their contemporaries) took language change to be language decline and hence looked for the 'ur'-language for perfection, the Neogrammarians insisted that '[t]he comparative linguist must ... divert himself from the 'ur'-language and direct his gaze to the present ... the youngest phases of the newer Indo-European languages, the living dialects, are of great importance to the methodology of comparative philology' (Brugmann & Osthoff 1878, *Morphologische Untersuchungen*). In Humboldt's wake, the Neogrammarians adopt an **individual** psychological perspective of language, and stress its **creativity**. Brugmann & Osthoff (1878) leave no doubt about their idea that 'language is not a thing that stands outside and above man and has a life of its own, but exists truly only in the individual, and that therefore all changes in its life can come only from the speaking individuals, and second, that the mental and physical activity of individuals when they acquire the language of their forbears and reproduce the acoustic images laid down in their conscience and construct new ones, must be the same for all times'. And in his *Prinzipien der Sprachgeschichte* (1880), Paul writes: 'The words and word groups that we use in speech are generated only in part by means of mere memory-based reproduction of what was taken in earlier. Just about as much results from a combinatorial activity that is based on the existence of the paradigms.'[7]

The birth of phonology: The Kazan School and the Prague School

The birth of phonology (or 'psychophonetics', as it was called at the time) is marked by the introduction, in the work of the **Kazan School** (established at the University of Kazan in the 1870s by the Polish-born linguist Jan Baudouin de Courtenay, and prominently including his student Mikołaj Kruszewski), of the **phoneme**.[8] The phoneme is an abstract, **psychological** entity, 'the psychological equivalent of a speech sound'.

Central to the Kazan School approach to phonology are **oppositions** or **alternations** between speech segments. Phoneme inventories for individual languages are established on the basis of systematic comparison of sounds. Individual phonemes are represented as the union of all the surface variants of a sound — i.e., as a set: like the Neogrammarians (see fn. 7), the Kazan School approach to alternations is representational: there are alternations between surface forms; those alternations are representable with the aid of a concept of a phoneme that states the alternation; but there is no sense in which one form underlies others. To illustrate, the Russian words *kniga* 'book', *knig* 'book-GEN.PL' and *knigi* 'book-GEN.SG' show a systematic alternation between the sounds [g] (in *kniga*), [k] (in *knig*) and palatalised [g'] (in *knigi*). These three speech sounds are grouped together under a single phoneme, {[g]~[k]~[g']}, with [k] used in word-final position, [g'] in front of the high front vowel [i], and [g] elsewhere.

7 Note the emphasis in this quote on paradigms: the Neogrammarians are paradigm-makers, not rule-writers; they take a **representational** perspective on language (change). In this regard, viewed from the perspective of Chomskyan transformational generative linguistics, which is decidedly **derivational** in nature, their work represents a retrograde move compared to Humboldt's 'System von Regeln' (system of rules).

8 The term 'phoneme' (French 'phonème') goes back A. Dufriche Desgenettes, ca. 1870, and was coined originally as the French equivalent of German 'Sprachlaut' ('speech sound'), i.e., a physical rather than psychological entity.

The Kazan School recognises that oppositions between sounds of the type seen in the Russian examples just reviewed may be better understood in terms of **binary** alternations — in the case at hand, the alternations {[g]~[k]} and {[g]~[g']}. This heralds the outlook on oppositions taken in the **Prague School** (whose leaders are Roman **Jakobson** and Nikolai **Trubetzkoy**). In Trubetzkoy's work, three different types of oppositions are postulated:

(15) a. **privative** oppositions — one member of the opposition has what the opposing member lacks (e.g., [i]~[y] in French *pire~pure*, where [y] has lip-rounding but is otherwise identical with [i])

b. **equipollent** oppositions — the members of the opposition are on equal footing (e.g., [k]~[s]~[ʃ] in English *electric~electricity~electrician*, involving a morphologically conditioned phonological alternation, for which Trubetzkoy invented the notion of a 'morphoneme')

c. **gradual** oppositions — oppositions along a scale (e.g., vowel height)

For Trubetzkoy, the phoneme is essentially what it is for Baudouin de Courtenay as well: the sum of the structured oppositions. But unlike the Kazan School, the Prague School recognises the significance of **distinctive features** in the analysis of sounds and sound systems: phonemes are characterised exclusively in terms of the properties for which they give rise to systematic oppositions. To appreciate this, consider the English phonemes /t/ and /k/.[9] The phoneme /t/ partakes in oppositions with /k/(involving place of articulation: alveolar *vs* velar), with /d/ (involving voicing: voiceless *vs* voiced), with /n/ (involving the oral~nasal distinction), and with /s/ (involving the stop~fricative distinction), but the phoneme /k/ participates only in place, voice and nasal oppositions (with /t/, /g/ and /ŋ/, resp.), NOT in a stop~fricative opposition — English does not have a velar fricative [x] in its inventory of phonemes. This leads to a classification of English /t/ and /k/ as in (16):

(16) a. /t/ {alveolar, voiceless, non-nasal, stop}

b. /k/ {velar, voiceless, non-nasal}

For the phoneme /t/ it is important to include the feature 'stop' in its description because the English phoneme inventory contains /s/ alongside /t/; but for the English phoneme /k/ it is redundant to specify it as a stop because the English sound system does not show an opposition between /k/ and a corresponding fricative.

Though Trubetzkoy does not give the distinctive features alluded to in the previous paragraph (such as 'alveolar' and 'voiceless') primitive status, Jakobson does. For Jakobson, the primitives of phonological analysis are not the phonemes but these distinctive features, which he takes to systematically represent binary oppositions — hence the term '**binary distinctive features**'. Jakobson defines distinctive features in both **articulatory** and **acoustic** terms. Examples of articulatory features are the ones mentioned in (16) (which all tell us something about the way in which a speech sound is articulated or pronounced). Examples of acoustic features stemming from Jakobson's work are the feature [grave] ('relatively large oral cavity with concomitant low frequency') and [flat] ('downward shift of the formants in the spectrum', comprising the articulatory gestures of labialisation, retroflexion, velarisation and pharyngealisation). Both articulatory and acoustic distinctive features are taken to have **psychological reality** in Prague School linguistics.

9 From this point onwards, phonemes will be enclosed in slants, as is the standard practice in modern phonology — a practice that goes back to the Prague School.

European structuralism

At the heart of the Prague School approach to the study of language lies the insight that language is a structured system, which is what has earned this approach the epithet **structuralist linguistics**. Ferdinand de **Saussure**, an Indo-Europeanist[10] working in Geneva, spearheads structuralist linguistics in Western Europe. His *Cours de linguistique générale* (published posthumously, based on his lectures at the University of Geneva) will forever be remembered for two central (and parallel) ideas:

(17) a. language (*langage* in French) is composed of *langue* (the psychological side of language — the language system, i.e., the formal pattern of relationships among linguistic signs; the 'inside' of language, often taken to be similar or even equivalent to Chomsky's 'I(nternalised)-language') and *parole* (the physical side of language — the 'outside' of language; cf. Chomsky's 'E(xternalised)-language')

b. the linguistic sign (*signe* in French) is composed of a *signifié* (the psychological concept denoted by the *signe*) and a *signifiant* (the physical sound image)

We will not discuss Saussure's work in any detail — in part because (due to the fact that it was not Saussure himself who wrote down the *Cours*) what we have on paper is in many ways an imperfect rendition of his ideas filtered through the minds of his students Charles Bally and Albert Sechehaye, and in part because the *Cour*'s central ideas are developed more clearly in other work in linguistics.

In his belief that 'in language there are only differences, without positive terms', Saussure aligns himself with the Kazan School approach, which had placed oppositions at centre-stage. Also like the Kazan School, Saussure recognises distinctive units of sound that he calls 'phonèmes' — but Saussure's perspective on the phoneme is unnecessarily confusing: he views the 'phonème' as belonging both to his *langue* (the psychological side, where oppositions are central) and to his *parole* (the physical side, the actual speech sounds).

Regarding the sentence, Saussure takes the position that it belongs strictly to the *parole*, not to the *langue*. As a result, Saussure pays no serious attention to the structure of sentences (i.e., syntax) — in contrast to the Prague School, where the so-called **functional sentence perspective** is developed. The linchpin of the functional sentence perspective is an organisation of sentences into units that have a particular function in the interpretation of the sentence within the discourse of which it is a part. Central notions in this approach to the structure of the sentence (nowadays often referred to as the pragmatic or **information-structural** approach) are the '**theme**' (the logical subject or 'topic') and the '**rheme**' (the logical predicate or 'comment'). The functional sentence perspective constitutes European structuralist linguistics' signature contribution to the understanding of the relationship between syntactic structure and discourse.

American structuralism

While for European structuralists the idea that the primitives of language are psychological entities, represented in the speaker's mind, is pervasive, on the other side of the Atlantic Ocean Leonard **Bloomfield**'s structuralist approach takes the opposite tack — for him, the theories of the mind of his time are much too vague to allow the study of language to attain scientific status.

10 Saussure's *Mémoire sur le système primitif des voyelles dans les langues indo-européennes* (1878/9) proposed what came to be known as the 'laryngeal theory' of Indo-European phonological reconstruction, later confirmed by Kuryłowicz's discovery of laryngeals in Hittite.

Because he is adamant that what is needed is a solidly scientific framework within which to couch the theory of language, in *Language* (1933) Bloomfield (inspired by the psychologist Albert Weiss) embraces behaviourism as a way of escaping the vagueness of contemporary psychology, and as a way of severing the ties between the study of language and the concept of the 'mind', with all the religious overtones that this concept had at the time.[11] Bloomfield's *Language* represents an unprecedented combination of theoretical rigour and innovation — not just when it comes to linguistic terminology (though here, too, the book certainly plays its part, introducing, among other things, the terms *phememe* 'smallest and meaningless unit of linguistic signaling', *glosseme* 'smallest meaningful unit of linguistic signaling', *noeme* 'meaning of a glosseme', and *sememe* 'meaning of a morpheme'; some of these terms have stuck while others have not). However, Bloomfield's outlook on syntax is not in any way revolutionary: his **Immediate Constituent Analysis** echoes directly Thomas of Erfurt's binary parse of *homo albus currit bene* (recall (3)–(4), above).

Zellig **Harris** (Professor of Linguistics at the University of Pennsylvania, and Noam Chomsky's teacher), who follows in Bloomfield's behaviourist footsteps and denies language mental reality, is significant for his initiation of a **structuralist theory of syntax**, in his book *Methods of structural linguistics* (1951) — where only chapter 19, entitled 'Morphological structure', addresses syntax — but mostly in subsequent work (1952–1957). Apart from his 'kernel sentences', which we already encountered in the brief discussion of the Port Royal approach to complex sentences — recall (5)), Harris' work in structuralist syntax is characterised by his recognition of a distinction between two types of 'statements' (or syntactic rules), which the generative approach would later name **phrase-structure rules** (18a) and **transformations** (18b):[12]

(18) a. 'statements which enable anyone to synthesize or predict utterances in the language', statements which 'form a deductive system with axiomatically defined initial elements and with theorems concerning the relations among them' (1951:372–73)

b. 'statements' which 'transform certain sentences of the text into grammaticality equivalent sentences' (incl. nominalisation, particle placement, VP–deletion, and question formation)

Though Harris' approach to syntax is profoundly representational in nature ('statements' rather than 'rules'), there are the beginnings of an awareness here that derivation might be needed, as is apparent from Harris' use of the verb 'transform' in his formulation of (18b). In Harris' later work (esp. his 1955 LSA–address 'Co-occurrence and transformation', published in *Language* in 1957), there is considerably more syntactic analysis than there was in his 1951 book. But American structuralism overall did not bring anything revolutionary to the table in linguistics' understanding of the structure of sentences. The American structuralists put more of a stamp of their own on the development of 'discovery procedures' for basic linguistic units (in particular, the phoneme and the morpheme), and on the formal relationship between word structure (morphology) and sound patterns (phonology), epitomised by the theory of **structuralist morphophonemics**.

11 Noam Chomsky, in his 1959 review of Skinner's (1957) *Verbal behavior*, dismantles the framework in which *habit* and *conditioning* play the key roles (psychological behaviour is the result of *habit formation*). As Chomsky puts it (echoing Humboldt), 'human language is free from stimulus control and does not serve a merely communicative function, but is rather an instrument for the free expression of thought and for appropriate response to new situations'.

12 The terms 'phrase-structure rule' and 'transformational rule' are due to Noam Chomsky, not to Zellig Harris. But the 'statements' in (18a) and (18b) express exactly what these more recent notions expressed.

One example that can serve as a basic illustration is Harris' treatment of morphologically conditioned neutralisation of phonemic contrast, in terms of the 'morphophoneme':

(19)	a.	knife/life/wife	/f/	}	{/f/~/v/}	*vs*	fife	/f/
	b.	knives/lives/wives	/v+z/				fifes	/f+s/

Harris at first presents an outlook on the **morpheme** according to which it is a set, a morpheme unit (cf. Trubetzkoy's set approach to the phoneme). Thus, the two surface alternants of words like *wife* (*wife* and *wive*, the latter used only in combination with the plural morpheme) make up a morpheme unit {*wife, wive-*}. But Harris then recognises that we do not actually need to list both members of this set: it will suffice to list just one (so that the morpheme unit becomes simply {*wife*}) and to add a 'statement' that says that this morpheme unit has an alternant with /v/ before the /z/ of the plural morpheme.

Precisely how to formulate the statement (or rule) is not exactly straightforward, however: although we are dealing with an automatic alternation (words like *wife* automatically exchange their final /f/ for a /v/ when the plural morpheme is added, but not when the otherwise identical genitive morpheme is added — the alternation is strictly conditioned by the plural morpheme), this automatic alternation cannot be an allophonic one: both /f/ and /v/ are phonemes of English (there are minimal pairs such as *fine~vine*); a central tenet of the American structuralist approach is what is known as '**biuniqueness**' ('once a phoneme, always a phoneme'), so /v/ cannot be an allophone of /f/.

Harris's initial solution (pp. 225–26) to this problem is to posit a **morphophoneme** /F/ — an abbreviation for the formula '/v/ before plural /z/, /f/ elsewhere'. But in an appendix to chapter 14, Harris (p. 241) considers an alternative approach eschewing the postulation of a morphophoneme: 'Thus in the case of {*knife*}, instead of saying that the morpheme is /nayF/, with /F/ representing /v/ before {*s*} 'plural', we may prefer to say that the morpheme is simply and always /nayf/, but that one of the members of the {*s*} 'plural' morpheme is /*voicing* + z/, occurring after /nayf/, /wayf/, etc. ... Shifting the burden of this alternation onto the {*-s*} may be preferable here, because {*s*} 'plural' has quite a number of other restricted members, so that less violence to the simplicity of the morphology may be done thereby than in creating the /F/ morphophoneme. On the other hand, the /F/ was useful in that it marked for easy notice the morphemes in which the alternation took place.' Notice how Harris here cleverly avoids talking directly in terms of a conditioned alternation between /f/ and /v/: his additional allomorph of {*s*} 'plural' is /*voicing* + z/, with 'voicing' turning /f/ into /v/.

While (19) is about morphologically conditioned neutralisation of phonemic contrast, we also find cases of phonologically conditioned neutralisation of phonemic contrast — as a matter of fact, we have already come across an example of such neutralisation, in the Russian pair *kniga* 'book' ~ *knig* 'book-GEN.PL'. The former is pronounced with a [g] and the latter with a [k]; but the voiced and voiceless velar stops must both be recognised as phonemes of Russian because in non-final position replacing one with the other produces minimal pairs. Trubetzkoy's solution for this neutralisation problem is similar to Harris'initial solution for the previous one: Trubetzkoy postulates the **archiphoneme** /K/ as the set of features common to a pair of phonemes (here /g/ and /k/) whose opposition is neutralised in a given context. But plainly, both the morphophoneme and the archiphoneme are nomenclatural ploys, enriching the terminological inventory but not providing profound solutions for the problems at hand: indeed, the morphophoneme and the archiphoneme still create paths from [v] and [k] to two distinct phonemes, so they do not fundamentally solve the biuniqueness problem.

Why do the American structuralists find biuniqueness so important? American structuralism is above all an approach to the description of novel (often 'exotic') language data (American structuralists preferred to call themselves 'descriptive linguists'). For them, biuniqueness provides a practical tool to fieldworkers aimed at facilitating the task of setting up the phoneme inventory for any natural language.[13] In other words, structuralist methodology is very much developed from the linguistic fieldworker's perspective, not the language learner's or language user's.

Generative grammar

Generative grammar, pioneered by Noam **Chomsky** (whose name we have come across a few times already), puts this entirely on its head: not the linguist but the learner becomes the focus. While **descriptive adequacy** (the requirement for the grammar to capture all and only the grammatical sentences of any language) of course remains an important concern, the emphasis on **language acquisition** makes **explanatory adequacy** (the requirement for the grammar to shed light on the fact that language is acquired fully and effortlessly within just a few years) the very essence of the generative linguistic enterprise.[14]

With this in mind, Chomsky (1964) presents a repartee of structuralist phonemics, systematically attacking all the principles (incl. biuniqueness) that structuralists had formulated as defining constraints. Together with Morris Halle, Chomsky presents in *The sound pattern of English* (1968) a thoroughly explicit fragment of a generative analysis of the phonology of one particular language — an analysis in which rules and rule ordering play a key role. In his earlier monographs *Syntactic structures* (1957) and *Aspects of the theory of syntax* (1965), Chomsky initiates the same rule-based approach to the structure of sentences. *Syntactic structures*, Chomsky's first publication on transformational generative grammar (his *Logical structure of linguistic theory* was completed in 1955 but not published until 1975), presents a theory of phrase structure comprising **phrase-structure rules** (PS rules), which are part of the so-called base component, and **transformational rules**, which form the transformational component. In *Syntactic structures*, the sum total of PS rules and transformations is all there is to the grammar: terminals (words) are introduced by PS rule; a separate lexicon is not recognised until *Aspects*. The PS rules are **context-free rules** (of the general form in (20a)), differing in this respect from the typically highly **context-sensitive rules** (20b) of phonology.

13 To allow the linguist to make unequivocal decisions in determining phoneme inventories, structuralism postulated four key criteria to which phonemic analysis should be subject:

(i)
- a. **biuniqueness** (any phone in a given environment must be an allophone of one and only one phoneme; 'once a phoneme, always a phoneme')
- b. **linearity** (the location of a contrast in a phonetic representation is the same as in the corresponding phonemic one)
- c. **invariance** (each phoneme has associated with it a certain set of defining features; wherever the phoneme occurs in a phonemic representation, there is an associated set of defining features in the corresponding phonetic representation)
- d. **local determinacy** (the unique phonemic representation corresponding to a given phonetic form can be determined by 'purely phonetic' considerations, or perhaps, considerations involving only 'neighbouring sounds')

14 American structuralists believe that the way the analyst went about devising an analysis of natural language facts is also essentially the way the child goes about learning his/her language; intuitions about what constitutes a simple or efficient grammar play no role: so long as everything is in accordance with the rules of the (rigorously defined) structuralist game, all is well. As the American structuralist Bernard Bloch once said, one should not 'pamper the child'.

(20) a. X → Y *context-free*
b. X → Y / Z ___ X → Y / ___ Z X → Y / W ___ Z *context-sensitive*

In these rules, the arrow (→) is read as 'turns into' or 'is rewritten as' (hence the name 'rewrite rules'). The forward slash in (20b) introduces the context in which the rule applies (so '/' stands for 'in the context of'), and in the representation of the context, the horizontal bar or underscore is a placeholder for the item to the left of the arrow. So concretely, the first rule in (20b) says that X is rewritten as Y if X occurs to the right of Z, whereas the second rule in (20b) says that X becomes Y if X precedes Z, and the third rule in (20b) has X turn into Y if X sits between W and Z. In (20b), the symbol to the left of the arrow and the context for the application of the rule (i.e., the information to the right of the slash) together form the **structural analysis** (or structural description) for the rule; the symbol(s) to the right of the arrow up to the slash represent the **structural change** effected by the rule.

For the grammar of English to generate the sentences in (21a) and (21b), it will need at a minimum the PS rules in (22). (On how to deal with the *-s* of *stinks* and *likes*, see the discussion of (25), below.)

(21) a. he stinks
b. he likes syntax

(22) a. S → NP VP
b. NP → N
c. VP → V
d. VP → V NP

For the grammar of English to account for the alternation in (23) (the active/passive voice alternation), it needs to include the (generally optional) passive transformation, formulated in (24) in the format of *Syntactic structures*.

(23) a. the people re-elected the president
b. the president was re-elected (by the people)

(24) *Passive*
SA: NP – Aux – V – NP
SC: 1 – 2 – 3 – 4 → 4 – 2 + *be* + *-en* – 3 – *by* + 1

In addition to optional transformations (such as the passive rule), the grammar may also feature obligatory transformations. A famous obligatory transformation which *Syntactic structures* postulates for English is the 'Affix Hopping' transformation, given in (25). What (25) says is that the affix (term #2) is ordered after the 'v' (which represents a modal, auxiliary or lexical verb), and a word boundary is introduced after the affix (to 'close off' the complex 'v' element).

(25) *'Affix Hopping'*
SA: X – 'Af' – 'v' – Y ('v' ∈ {M, *have*, *be*, V})
SC: 1 – 2 – 3 – 4 → 1 – 3 – 2 # – 4

Thus, from an **underlying representation** such as *he -s like syntax*, we get to the desired **surface representation** *he likes syntax*, (21b), by applying (25). And in a similar vein (bearing in mind that terms 2 and 3 can occur multiple times in a sentence — i.e., 'Af' and 'v' are recursive), we can get from *he -s be -ing be -en beat* to *he is being beaten*. With the aid of the 'Affix Hopping' rule, we can take care of the correct attachment of all verbal inflectional morphology of English.

We will not go any further into the details of the theory of syntax emanating from *Syntactic structures* and *Aspects* or, for that matter, the phonological theory presented in *The sound pattern of English* — our historical overview of the history of linguistics prior to the advent of the generative approach ends here. In your classes on phonology and syntax in this department, and also in the remainder of the MA lecture course on linguistic theory, you will be confronted directly and on a regular basis with generative linguistic analysis.

Some useful references for further reading

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