

The Generative Model of Chomsky & Halle 1968 (aka SPE)

Structuralist background:

[1]. Sapir School (Swadesh, Voegelin, Newman, Haas): Below the surface sound structure is a hidden system in terms of which the phonetics is interpreted. Two different systems may interpret the same phonetic event quite differently.

1925: two lgs may have same surface sound inventory but quite different patterning
two lgs may have quite different surface inventories but equivalent phonological systems (e.g. two dialects of the same language)

1933: psychological reality: phonetic illusions: native speakers hear sounds that are not objectively present in the signal—they possess an inner system through which surface sounds are interpreted that can fill in the blanks.

Grammatical descriptions of numerous Native American languages;
Phonological processes mapping a phonological to phonetic representation are assumed but seldom formalized.

[2] Bloomfield School (Hockett, Harris, Bloch)

intuition: contrast is basic parameter of difference among languages; represented as a level of transcription between Sapir's Phonological Representation and the Phonetic Representation—called the Phonemic Level.

Attempt to give explicit principles to define the Phonemic Level—shared goal and much debate: invariance, complementary distribution, minimal pairs, biuniqueness

Bloomfield 1939 Menomini Morphophonemics with ordered rules similar in spirit to Sapir but more explicit.

[3] other schools: Kenneth Pike (Tagmemics, SIL), Roman Jakobson (Prague School, markedness, features)

[4] Chomsky (1951, 1964) Halle (1959, 1962) critique of autonomous phonemic level: attempts to satisfy it lead to loss of generalization and formal simplicity (Russian voicing assimilation, writer-rider) and general incoherence. Notion of (surface) contrast is rejected/reinterpreted as a significant goal. Rather, goal is to discover the phonological rules that convert the phonological representation to the phonetic representation and develop a general theory of their form and substance.

[5] Early Generative Model (SPE)

converts surface syntactic structure to phonetic representation
lexical and grammatical formatives represented as strings of distinctive feature matrixes at both the

lexical, phonological level and the phonetic level
phonological rules are context sensitive rewrite rules that alter feature structure: $A \rightarrow B / X_Y$
rules apply in a linear sequence (partially ordered set)
some rules apply at the level of the word and others at level of the phrase
some rules may apply in a cycle
readjustment rules may alter surface syntax to form an input appropriate to phonology:
insert phrasing breaks; add formatives; rebracket (cliticization); delete.

focus on alternations to discover the rules (if alternations are regular then posit a single underlying form from which the different variants can be derived by context-sensitive rules)
 concern with explicitness, formal statement, and ways to economize rules
 tremendous success; many lgs analyzed; new generalizations discovered or viewed in different light.

rules do not aim at particular structures; functional explanations viewed with suspicion.
 principles of morpheme and word-shape (phonotactics) of minimal interest; no concern for frequency; focus on “deeper” morphophonemics rather than lower-level, phonetic processes.

[6] Illustration from analysis of English phonology in SPE:

[7] vowel reduction: shifting stress (while long tense vowels are stable (and attract stress) short vowels’ stressability depends on location in word (often lexically determined).

télégraph, télégraphy	[ɛ] ≈ ə, [æ] ≈ ə,
átom, atómic	[a] ≈ ə,
aróma, àromátic	[o] ≈ ə,
órigin, oríginál	[ɔ] ≈ ə, [i] ≈ ə,

schwa is predictable variant of full vowel in unstressed syllable; if start with schwa cannot predict which vowel will occur under stress; problem for autonomous phonemics: violates invariance and yet schwa not felt to be phonemic.

[8] Flapping and vowel length: vowels shorter before voiceless consonants. In many dialects nucleus of [ay], [aw] raised when short (Canadian Raising): writer vs. rider

[9] Vowel shift:	divīne	divinity	rigid	rigidity
	serēne	serenity	perpetual	perpetuity
	profāne	profanity	final	finality
	[aj]	[ɪ]		
	[ij]	[ɛ]		
	[ej]	[æ]		

analysis: a quantitative alternation (long diphthong and short lax vowel) as well as a difference in vowel quality. Stress reveals underlying quality of vowel but to distinguish from stable short vowels the vowels must be underlyingly long; their quality is changed by shifting the nucleus of the diphthong (a change that is recurrent in the history of English). Some rule must shorten the root vowel when certain affixes are added. Trisyllabic Laxing. The analysis entails that the underlying vowel never surfaces as such: it is always changed in quantity or elsewhere in quality. But this is exactly what is expected if rules apply mechanically in sequence without regard to the consequences.

Order: TSL precedes vowel shift

/ divīn /	/ divīŋ iti/	
-----	divin iti	TSL
divajn	-----	VS

[10] Velar Softening:

critic	critic-al	critic-ism	critic-ize
medic	medic-al	medic-ine	medic-ate
allege	alleg-ation		

rigid	rigor	
reg-al	regicide	
analog-ous	analog-y	analog-ize

[k,g] -> [s,j] / __ [+vocalic, -low, -back]

precedes Vowel Shift for two reasons:

in critic-ize Vowel Shift alters the context to a low vowel (counterbleeds)

in medic-ate Vowel Shift creates a front mid vowel that fails to soften the velar (counterfeeds)

/kritik-i:z/	/medik-æ:t/	
kritis-I:z	-----	velar softening
kritis-ajz	medik-ejt	Vowel Shift

[11] s-voicing:

con=sume	re=sume
in=sist, per=sist	re=sist
con=sign	de=sign, re=sign
con=serve	re=serve, de=serve

s -> [+voice] / V = __ V

apparent exceptions explained by rule ordering: (counterfeeding)

con=cede	re=cede
in=cite	re=cite

/re=ki:t/	
-----	s-voicing
re=si:t	Velar-Softening
re=sajt	Vowel Shift

[12] ks-voicing:

ex=amine	vs.	ex-ceed
ex=alt		ex=cite
ex=ist		

/eks=ke:d/	/eks=ist/	
-----	egz=ist	ks-voicing
eks=se:d	-----	Velar Softening
eks=sijd	-----	Vowel Shift
eksijjd	-----	degemination

[13] more prefixes: C -> C* / __ =C*

ad=here	sub=due
ad=mire	sub=sist

at=test	sup=port
as=sist	suf=fice
an=noy	sub=merge
ac=cuse	suc=cumb

ac=cede suc=ceed sug=gest

/sub=ke:d/
 suk=ke:d assimilation
 suk=se:d velar softening
 suk=sjd vowel shift

[14] the cycle: Chomsky, Halle & Lukoff 1956 show that stress contours of English compounds and phrases can be computed by simple rules that track the constituent structure, working from the inside out.

Compound: make the stress of the first constituent primary and reduce the other by one degree

[[[black] [board]]	[eraser]]	
<u> 1 </u> <u> 1 </u>	<u> 1 </u>	word stress
<u> 1 </u> <u> 2 </u>		compound stress
----- <u> 1 </u> <u> 3 </u> <u> 2 </u>		compound stress

SPE suggests applying cyclic stress to word-internal structure

[[[theater] ic + al] ity]
<u> 1 </u>
21_____
<u> 3 2 </u> <u> 1 </u>

[15] some subtle contrasts explained:

relaxátion	devastátion
emendátion	contemplátion
domestícity	opportúnity
tórment	tórrent
cónvict	vérdict
prógress	tígress

[relax] ation	[devastate] ion	
2 1	1 2	Word Stress cycle-1
3 2 1	2 1	word stress cycle-2
-----	devastation	Vowel Reduction
2 1	-----	Clash

[[torment]]	[torrent]	
2 1	1	Word-Stress cycle-1
1 2	-----	Word-Stress cycle-2
-----	ə	

Homework:

For **Week 2, Class #1** exercises 2.5 (Singapore English) and 3.5 (Somali) in PGG.

For **Week 3, Class #1** Selayraese exercise

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