24.961 Basic Premises of the Generative Approach

[1] Object of investigation is native speaker's tacit knowledge of his/her language

- I-language: internal vs. external, individual vs. community
- language faculty internal to mind-brain; can only be studied indirectly through native speaker judgments of grammaticality, synonymy, well-formed inflected word, phonotactically possible word
- data extracted from grammatical descriptions, dictionaries, texts, corpora are assumed to mirror such judgments
- supplemented by "corpus-external" methods of psycholinguistic (including phonetic) experiments, artificial language learning, neural imaging, speech disguises, poetic rhyme, speech errors, loanword adaptation, …
- relation between such data and the I-language is tenuous; can lead to radical shifts in conception of grammar (transformations, conditions, parameters, minimalism)
- phonology is somewhat more stable but major questions on nature of constraints (induced from data vs. innate); role of phonetics (how are the continuous parameters of "time and space" related to symbolic grammatical computations?)
- Generative grammar: a formal system that computes an infinite set of structured expressions that relate grammatical meaning to articulated sound (or visual gesture in the case of the deaf)
- Grammar operates over symbolic representations that interface with conceptual-intentional (meaning) and sensory-motor (phonetics) systems

[2] Sound structure (standard view)

- Lexical items are strings of successive discrete sound segments: orthography (o-b-a-m-a, オバマ), slips of the tongue (*our dear old queen* -> [*queer old dean*]), speech disguises (*Linda Lombardi* > [inda-lay ombardi-lay])
- syllabary based writing systems independently developed multiple times while alphabetic system unique (?); suggests that syllable count (peak of sonority/energy) is most salient parse of speech stream; also poetic metrics of alexandrine, tanka
- Spoonerisms [http://www.fun-with-words.com/spoonerisms.html]

A lack of pies	a pack of lies	p ≈ l
Wave the sails	save the whales	s ≈ w
Cattle ships and bruisers	battle ships and cruisers	k ≈ b
Our queer old dean	our dear old queen	d ≈ kw
The hags flung out	the flags hung out	fl ≈ h
A blushing crow	a crushing blow	kr ≈ bl
Lead of spite	speed of light	sp ≈ l

- most involve entire onset cluster;
- similar bias in Pig Latin (Vaux and Nevins 2003)

Tree in pig latin online survey cf. [www.youtube.com/watch?v=_eWlAkAJUOc]

ee-tray	196
ree-tay	32
ree-tray	7
tee-ray	0

- suggests that C/V is the next most salient cut of the speech stream: transition from low to high energy
- but sound change can isolate individual segments

Polish CS *l > ɬ [w]	Russian	
ɬopata	lopata	'shovel'
sokoɬ	sokol	'falcon'
ɬgać	lgat'	'to lie'
płakać	plakat'	'to weep'
zmysɬ	mysl'	'sense, thought'

Ukrainian CS g > [ɦ] [http://www.forvo.com/word/вигнати/]

[ɦ]olod	golod	'hunger'
[ɦ]roba	grob	'grave'
tor[ɦ]	torg	'bargain'
vy[ɦ]naty	vygnat'	'expel'

- two items are distinct if they differ in length (*sea*, *seat*) or if they differ in position: *seat* vs. *heat*; *seat* vs. *sit*; *seat* vs. *seed*
- alphabet of the International Phonetic Association: assumes we can equate speech sounds from one language to another: [p^h] in English *pool* and Korean *p^hul* 'grass'

[3] Distinctive Features (Jakobson, Fant, & Halle 1951, aka PSA)

- Distinctive features: any speech sound can be decomposed into components that represent the grammatically controlled properties of a speech sound
- In their *classificatory* function features provide the dimensions for the formal representation of lexical items in permanent memory as well as the natural classes of sounds for phonological rules and constraints

- In their *interpretive* function they provide the instructions to the vocal apparatus for the articulatory gestures of speech and their acoustic correlates
- some evidence to suggest that speech sounds processed in different region of brain from other sounds
- Aphasia: left brain lesions for grammatical and semantic deficits (Broca's and Wernicke's aphasia) right brain (based on fMRI studies) for individual voice recognition, emotional content, vocalizations like screams, sighs, and laughter
- Macaques show similar neural responses to monkey calls and human vocalizations (speech and nonspeech) in superior temporal gyrus, while in humans, human vocalizations registered in superior temporal sulcus and Broca's area (Joly et al.2012)
- Features are typically binary: [+/ – nasal], [+/– voice], [+/– continuant], etc.
- A speech sound can be represented as a matrix of features with a plus/minus specification for each feature

	ɪ	ʊ	ɛ	ɔ	æ	ʌ
high	+	+	–	–	–	–
low	–	–	–	–	+	–
back	–	+	–	+	–	+
	t	d	s	z	n	l
continuant	–	–	+	+	–	–
sonorant	–	–	–	–	+	+
nasal	–	–	–	–	+	–
voice	–	+	–	+	+	+

Key words: sit, soot, set, sought, sat, shut; tip, dip, sip, zip, nip, lip

- To change one sound into another sound is to change its feature coefficients

[3] Grammar composed of context–sensitive rewrite rules and constraints:

A –> B / X__Y *#ŋ (no velar nasal at the beginning of the word)

simple example from Russian

'from X'	'without X'	
ot mam–ɯ	bez mam–ɯ	'mama'
ot pap–ɯ	bes pap–ɯ	'papa'
od ded–a	bez ded–a	'grandpa'

[–sonorant] –> [–voice] / ___ [–sonorant, –voice]
[–sonorant] –> [+voice] / ___ [–sonorant, +voice]

- Predicts the behavior of other sound combinations
  s– 'with', vokrug– 'around', Ivan, brat 'brother', sestra 'sister'
- Even non–native sounds may trigger or undergo the rule: *John*, *job* (Russian lacks the voiced affricates [$d^{ʒ}$, $d^{ʐ}$]

[4] some basic analytic concepts and notation

- *alternation*: a given morpheme (root, stem, affix) has two or more alternate phonetic realizations depending on context
- alternations can be general (as in the Russian example above) or lexically specific:

  a ≈ an English articles: a: lip, seat, duck
  an: ant, egg, cf. in: in Boston, in Alston
- if the alternation is recurrent, we write sounds: p ≈ b
- for regular alternations, one variant is basic and the others are predictable from context by rewrite rules
- choice of basic alternant (more generally underlying representation) is a fundamental analytic question
- no mechanical procedures; depends on naturalness of the rule and simplicity of overall grammar; see Tesar (2014) for recent formalization of simple cases
- two sounds *contrast* if they distinguish a pair of lexical items: *pin* vs. *bin*, *seat* vs. *sit*
- the contrast may be *neutralized* in a particular environment
  Russian: [+/– voice] neutralized at end of word and before an obstruent
  English: [ɪ] vs. [i:] neutralized at end of word
- if one alternant in x ≈ y is a neutralization site, then it is unlikely to reveal the underlying representation for that alternation: preobstruent vs. presonorant position in Russian: *koʃ–ka koʃ–ek* 'cat' vs. *noʃ–ka*, *noʒ–ek* 'knife', dimin.
- two sounds are in *complementary distribution* if they never occur in the same environment
- one normally assumes that two sounds in complementary distribution are related by a rule provided the rule is natural; cf. English [h] and [ŋ], which are in complementary distribution

IPA

- modern phonetics suggests that IPA categories are statistical distributions over a speech community and so may differ from one lg to another D.R. Ladd (2014); are such differences relevant for phonology? See Ito & Kenstowicz (2013) for possible example
- also phonetic correlates for a phonological contrast can be complex: for [nasal] raising or lowering of velum, but for [voice] a variety of factors are involved that

can vary from one language to another: vocal fold tension, VOT (aspiration), closure duration, prior vowel duration, F0: is one factor dominant and others enhancing? If so, which one? Do languages differ in this regard? Can phonological behavior depend on this?

24.961 Introduction to Phonology
Fall 2014