Handout #2

More on complementary and contrastive distribution

English: Voiced plosives

- English also has voiced plosives: [b, d, g]
- The voiced and voiceless plosives are in contrastive distribution:
  - *bad* [ˈbæd] - *pad* [ˈpʰæd] - *bat* [ˈbæt] - *pat* [ˈpʰæt]
- Therefore the voiced and voiceless stops must belong to different phonemes: /b, d, g, p, t, k/
- There is no restriction on distribution, so no need for a phonological rule.

Zoque (Mexico): Voiced and voiceless oral stops

	Bilabial	Alveolar	Palatalized alveolar	Alveopala-tal	Velar
Voiceless plosive	p	t	t^j		k
Voiced plosive	b	d	d^j		g
Voiceless affricate		ts		tʃ	
Voiced affricate		dz		dʒ	

Zoque voiced stops: Data

- ŋgjunu “you fell”
- kenba “he sees”
- mjaŋdamu “you came”
- ʔɨŋdʲoʔpja “he is sleepy”
- ɲdʒehtsu “you cut brush”
- liŋba “he slashes”

Zoque voiceless stops: Data

(Kenstowicz and Kisseberth 1979: 35-37)

- **p**ata “mat”
- **t**a**t**ah “father”
- **tʲɨtʲɨj** “little”
- **ts**ima “calabash”
- **ts**eh**ts**u “he cut it”
- **k**unu “he fell”
- **k**ama “cornfield”

Zoque oral stops: Distribution

- To determine the distribution of these sounds, look for every instance in the data of a voiced stop [b, d, dz, d^j, dʒ, g].
- Every one of them occurs after a nasal (ŋ, ɲ, n).
- No instance of the voiceless stops [p, t, ts, t^j, tʃ, k] occurs after a nasal.

Zoque plosives: Distribution

- This is a complementary distribution.
- Statement of distribution:
  - Voiced plosives occur only after a nasal.
  - Voiceless plosives occur only elsewhere.

Zoque plosives: Analysis

- The voiceless stops are in the elsewhere environment in the distribution, so those are the default form of the phonemes: /p, t, ts, t^j, tʃ, k/.
- The voiced stops are in the restricted environment, so they are introduced by a rule.
- Voicing rule:
  - Change a plosive into a voiced one if it occurs after a nasal.

Derivations

Underlying representation	/ŋkjunu/	/kunu/
Voicing rule	/ŋgjunu/	_____
Surface representation	[ŋgjunu]	[kunu]

Angas (Nigeria) (Halle and Clements 1983: 45)

- Angas has both voiced and voiceless sonorant consonants.
- **Sonorant** consonants are ones made with a vocal tract wide enough that voiced airflow through it is not turbulent.
- Voiced: [m, n, ŋ, r, l]
- Voiceless: [m̥, n̥, ŋ̊, r̥, l̥]
- What is the distribution of these two sets of sounds?

Angas: Data

- mut “to die”
- nuŋ “ to ripen”
- ntaŋzum̥ “wasp”
- mbaŋga “drum”
- si̥r “to forgive”
- liːliː “slowly”
- ʔara “road?”

Angas: Data

- kʷaḷ “joint”
- kʷɔnsaṛ “ finger”
- mɓɛ lmṇ “to lick”
- mbaŋga “drum”
- fʷaṇ “to rain”
- dondoṇ “yesterday”
- zigɔḷ “Satan”

Angas: Distribution

- Look for every instance of the voiceless sonorant consonants [m̥, n̥, ŋ̊, r̥, l̥] in the data.
  - Generalization: Each one occurs at the end of the word.
- Look for every instance of the voiced sonorant consonants [m, n, ŋ, r, l] in the data.
  - Generalization: None of them occurs at the end of a word.

Angas: Distribution

- This is a complementary distribution.
- Statement of distribution:
  - The voiceless sonorants occur only at the end of a word.
  - The voiced sonorants occur only elsewhere.

Angas: Analysis

- The default form of the phonemes are the sounds that occur in the elsewhere context: the voiced sonorants /m, n, ŋ, l, r/.
- The restricted forms are the voiceless sonorants, which must be introduced by a rule (which we will call **Final devoicing**):
  - Change a sonorant consonant into a voiceless one if it occurs at the end of a word.

Angas: Underlying representations

- / mut /
- / nuŋ /
- / ntaŋzum /
- / sir /
- / k^wal /
- / k^wɔnsar /
- / mɓɛlm /

Derivations

Underlying representation	/ ntaŋzum /	/ sir /
Final devoicing rule	/ ntaŋzum̥ /	/ sir̥ /
Surface representation	[ntaŋzum̥]	[sir̥]

English [s] and [ʃ]: Data

• *sip*	[sɪp]	*ship*	[ʃɪp]
• *sore*	[sɔɹ]	*shore*	[ʃɔɹ]
• *lass*	[læs]	*lash*	[læʃ]
• *mess*	[mɛs]	*mesh*	[mɛʃ]

English [s] and [ʃ]: Analysis

- There are minimal pairs distinguished by [s] vs. [ʃ] in English.
- Therefore, these two sounds must be in contrastive distribution.
- Therefore, they must belong to two different phonemes: /s, ʃ/.
- There is no restriction on their relative distribution, so there is no rule involved.

Korean [s] and [ʃ]: Data

- sega “powerful family”
- segi “century”
- sebi “annual expenditure”
- ʃigak “sight, time”
- ʃigi “jealousy”
- ʃibi “dispute”
- ʃido “trial”

Korean [s] and [ʃ]: Data

- sugap “handcuffs”
- sugi “note”
- subi “defense”
- sogak “destruction by fire”
- sogi “expectation”
- sobi “consumption”
- sagak “square”

Korean [s] and [ʃ]: Data

- sagi “trickery”
- sosəl “novel”
- ʃipsam “thirteen”
- maʃi “delicious”
- sesuʃil “washroom”
- Data from Gleason (1955: 60), with some modifications by Korean speakers here at UT

Korean [s]: Distribution

Before [s]	**After [s]**
Beginning of the word	e
Beginning of the word	u
Beginning of the word	o
Beginning of the word	a
o	ə
p	a
e	u

Korean [ʃ]: Distribution

Before [s]	**After [s]**
Beginning of the word	i
a	i
u	i

Korean [s] and [ʃ]

- Every instance of the alveopalatal fricative [ʃ] occurs before [i].
- No instance of alveolar fricative [s] occurs there.
- The two sounds are in complementary distribution:
  - [ʃ] occurs only before [i].
  - [s] occurs only elsewhere.

Korean: Analysis of [s] and [ʃ]

- The sound in the elsewhere context, [s], is the default form of the phoneme: /s/.
- The sound in the restricted context, [ʃ], is the result of a rule (which we will call **Palatalization**):
  - Change an alveolar fricative into an alveopalatal one if it occurs before a high front vowel.

Derivations

Underlying representation	/sigi/	/segi/
Palatalization	/ʃigi/	____
Surface representation	[ʃigi]	[segi]

Tohonno O'odham (Arizona): [t] vs. [tʃ] (Akmajian, Demers, and Harnish 1984: 159)

- taːt
- toːn
- ton
- toha
- tokit
- tatk
- taːɲ

tʃɨhok

tʃin

tʃɨm

tʃuk

tʃikpan

tʃɨːkor

tʃuʔi

Tohonno O'odham: Vowels in the data

Front	*Central*	*Back*	
i	ɨ, ɨː	u	*High*
		o, oː	*Mid*
	a, aː		*Low*

Tohonno O'odham (Arizona): [t] vs. [tʃ]

- State the distribution of [t] and [tʃ].

- What is the phoneme?

Tohonno O'odham (Arizona): [t] vs. [tʃ]

- What rule, if any, is involved?

- Give the underlying representations of the words [tokit] and [tʃɨːkor].

References

- Akmajian, Adrian, Richard Demers, and Robert Harnish (1984). *Linguistics: An Introduction to Language and Communication*. MIT Press, Cambridge.
- Gleason, Henry (1955). *Workbook in Descriptive Linguistics*. Holt, Rinehart and Winston, New York.
- Halle, Morris, and G.N. Clements (1983). *Problem Book in Phonology*. MIT Press, Cambridge.
- Kenstowicz, Michael and Charles Kisseberth (1979). *Generative Phonology: Description and Theory*. Academic Press, San Diego.