

# APPROACHES TO LANGUAGE



Lecture 6:  
Child Language Acquisition - Development of the Sound  
System

# Overview



- ▶ Perception of speech
- ▶ Early vocalisations
- ▶ Babbling
- ▶ Development of discernable speech sounds – vowels & consonants
- ▶ Adjusting to the adult model
- ▶ Speech perception vs. speech production



Approx. age	Typical sounds
Birth - 1 month	‘reflexive sounds’ - burps/crying/grunts
2 – 3 months	cooing
4 – 6 months	marginal babbling – squeals, yells, growls – made with the lips... - ‘vocal play’
7 – 11 months	babbling/ ‘the canonical stage’
10 – 18 months	first words/ ‘the variegated stage’

# Perception of speech sounds: prenatal & post-natal

- ▶ Speech is heard in the womb - salient characteristics - rhythm & intonation.
- ▶ Evidence:
  - infants turn heads to recognisable sounds;
  - infants suck more vigorously on pacifiers when listening to familiar voices;



# Post-natal recognition of consonants & vowels

- ▶ Measures of sucking & heart rate
- ▶ Contrasting [b] & [p]
- ▶ Each sound played for several minutes  
- change of sound coincided with increased heart & sucking rates
- ▶ By 6 months - children hear the difference between vowel sounds



# Phonetic sensitivity

- Infants up to 6 to 8 months can discriminate phonemes from native and non-native languages
- 10-12 month-olds cannot
- Infants can perceive voicing contrast
- Japanese infants can distinguish between [r] and [l]; their parents cannot
- Babies can perceive voicing contrasts, [pa] vs. [ba]; place of articulation contrasts, [da] vs. [ga]; manner of articulation contrasts, [ra] vs. [la]

Eimas, Siqueland, Jusczyk & Vigorito (1971)  
Werker & Tees (1984)

# Recognising sounds in a sequence: Minimal pairs

- ▶ **B**at vs. **C**at
- ▶ **B**in vs. **P**in
- ▶ **G**oat vs. **B**oat



**Minimal pairs:** pairs of words which differ in only one phoneme and have distinct meanings.

# Phonological development

- ▶ Children take time to master the range of sounds and sound structures relevant to their target language
- ▶ Children first acquire the small set of sounds common to all languages, e.g. [p], [s], [b], [m]; later stages: less common sounds of their own language
- ▶ As they do this they often make errors (simplification processes)
- ▶ There is considerable consistency between children in the types of errors that they make



# From perception to production & from vocalisation to babbling

- ▶ 2-4 months: the “cooing” stage
- ▶ Develops alongside crying
- ▶ Child begins to respond to caregiver’s smiles and speech
- ▶ Quieter, lower in pitch and more musical than crying
- ▶ Often consonant + vowel (CV) syllabic structures– [ga] [gu]
- ▶ End of this stage – laughter begins to emerge



<http://www.youtube.com/watch?v=4xrAEFuq8eQ>

# 4-6 months

- ▶ 4-6 months: “vocal play”
- ▶ Much steadier and longer than cooing
- ▶ Sequences of CV syllables [ga ga ga]
- ▶ Seems to be a strong element of practice
- ▶ Parents often hear words which are not there ... [ma ma ma]



# ‘The Canonical Stage’

- ▶ Sounds become recognisably like the adult model.
- ▶ Consist of syllabic reduplications e.g. CV [bababa] or CVC [panpanpan]
- ▶ Similar structure of babbling - found in all languages studied
- ▶ Deaf children also make babbling sounds; babies of deaf parents exposed to sign language: manual babbling (Petito et al., 2001)
- ▶ However from 6 months - infants from different language communities begin to babble distinctively (difference in intonation is marked).

# Babbling

- ▶ Babbling: the earliest stage in language acquisition; neurological studies: babbling linked to language centres in the brain → brain specialisation for language from an early age



<http://www.youtube.com/watch?v=Zmf1kpXRljg>

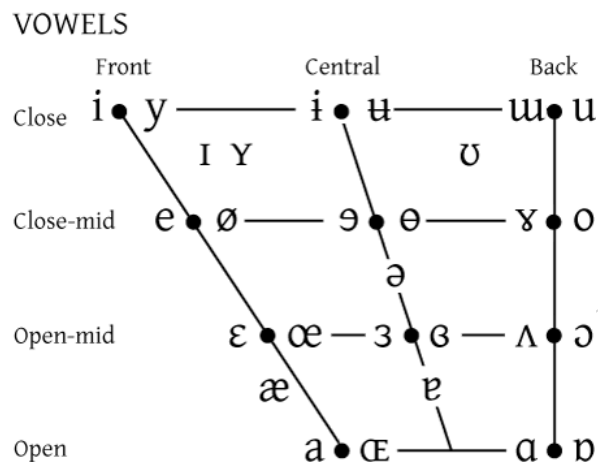
# Babbling

- ▶ Babbling increases in frequency and complexity until the age of about 12 months.
- ▶ Babbling doesn't seem to be crucial for the later development of speech.
- ▶ Degree of discontinuity between babbling & production of speech sounds.

# Order of acquisition of sounds

The order of acquisition of classes of sounds begins with vowels

- Initially highly variable
  - Highly accurate from age 2
- Therefore the acquisition of consonants has been the major focus



# Common & uncommon sounds during the babbling phase

(O'Grady 2005:150)

<b>Frequently found consonants</b>	<b>Infrequently found consonants</b>
p b m	f v th
t d n	sh ch j
k g	l r ng
s h	
w y	

# The Variegated Stage

- ▶ Consonants and vowels change [badu]
- ▶ By 10 months the sounds have settled to a recognisable L1 range
- ▶ By 13-14 months children start to produce recognisable words – although these may be realised differently, e.g. one child used following pronunciation for 'the':  
duh, deh, tuh, zuh, luh, dl, dee, the



# Early vowels & consonants

- ▶ 5 vowel sounds typically acquired early:
  - [i:] “ee”
  - [a:] “ah”
  - [u:] “oo”
  - [əu] “oh”
  - [ʊ:] “uh”
- ▶ Most common consonants in word-initial position are “b”, “d”, “m”, “n” and “h”.

- ▶ Consonants are acquired in a front-to-back order, (where 'front' and 'back' refer to the origin of the articulation of the sound).

Thus [t k f b g ŋ j d s ... before

... l r ʃ tʃ dʒ v ʒ ð θ]

- ▶ Vowels seem to be acquired in a back-to-front order, with “or” (ball) and “e” (tell) preceding “ee” (meet) and “u” (mud).
- ▶ It appears that two variables dominate this process: *visibility of articulators* and *ease of articulation*

# Typical consonant inventory by 2 years (O'Grady 2005:152)

p	b	m	f	w
t	d	n	s	
k	g			

Correlation between these sounds and the distribution of these sounds in the world's languages – sounds acquired early are generally found in more languages than the sounds that are acquired late. Some sounds are easier for the human vocal tract to produce.

# Typical Consonant Inventory (Age 4)

p b m f v ch j w y

t d n s z l r

k g ng sh

(Still to be acquired 'th' – as in 'this' & 'thing')

# Child Articulations

- ▶ What happens when a child can't pronounce an adult target form/sound?
  - delete it
  - substitute it



# Phonological error patterns

## PLACE

CONSONANTS (PULMONIC)

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MANNER

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

# Deletion

- ▶ dog > dah
- ▶ cat > ca
- ▶ foot > foo

CVC      CV  
cat      >    ca

CV consonants are favoured internationally.

•**Consonant cluster reduction:** two or more consonants are reduced to a single consonant  
'snow' /snəʊ/ → /no/, CCV → CV

# Deletion: consonant clusters

- ▶ When a consonant at the beginning of the word is followed by 'l' or 'r' - drop the 'l' or 'r':  
blanket -> "banket" or "bankie"  
bring -> "bing"
- ▶ When a nasal consonant ('m', 'n', 'ng') is followed by 'p', 't' or 'k' at the end of the word, delete the nasal:  
bump -> "bup"  
tent -> 'tet'
- ▶ When 's' is followed by another consonant, drop the 's':  
stop -> "top"  
test -> "tet"



# “s”

- ▶ ask -> “aks”
- ▶ spaghetti -> “pas-ghetti”

Child finds it easier to pronounce “s” at the end of the syllable than at the beginning if it’s next to another consonant.

# Substitution: 1. The stopping process

- **The stopping process:** replace a consonant that is produced with a continuous flow of air (e.g. 's', 'z', 'sh') by one that stops air flow (e.g. 't', 'd'):

Word	Child's pronun.	Substitution
sing	ting	s>t
see	tee	s>t
zebra	debra	z>d
thing	ting	th>t
this	dit	th>d
shoes	tooz	sh>t

## 2. The gliding process

- Replace 'l' or 'r' with 'y' or 'w'

Word	Child's pronunciation	Substitution
lion	yion	l > y
leep	yeep	l > y
look	wook	l > w
rock	wock	l > w
story	stowy	r > w

### 3. The denasalisation process

- Replace a nasal sound ('n', 'm', ng') with a non-nasal sound ('b', 'd')

Word	Child pronun.	Substitution
jam	dab	m > b
room	woob	m > b
spoon	bood	sp > b n > d

## 4: The fronting process

- Replace a sound with one made towards the front of the mouth.

Word	Child's pronunciation	Substitution
thumb	fum	th > f
ship	sip	sh > s
go	doe	g > d

# Assimilation

- **ASSIMILATION:** Context-sensitive voicing—one sound will be made more similar to or exactly the same as another one.
  - a. Consonant voicing: voiceless consonants (beginning of words) followed by a vowel tend to become voiced  
'pet' /pet/ → /bet/
  - b. Consonant devoicing: voiced consonants at the end of words → voiceless  
'pig' /pɪg/ → /bɪk/

# Assimilation

Word	Child's pronunciation	Change
pig	big	p > b
push	bush	
tell	dell	
soup	zoop	

# Reduplication

- ▶ “water” [wɔwɔ]
- ▶ “chip” [tɪtɪ]
- ▶ “tigger” [tɪdɪ]
- ▶ “chicken” [kɪkɪ]
- ▶ “money” [mɪmɪ]
- ▶ “scissors”; “house” [dɪdɪ]
- ▶ “necklace” [nɛnɛ]
- ▶ “take” [kɛkɛ]



# Brief overview + additional strategies

- ▶ Children tend to produce sounds at the beginnings of syllables first
  - and front consonants and back vowels first
- ▶ They avoid consonant clusters
  - ▶ “sky” is often pronounced [kaɪ] or [gaɪ]
- ▶ Unstressed syllables are dropped
  - ▶ “nana” instead of “banana”
- ▶ Consonants “harmonise” with each other
  - ▶ “cat” is [tat]
- ▶ [w] and [j] are used instead of [l]
- ▶ Fricative sounds are “stopped”
  - ▶ “scissors” is pronounced as [dɪdɪ]

# Why do children make these errors? Problems in speech perception?

- No. Children are able to discriminate a phonemic contrast before they are able to produce it.

C: *fɪs*

A: This is your fis?

C: No, my *fɪs*.

A: Oh, this is your fish.

C: Yes. My *fɪs*.

Berko & Brown (1960)

# Why do children make these errors? Problems in speech perception?

- No. Children aged 14-15 months can detect even quite subtle mispronunciations



**‘opple’ vs. ‘apple’**

Swingley & Aslin (2002)

# Speech perception > Speech production

Linguist Neil Smith and his 2 year-old son Amahl;  
Amahl's pronunciation of "mouth" is [maʊs].

NS: What does [maʊs] mean?

A: Like a cat.

NS: Yes, what else?

A: Nothing else.

NS: It's part of your head.

A: (*fascinated*)

NS: (*touching A's mouth*) What's this?

A: [maʊs]

# Speech perception > Speech production

- Amahl realized that his word for “mouse” and his word for “mouth” were the same.
- Children hear the correct adult pronunciation: they are unable to produce it accurately themselves.

# Why do children make these errors? Problems with articulation?

Age group	Gliding	De-affrication	Cluster Reduction	Fronting*	Weak Syllable Deletion	Stopping	Voicing
3;0–3;5							
3;6–3;11							
4;0–4;5							
4;6–4;11							
5;0–5;5							
5;6–5;11							
6;0–6;5							
6;6–6;11							

- The substituted sounds are easier to produce...
- The deleted sounds are more difficult to produce...

# Why do children make these errors?

## A phonological component.

- Articulation skills do play a part...
- ... but the kinds of errors children make demonstrate they're acquiring a system.
- Phonological error patterns: simplifications of the adult pronunciation → easier articulation
- Phonological substitutions/other error patterns: systematic & rule-governed (not random rules) found in the very early stages of acquisition; they generally reflect natural phonological processes (adult language), e.g. syllable-final consonant devoicing (German)

# Summary

- ▶ Newborn children can recognise the speech of their parents and can discriminate amongst speakers.
- ▶ Age 2 – they recognise and are acquiring the sounds of their language.
- ▶ Difficulties in pronunciation are dealt with systematically by: substitution, deletion and reduplication.
- ▶ Phonological errors are not due to speech perception problems: speech perception > speech production



# Concepts introduced

- ▶ Babbling
- ▶ Canonical stage
- ▶ Deletion
- ▶ Minimal pairs
- ▶ Reduplication
- ▶ Reflexive sounds
- ▶ Syllabic structure
- ▶ Substitution
- ▶ Variegated stage

# Post-class reading & references

- ▶ Fromkin, Rodman & Hyams
- ▶ Trask, chapter 8
- ▶ Yule, chapter 14
- ▶ Bloomer et al Ch 10
- ▶ Crystal encyclopaedia, section 42
  
- ▶ O'Grady, W. (2005) How Children Learn Language. Cambridge: Cambridge University Press.