SPAU 3343
Clinical Phonetics

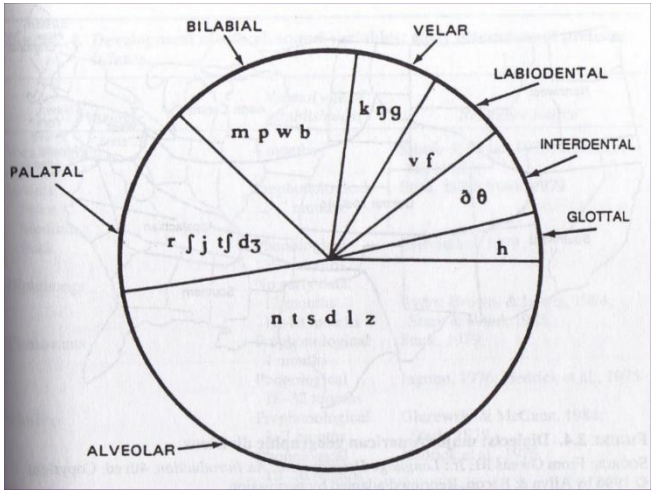
- Children (healthy / phonological disorders)
  - Adults (AOS / cerebellar ataxia)

Samples of children's speech

- Early sounds – 6 mo.
- Babbling – 1 yr.
- Some early words -18 mo.
- 2 years
- 3 years

(Thanks to the Louisville Science Museum)

GAE: phoneme
C/V frequency of occurrence

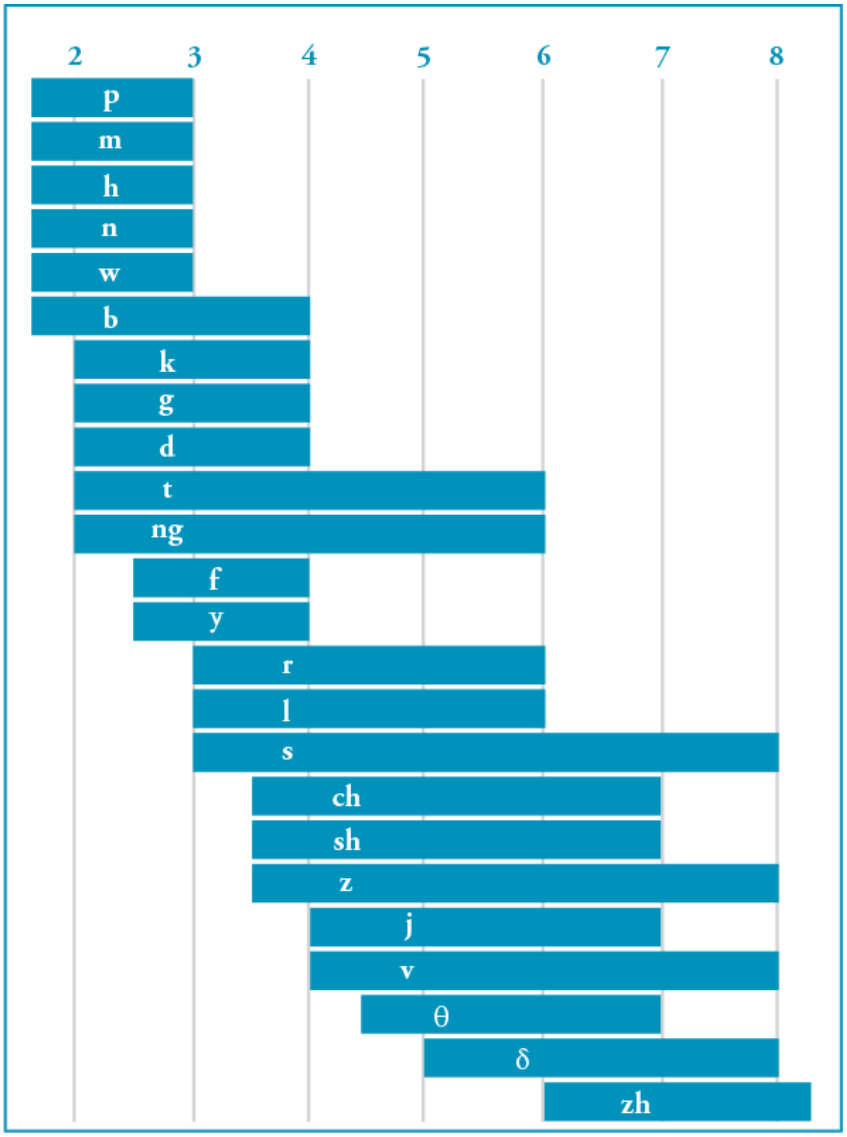


e.g. Milnes et al., 1978

Phoneme	Number of Occurrences	Frequency Percentage
		per cent
ə	6488	9.96
I	6350	9.75
æ	2011	3.09
ɛ	1324	2.03
e	1265	1.94
a	1174	1.80
i	1083	1.66
u	987	1.52
O	971	1.49
a^i	954	1.46
ɔ	667	1.02
U	648	0.99
a^u	414	0.64
o^i	42	0.06

(Hayden, 1950)

Children's consonant acquisition (GAE)



(years)

Sander, E. (1972). When are speech sounds learned? *Journal of Speech and Hearing Disorders, 37,* 55-63.

TABLE 7.2 Examples of Some Common Phonological Processes of Children

Syllable Structure Processes	Example Word	Production
weak syllable deletion	surprise	/praɪz/
final consonant deletion	look	/lʊ/
reduplication	baby	/bibi/
cluster reduction	clean	/kin/
Substitution Processes		
stopping	sand	/tænd/
fronting	kite	/taɪt/
deaffrication	jump	/ʒʌmp/
gliding	lake	/weɪk/
vocalization	bird	/bʊd/
Assimilatory Processes		
labial assimilation	put	/pʊp/
alveolar assimilation	mine	/naɪn/
velar assimilation	garden	/gɑrgn̩/
prevocalic voicing	cop	/gɑp/
devoicing	ride	/raɪt/

(Stoel-Gammon & Dunn, 1985)

Shared phonological processes: Healthy children, Children with Phonological Disorders

cluster reduction
weak syllable deletion
final consonant deletion
stopping
velar and palatal fronting
voicing processes
labial, nasal, and velar assimilation
liquid simplification (a combination of gliding and vocalization)

(Stoel-Gammon & Dunn, 1985)

Phonological problems

- “Mixed receptive, expressive language and phonological delay” (3 yrs; 4 mo)

- http://www.youtube.com/watch?v=mFguWOufFrs&feature=player_embedded

Idiosyncratic processes of children with PD

1. *Glottal replacement*—the substitution of a glottal stop for another consonant.

   pick → /pɪʔ/; butter → /bʌʔʊ/ (with vocalization) ; lip → /ʔɪp/

2. *Backing*—the substitution of a velar stop consonant for consonants usually produced more anterior in the oral cavity. Backing usually involves alveolars and palatals; however, labial sounds may be affected.

   time → /kaɪm/; zoom → /gum/; push → /pʊk/

3. *Initial consonant deletion*—the omission of a single consonant at the beginning of a word.

   cut → /ʌt/; game → /eɪm/

4. *Stops replacing a glide*—the substitution of a stop for a glide.

   yes → /dɛs/
   wait → /beɪt/

5. *Fricatives replacing a stop*—the substitution of a fricative for a stop.

   sit → /sɪs/
   doll → /zɔl/

(Stoel-Gammon & Dunn, 1985)

Transcription of speech sound disorders: Useful diacritics

- (unusual) aspirated stops – “spoon” → [sp^{h}un]
- Unaspirated stop – “keys” → [k$^{=}$iz]
- Nasality – “pan” → [p^{h}æ̃]
- Nasal emission “snow”→ [s̰̃no]
- Denasalization “nice” → [ñ̰ais]
- Dentalization (frontal lisp) “shoe” → [s̪u]
- Labiodentalized [ɱ] “unfair”→ [əɱˈfɛɹ]

Diacritics for sound disorders: Non-English examples

- Fricatives
- Affricates
- Approximant
- Stops

“fit”	→	[ɸɪt]
“go”	→	[ɣo]
“Joe”	→	[dzo]
“red”	→	[ʋɛd]*
“nope”	→	[nop’]
“girl”	→	[ɡʒɬ]

* (vd labiodental)

Childhood apraxia of speech (CAS)

- Speech motor programming/planning problem
- Difficulty with sound transitioning
- Vowel distortions
- Prosodic errors
- Inconsistent error patterns upon word repetition

Video sample - CAS

3 ½ year-old girl:

http://www.youtube.com/watch?v=szjfC9K190U

Disordered child audio examples

- 5-yr-old boy /gliding

[ˈwɑb̥ster] …

- 7-yr-old girl / dentalization of alveolars

[ˈt̪ʃɛɹɪz̪]…

- 7-yr-old girl / dentalization & vocalization of alveolars

[ˈz̪ibɹə]…

From L.H. Small, Fundamentals of Phonetics, Pearson, Fourth Ed.

Sample spectrograms illustrating disordered adult speech

- ✓Apraxia of speech (AOS)
- ✓ Cerebellar Ataxia (dysarthria)

Apraxia of speech (AOS)

- Phonetic-motoric disorder of speech production[1]
- Problem with motor planning[2] and/or programming[1]
- Characterized by[1]:
  - Distortions
  - Prosodic abnormalities
  - Intersegment transitionalizing problems
  - Relatively inconsistent errors

[1] McNeil, Robin & Schmidt, 1997
[2] Van der Merwe, 2011

Etiology

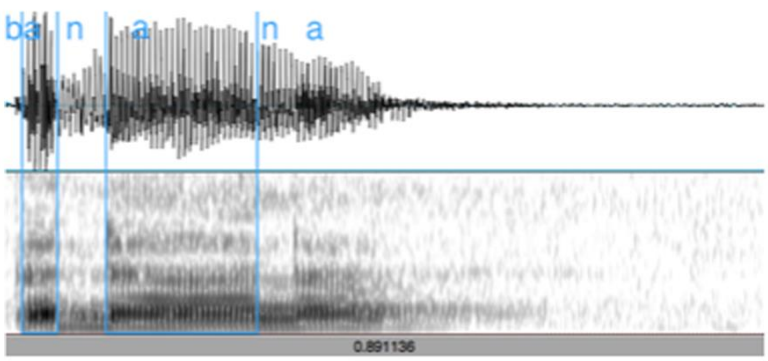
- Most common:
  - Stroke
  - Brain Injury
  - Degenerative disease
- Patients often describe:

"I know what I want to say, I just can't get it out"

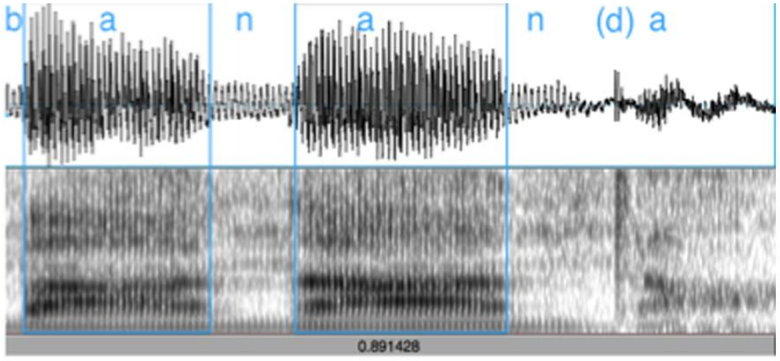
Example of adult AOS

(Pt. of R. Marshall, Purdue Univ.)

AOS – Syllable segregation



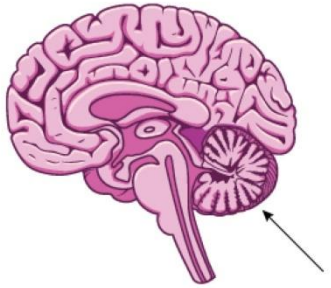
A1.



A2.

Ballard et al., Logopenic and nonfluent variants of primary progressive aphasia are differentiated by acoustic measures of speech production; PLOS One, 2014

Ataxic dysarthria

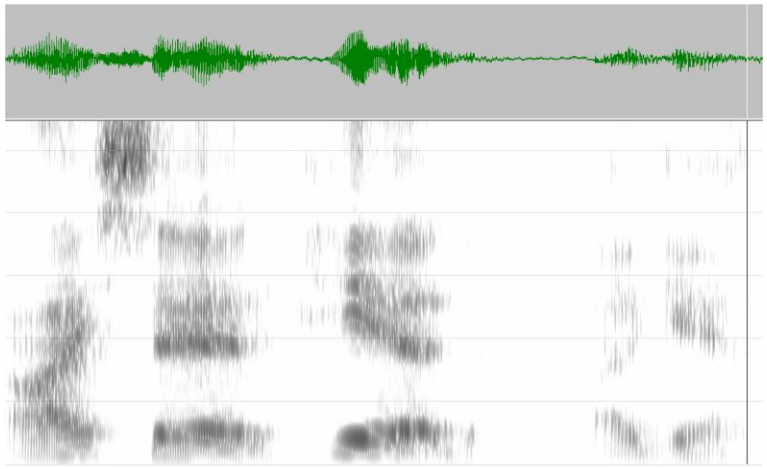


- results from **cerebellar** damage
- deficits in coordination
- inaccuracy in force, range, timing and direction of speech movement
- “slurred speech” – distortions
- excess and equal stress
- excess loudness variation, dysprosody

Ataxic dysarthia - example

- Dallas male w/ speech problems from W. Nile Disease (encephalitis)

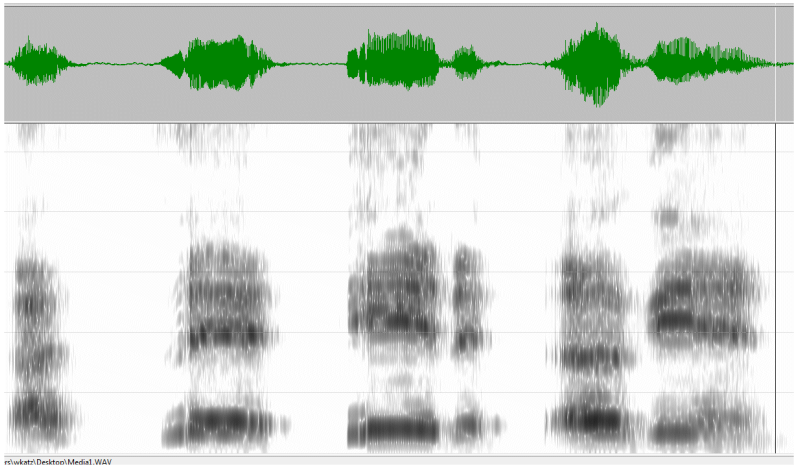
Clinician



“I said hid again”

(2119 ms)

Pt with dysarthria



“I said hid a gain”

(4215 ms)

Two proposed feature systems for describing disordered speech

- Voice Quality Symbols
- Extended IPA (“extIPA”)

extIPA SYMBOLS FOR DISORDERED SPEECH

(Revised to 2002)

CONSONANTS (other than on the IPA Chart)

	bilabial	labiodental	dentolabial	labioalv.	linguolabial	interdental	bidental	alveolar	velar	velophar.
Plosive		p̪ b̪	p̪͆ b̪͆	p̪͇ b̪͇	t̪ d̪	t̪͆ d̪͆				
Nasal			m̪͆	m̪͇	n̪	n̪͆				
Trill					r̪	r̪͆				
Fricative median			f͆ v͆	f͇ v͇	θ̪ ð̪	θ̪͆ ð̪͆	h̪͆ ɦ̪͆			ɸŋ
Fricative lateral+median								ɬ ɮ		
Fricative nareal	m̊͆							n̊	ŋ̊	
Percussive	ʬ						⫤			
Approximant lateral					l̪	l̪͆				

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

DIACRITICS

↔	labial spreading	s̪↔	‥	strong articulation	t̪‥	˜	denasal	m̃
̪	dentolabial	v̪	˗	weak articulation	v̪˗	˜	nasal escape	ṽ̪
̪͆	interdental/bidental	n̪͆	\	reiterated articulation	p\p\p	̴	velopharyngeal friction	s̴
̺	alveolar	t̺	₊	whistled articulation	s̪₊	↓	ingressive airflow	p↓
̼	linguolabial	d̼	→	sliding articulation	θ̪s̪→	↑	egressive airflow	!↑

CONNECTED SPEECH

(.)	short pause
(..)	medium pause
(...)	long pause
f	loud speech [{*f* laʊd *f*}]
ff	louder speech [{*ff* laʊdə˗ *ff*}]
p	quiet speech [{*p* kwaɪət *p*}]
pp	quieter speech [{*pp* kwaɪətə˗ *pp*}]
allegro	fast speech [{*allegro* fast *allegro*}]
lento	slow speech [{*lento* sloʊ *lento*}]
crescendo, ralentando, etc. may also be used	

VOICING

ˬ	pre-voicing	ˬz	
ˬ	post-voicing	zˬ	
˭	partial devoicing	z̥̭	
˭	initial partial devoicing	z̥̭	
˭	final partial devoicing	z̥̭	
˭	partial voicing	s̬̭	
˭	initial partial voicing	s̬̭	
˭	final partial voicing	s̬̭	
⁼	unaspirated	p⁼	
ʰ	pre-aspiration	ʰp	

OTHERS

(C̄), (C̄)	indeterminate sound, consonant	(( ))	extraneous noise ((2 sylls))
(V̄), (P̄l̄.v̄l̄s̄)	indeterminate vowel, voiceless plosive, etc.	¡	sublaminal lower alveolar percussive click
(N̄), (v̄)	indeterminate nasal, probably [v], etc.	!¡	alveolar and sublaminal clicks (cluck-click)
( )	silent articulation (ʃ), (m)	*	sound with no available symbol

VoQS: Voice Quality Symbols

AIRSTREAM TYPES

Œ	oesophageal speech	И·	electrolarynx speech
Ю	tracheo-oesophageal speech	↓	pulmonic ingressive speech

PHONATION TYPES

V	modal voice	F	falsetto
W	whisper	C	creak
Ṿ	whispery voice (murmur)	V̰	creaky voice
V̤	breathy voice	C̣	whispery creak
V!	harsh voice	V!!	ventricular phonation
V̬!!	diplophonia	Ṿ!!	whispery ventricular phon.
V̟	anterior or pressed phonation	W̠	posterior whisper

SUPRALARYNGEAL SETTINGS

L̝	raised larynx voice	L̞	lowered larynx voice
Vᶶ	labialized voice (open round)	Vʷ	labialized voice (close round)
V͍	spread-lip voice	Vᶹ	labio-dentalized voice
V̺	linguo-apicalized voice	V̻	linguo-laminalized voice
V˞	retroflex voice	V̪	dentalized voice
V̳	alveolarized voice	V̳ʲ	palatoalveolarized voice
Vʲ	palatalized voice	Vˠ	velarized voice
Vʁ	uvularized voice	Vˤ	pharyngealized voice
V̝ˤ	laryngo-pharyngealized voice	Vᴴ	faucalized voice
Ṽ	nasalized voice	V͊	denasalized voice
J̞	open jaw voice	J̝	close jaw voice
J͔	right offset jaw voice	J͕	left offset jaw voice
J̟	protruded jaw voice	Θ	protruded tongue voice

USE OF LABELED BRACES & NUMERALS TO MARK STRETCHES OF SPEECH AND DEGREES AND COMBINATIONS OF VOICE QUALITY

[ˈðɪs ɪz ˈnɔ˞məl ˈvɔɪs {3V! ˈðɪs ɪz ˈvɛɹi ˈhɑ˞ʃ ˈvɔɪs 3V!} ˈðɪs ɪz ˈnɔ˞məl ˈvɔɪs wʌns ˈmɔ˞ {L̝1V! ˈðɪs ɪz ˈlɛs ˈhɑ˞ʃ ˈvɔɪs wɪð ˈloʊəd ˈlæɹɪŋks 1V!L̝}]

Sample transcription – Individual with AOS, UTD Callier Center

BAT007

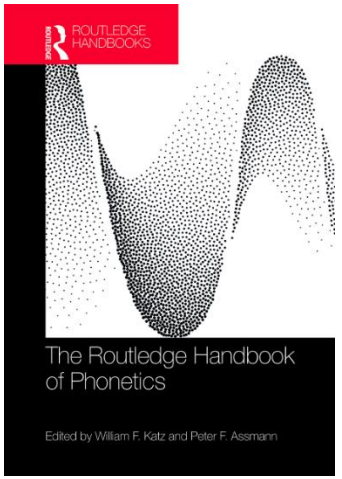
“swarm” [swɔɹm]	[uʷ d̪aʊɹ̩ k̪wɔɹm wɹaɪt aɪ mĩn wɹaɪ / uʷ‧kwɔɹm uʷɹaɪʔt]
“trait” [tʰɹ̥ɛˈʔt]	[dɹɛˈʔtʰ wɹaɪʔt aɪ‿mĩn / uʷ ɹɛɪʔtʰ uʷ ɹɛɪʔt]
“shear” [ʃiɹ]	[uʷ ɹaɪʔt aɪ mĩn ˈədőno]
“toot” [tʰuʔt]	[tʰuʔt / t̠uʔt]
“pretty” [ˈpʰɹ̥ɪɾɪ]	[ɹaɪʔt mi ɹaɪʔt aɪ mĩn]
“part” [pʰaɹt]	[pʰaɹtʰ]
“bread” [bɹɛd]	[ɹaɪʔt aɪ mĩn / pʰɹ̥e]
“liquor” [ˈlɪʔkɹ̩]	[ˈlaɪk̪ɚ]
“sport” [spɔɹt]	[kɑ̠ɹt lɛ̩ʔt]
“bed” [bɛd]	[l kʰɛɹ / ˈlaɪgɛ̩ɹ]

(target) (attempts)

For more information

W. Katz, "*New horizons in clinical phonetics*",
In Katz & Assmann,
The Routledge Handbook of Phonetics
(2019). London: Routledge.

(Available at UTD library)



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