Validity and Implementation of Frequency-Specific Words as a Measure of Speech Perception

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INTRODUCTION

Frequency-specific word lists (e.g., Tonality Word List, the Tonality Perceptual Continuum, and the Tennessee Tonality Test) as well as the Ling 6 Sound Test, have been used by audiologists and speech pathologists for years to better assess speech perception abilities in relation to hearing loss (Martin & Asp, 2012; Mildner & Bakran, 2001; Asp and Plyler, 1998). These word lists are composed of homogeneous frequency-specific phonemes which have been categorized by their frequency bandwidths and perceptual qualities, and which appear to provide more critical information for the perception of vowels and consonants across the range of speech frequencies.

Anecdotal reports indicate that many clinicians prefer using frequency-specific words as an alternative to the Ling 6 Sound Test for older children and adults due to the larger number of stimuli within each frequency band across the speech frequencies. Although success with frequency-specific words has been reported related to percetual qualities (Bessel, 1979), there is little empirical evidence available in regard to the validity and reliability of these words as a tool for the measurement of speech perception.

PURPOSE

In order for frequency-specific word lists to become a valid, reliable assessment of speech perception, more research is needed to standardize the word lists. The first step is to provide performance-intensity data on lists of words composed of frequency-specific phonemes.

The purpose of the present study is to provide performance-intensity data on a list of words, categorized according to the homogeneous frequency-specific phonemes of the words.

PARTICIPANTS

8 young adults with normal hearing

STIMULI

- 200 homogeneous words based on 5 frequency-specific categories (Low, Low-Mid, Middle, Mid-High, and High)
- Words were divided into 4 word lists, each containing 10 words in each category
- Carrier phrase followed by target word (Say the word [target word])
- Presented at 10 intensity levels (4dB steps) above speech Reception Threshold (SRT)
- 11 randomizations of 4 word lists were used
- Male speaker of General American dialect

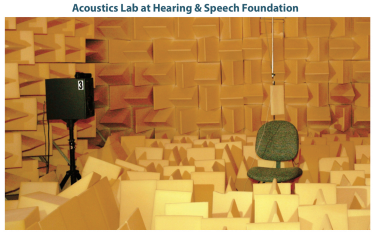
Frequency-Specific Words Used in Present Study

LOW			LOW-MID			MIDDLE			MID-HIGH			HIGH		
blow	bowl	known	ball	bum	all	duck	cat	add	hay	at	date	ace	cease	cheap
blue	burn	lobe	blood	comb	bug	had	cot	dad	hide	ate	ear	each	chase	cheat
bone	loon	moan	boat	good	down	hall	drum	hack	high	kit	edge	ease	cheese	cheek
bow	loop	mood	book	gum	go	head	heart	hair	hit	ledge	hate	eyes	say	shake
broom	lop	moon	bump	knock	mum	hot	her	ham	isle	tare	hire	ice	seize	shape
no	low	new	mow	law	one	jam	lamb	hat	it	tear	ill	is	sheath	sheep
noon	pole	noun	numb	mob	paw	joy	lot	have	lie	tide	jail	itch	shy	sheet
pool	pope	now	pop	mop	perm	met	love	hurt	light	tile	jet	see	sight	sigh
pull	prune	own	pump	palm	plow	toy	mad	tack	tell	till	sir	she	teeth	size
wool	room	row	up	pup	pound	void	rock	talk	tie	tire	tick	thigh	this	thick
bloom	mole	rope	bud	lawn	nut	fad	fire	jar	dare	height	rare	chick	seek	tea
blown	moo	warm	done	loan	plot	far	flock	rat	dial	raid	rear	east	sip	teach
boom	move	wood	hole	loud	plum	fat	get	red	die	rail	rid	sake	sit	tease
worm			wall			rum			hedge			seat		

PROCEDURE

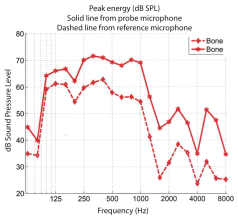
- Subjects participated in two 2-hour sessions scheduled 1 week apart
- Hearing Screening performed at 1st session
- Speech Reception Threshold (SRT) obtained at 1st session
- Two 50-word lists of original words were presented at each session in ascending intensity levels beginning at 0 dB SL re SRT
- Rest breaks were taken as needed
- Responses were recorded via digital recorder and scored by independent, trained listeners

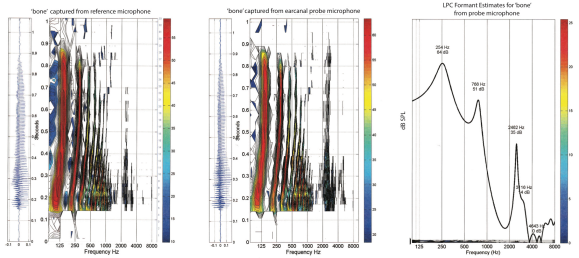
Acoustics Lab at Hearing & Speech Foundation



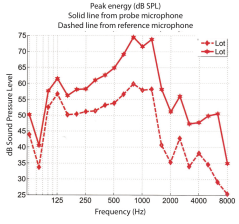
Acoustic Characteristics of Frequency-Specific Words

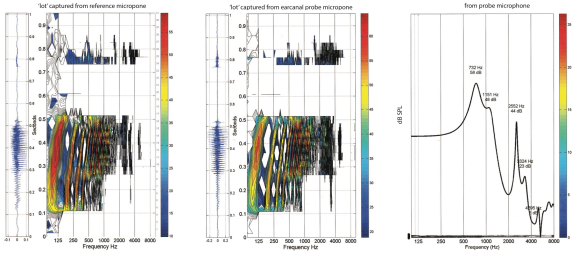
Low Category Word



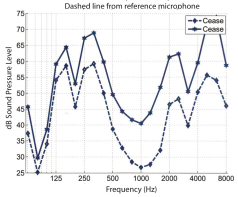


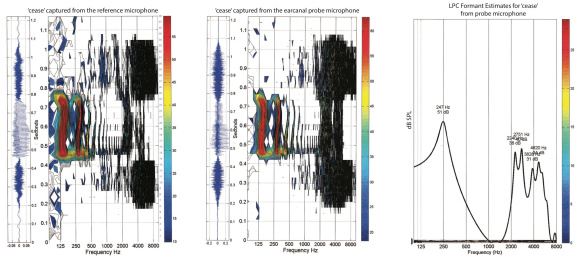
Middle Category Word



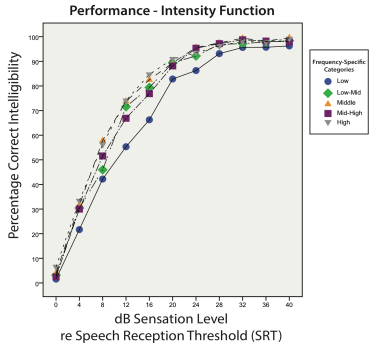


High Category Word





PRELIMINARY RESULTS



The preliminary results suggest that the words used in this study appear to be sufficiently reliable to be viewed as a promising tool for the assessment of speech perception. Frequency categories *Low-Mid, Middle, Mid-High, and High* approach 100% intelligibility at 28 dBSL. Intelligibility increases linearly to 90%, then increases less with increasing intensity for these four categories. However, the *Low* category requires more intensity for intelligibility than the other categories.

Future studies will include: 1) performance-intensity assessments for individuals with hearing impairment in unaided and aided conditions, i.e. hearing aids and cochlear implants and 2) a pitch-ranking study to determine if the perceptual quality of the words correlate with the acoustic energy in each word, thus determining if the frequency-specific words are in the correct category across the frequency spectrum.

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