Liz Pearse MUS7220 Assignment #4

How do people learn to make sounds?

The topic of language acquisition is broad, and its connection to music cognition may not be obvious. For teachers of singing, however, the ways in which humans learn and utilize language is of utmost importance. Of particular interest is the study of how individuals learn to make sounds – within their native language, and (especially for singers) within several other languages. Specifically to the realm of contemporary Western Art music, one may be interested in the learning and production of *paralinguistic* sounds, such as sighing, crying, and other vocal noises that communicate emotion or intent non-verbally. As contemporary compositions occasionally require a singer to make such sounds on-command, as well as other novel sounds (examples include "car-crash" noise, "pterodactyl screech", and guttural grunts), knowledge of how one learns to make these sounds is a clear benefit of research. Practically, the enigma of teaching singing is: how does one train another to use an instrument that neither teacher nor student can see, that has no simply-voluntary control mechanism, when each involved person has a different "model" instrument?

A majority of the literature available in the realm of language acquisition focuses on child research. Studies of children's first language learning experiences reveal a wealth of information of how first-time language learners organize and structure the stream of sounds to which they're exposed.

Current research in linguistics

There is a wealth of information regarding childhood language acquisition, as the vast majority of human beings learn to communicate in their first spoken language within the first

few years of life. Research angles include the order in which children learn concepts, how children practice language skills, and from whom children learn language.

One would imagine (correctly) that a child's first language teacher is his/her parents or main caregivers. However, even very young children exhibit a tendency toward peer learning: "Once they start to mix with other children…they start to speak like friends their own age…they will develop their own accents" (Cruz-Ferreira, paragraph 5). Peer exposure results in a linguistic "trading" of sorts – children practice speech with other children, in addition to communicating with their parents or caregivers.

The way children practice language reveals the types of mental representations developed for language concepts. "In the first 12 months, infants start to organize what they know about entities before they gain access to the representational properties of language. But as they start to learn particular languages, their paths diverge." (Clark, 2004, p. 472). Clark's article describes the progression from very basic conceptual relations to more comprehensive distinctions (an example: different English words that mean "in contact with" an object include "in" and "on", words that are frequently misused by young children).

A 2007 article by Ramscar and Yarlett further explores how children learn these linguistic distinctions. This article studies how children learn irregular plural noun forms (geese, mice, etc.), and shows that by over-regularizing their nascent knowledge of "+s = more than one of something", the problems of irregular plural forms are brought to attention, and through feedback learn the correct forms over time. What is fascinating, however, is that the studies described in the article show that children learn even *in the absence of* feedback. "Through repeatedly rehearsing the production of the knowledge they have extracted…they do not appear

to need feedback, explicit or otherwise" (Ramscar and Yarlett, p. 950). The article further posits that superset hypotheses such as +s "are simply transitional states that arise and resolve themselves as the representations underlying probabilistic responses develop" (ibid.). It is fascinating to think that through practice, even without corrective feedback, children seem to learn correct speech patterns for irregular plurals (especially curious, as some adults struggle with them!).

Regarding the most basic building blocks of language – phonemes – a distinct hierarchy of attention is exhibited. The earliest sounds children make and distinguish between are vowel sounds, with distinct consonant sounds occurring slightly later in development. Data collected by Halle and Christia (in press 2012) seems to suggest that infants *do* attend to syllables rather than phonemes, but not mora-groups (an example given on p 6: kago and kaNgo were received in the same way in a previous Bertoncini et al. 1995 study). However, concurrent research seems to suggest that consonant sounds *are* regarded as important even by very young children. The Halle and Christia article discusses studies that bear varying results. One study showed that though 15-month-olds had trouble understanding phrases spoken in Jamaican English (rather than their native Connecticutian dialect), 19-month-olds were able to understand both. "Somewhere between 15 and 19 months, children develop the ability to ignore irrelevant vowel variation in lexical items" (p. 20). The article hypothesizes that while consonant sounds are regarded as fixed in a language, vowel sounds are a more flexible part of one's linguistic coding (thinking of U.S. regional accents – the differences are mostly in vowels, which may explain why we understand those with different regional accents, but can perceive that they are different from "us"). This

consonant inflexibility is also exhibited in at least one study of French children, by Havy, Bertoncini, and Nazzi (2011).

Much research has shown that children seem primed for language learning. "The language learning circuitry of the brain is more plastic in childhood; children learn or recover language when the left hemisphere of the brain is damaged or even surgically removed…but comparable damage in an adult usually leads to permanent aphasia" (Pinker, 1998, "2.3 Maturation of the Language System"). This article goes on to describe how most adults are unable to master foreign language phonology, resulting in a "foreign accent". But why is this? Explanations discussed in the article include un-self-conscious error making, motivation to communicate, conformity, no other language interference, and general thought-plasticity. Pinker goes on to mention other research that seems to suggest that "successful acquisition of language" occurs before age 4, with a steadily declining success rate after the age of 6, to rarity post-puberty. (This would indicate that the conventional track of middle-school foreign language class is ultimately useless?)

Paralanguage

Related to language acquisition is the study of paralanguage – "defined as the vocal (but nonverbal) dimension of speech" (DeVito, 1989, p. 156). Attending to paralinguistic sounds includes noting changes in pitch, intensity, and duration (three facets that language shares with most music). Research shows that coding non-verbal communication happens at a slower rate than language coding in children. Several articles (Friend, 2000; Morton & Trehub, 2001; Morton, Trehub, & Zelazo, 2003) discuss that though children attend to paralinguistic facets of communication (for instance, responding differently to positive and negative sounds made by a

parent), they are unable to "over-ride" lexical information when it conflicts with paralinguistic cues. Basically, younger children will attend to *what* is being said rather than *how* the words are delivered. Adults, by contrast, are more attentive to paralinguistic cues (hence, an adult understanding of insincerity and sarcasm). This shift seems to happen gradually, and there is still much research to be done into what aspects of vocal expressivity young children may attend to.

Possible research avenues

One could potentially illuminate a certain aspect of language learning applicable to singing with the following study, subjecting a "novel sound" to varying methods of traditional voice "teaching" – via demonstration, concrete verbal instruction, and imagery-based instruction. In this study, the target sound would be that sound often termed "pterodactyl voice" (one type of ingressive multiphonic). In truth, science does not know exactly what sound a pterodactyl would make, so potentially one could call it "falcon screech". Technically, this sound is produced by tightly adducting the vocal folds, and lowering lung pressure by means of using the inhalatory muscles until the vocal folds begin oscillation to allow air into the lungs. As one may expect, it requires the coordination of different muscle systems – the muscles of the larynx (thyroarytenoid and cricoarytenoid, among others), and the muscles of the respiratory system (diaphragm and intercostals, primarily). In addition, the muscles that control the shaping of the rest of the vocal tract come into play (tongue, palate, jaw). This sort of multi-system coordination is not unique to this sound, it is the basis of all human speech.

The proposed study would involve five groups. Four of the groups would be singers in a graduate degree program in voice, the fifth would be students in non-music graduate programs.

The non-music "control" group and one music group would be asked, without preparation, "Can you make the sound of a pterodactyl/falcon screech?", recording the sound for later data collection. One group would receive technical verbal instruction similar to the sound-description above, and after the brief description, be asked to make the sound. One group would receive instruction in the form of imagery, for instance: "Pretend you have an invisible rope around your larynx/neck, and you need to take a breath in – but don't let go of the rope" (alternate imagery may be used). After this brief instruction, they would be asked to make the sound. The final group would be instructed "Make the sound I make", followed by the instructor demonstrating the sound, after which the subject would be asked to demonstrate.

In actual voice teaching, demonstration, imagery, and technical instruction are all used to elicit desired target-sounds – this study serves to separate the aspects to test for efficacy. Future studies could combine these different methods to test for combined efficacy (one would hypothesize that multiple approaches would be more effective).

Another potential study pertinent to singing instruction involves learning vowel sounds proper to the French language. In this study, the subjects would ideally be undergraduate, American-English native speaking singers in a college music program, separated into three groups (students with prior French language experience would be excluded). All students would be in a course of French diction, ideally receiving in the same classroom. Over the course of a semester, one group would listen to 15 minutes daily of spoken French poetry. One group would listen to 15 minutes daily of sung French poetry (ideally the same poems that the spoken groups receive). One group would not listen to either. At the end of the semester, the students would be required to sing a song in French for which no easily-obtainable recording is available (to

minimize “parroting” of an extant performance) that they prepare on their own (to minimize private-teacher variability). The performances would be recorded, and scored according to accuracy in reproducing the vowel sounds that exist in French but not English (the [e], [oe], [ø], [y], and nasal vowels)

This study has obvious concerns of confounding variables – but it could provide some useful information as to what type of language exposure is most helpful to students learning to make sounds from “foreign” languages.

In summary, a wealth of research exists into how children represent the sounds of language, and how they perceive the non-verbal communicative sounds to which they are exposed. In addition, research has shown that adults (at least in Western, English speaking cultures) respond to tone of voice over content in a way that younger children are unable. Further research is indicated into the ways that adults of varying cultures respond to the same emotional versus word-content cues in communication. In addition, research should continue to uncover the ways that adults learn new languages (as language learning, even of one’s native tongue, is plastic). For the singing teacher, this research is of special value. In the realm of contemporary singing, studies in how humans perceive, encode, and replicate novel sounds could prove of great use to pedagogy. More literature on the reception of non-verbal communication seems to exist than research into how non-verbal communicative behaviors are learned and used, at least during this preliminary search for information. Surely, further research will uncover more insight into this facet of human behavior.

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