

Assignment 5

After investigating the vocal tract of the alien entity, several things can be said about its speech patterns. Strikingly, the alien lacks teeth aside from molars. While the molars afford an area for bracing of the tongue, there is a severe consonant deficit when compared to human speech simply by the lack of dental place. Labiodentals such as [v] would be impossible, as would interdental sounds such as [θ]. Because of the lack of teeth, there is no alveolar ridge formed in the mouth and thus sounds like [s] would be impossible to produce. Post-alveolar sounds may be difficult or impossible to produce, with sounds like [ʃ] being markedly different if even possible to articulate. As the tongue is much more tethered in position, retroflex sounds would be difficult to produce; in this way, the alien language may make little or no use of retroflex sounds at all. The constrained center of the tongue would disallow palatal sounds and palatalized consonants; a very limited number of laterals would be produced in similar or identical human fashion (if at all). If both sides of the tongue could move simultaneously and independently of one another, the alien would be able to coarticulate a wider variety of sounds together with ease. Any language the alien speaks would have to make great use of sounds placed at extreme ends of the mouth, as most places in the middle of the mouth would be unavailable. All manners of articulation would be available but some may be too difficult to produce to appear in alien language. The alien has a nasal cavity that would allow nasalized consonants and vowels with flexibility of the velum.

Vowels would suffer severely at the lack of mobility in the tongue. Back vowels would be numerous, with perhaps even the finest distinctions being phonemic. Central vowels *may* be able to be produced with some difficulty; human-like front vowels would be difficult as they involve movement with the dorsum. Vowel rounding would be particularly important to make up for the lack of possible vowels. The third formant may be particularly important as well, as the front of the tongue would be able to curl slightly to produce an R-colored vowel. Nasality would be much more prominent as it would aid in recuperating the number of possible segments by introducing an additional form of articulation.

Because the sound inventory available to the alien would be extremely limited, suprasegmental features would need to have a strong presence in the language. Stress would be very important in an alien language, and tones would also be used. Utilizing these would allow the small inventory to stretch farther in terms of contrastive meanings.

The aliens have two sets of glottises that can be independently controlled. This allows for voiced and devoiced consonants, but may also allow for *doubly voiced consonants* as well, introducing an entirely new set of possible segments. Additionally, the alien essentially has two distinct vocal tract lengths, allowing for one alien to wield two sets of pitches easily. Perhaps an alien would use this phonemically, with the use of one pitch differentiating between words of another pitch or distinct registers of communication occurring while utilizing one glottis over the other. The alien may, for a short time, also

vibrate the middle of the neck by vibrating the lower glottis while keeping the upper glottis shut. This may have some sort of linguistic or paralinguistic role in alien communication.

Due to the small inventory of sounds within alien speech, speakers of the alien language would have difficulty differentiating sounds of human speech. Any speech sound that occurs outside the alien's range of possible segments would need to be repaired by the alien's auditory mechanisms. This would mean that the myriad human consonants that are produced in the middle of the mouth would be heard as other consonants in the alien language, with several likely collapsing into one sound; alien ears would have a difficult time differentiating human sounds if many human-sounds were all realized as the same alien-segment. Despite all this, the aliens would have incredible acuity in regards to suprasegmental features of a language and would be much more discriminant with these features—perhaps even more discriminant than any human could be. Alien ears would be very sensitive to tone and stress.

Using the equation $F_n = ((2n-1)C)/4L$, I calculate the first formant of the alien's 20cm vocal tract as being around 437.5Hz; the second formant would lie at around 1312.5Hz; the third formant would reach around 2187.5. As the alien exists on a hydrogenous planet, its formants would be different as sound waves pass through a different atmosphere. The formants would rest around 16Hz, 47Hz, and 79Hz respectively, adjusting C from 35,000cm/s to 1,270cm/s

Vowels in general, outside of [ə], would be much closer together in frequency. Notice that, in a hydrogen atmosphere, F_1 differs from F_2 by only 31Hz; likewise, F_2 differs from F_3 by only 32 Hz. Even high front sounds like [i] would be relatively close together, unlike a human [i] which has a large gulf between formants. Again, alien ears are probably much more acute and discriminant with changes in sound.

In the Alien's first vowel, the first three formants rest at 407Hz, 997Hz, and 1992Hz respectively. In the Alien's second vowel the formants are 376Hz, 1122Hz, and 2209Hz, respectively. Human speech often rounds back vowels; if alien speech experienced a similar tendency, then the first vowel would be the most likely to be rounded.