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Exolang Phonology: Vixzrinddyig

By Paul Hartzer

Abstract

Natural language phonology is restricted by human anatomy. Likewise, conlangs with a spoken component which are intended to be spoken by humans begin with similar phonetic parameters, although they can include sounds not typically used in natural languages. Exolangs are not similarly limited by restrictions of human anatomy. However, with this freedom comes a new challenge: Just as details of human anatomy contribute to our phonetic parameters, exolang phonetic profiles ought likewise to be justified by anatomical characteristics of the sentient species using it. Also, from a practical level, there is the danger in making an exolang so alien it becomes inaccessible to human audiences. Vixzrinddyig was designed for an alien species whose articulatory system is similar, but not identical, to that of humans. As a result, its phonology is comprehendible to humans but alien nonetheless. This article discusses the linguistic strategies used in devising the phonology profile of Vixzrinddyig.

Background

In the Star Trek episode "This Side of Paradise," Spock is asked his surname by a human character, and responds, "You couldn't pronounce it" (Memory-Alpha Wiki, This_Side_of_Paradise_%28episode%29). This line, along with the absence throughout the show of any other name for Spock, has been taken as canon that Vulcan names are not pronounceable, despite any obvious difference in physiology between Vulcan and human oral articulators (and also despite a reference in another Star Trek episode by Spock's mother, who is human, that she *can* say the surname, albeit only "after a fashion, and after many years of practice") (Memory-Alpha Wiki, Talk:Spock).

Inspired by this, when I was creating a language for an alien species, I decided to explore making a language that is indeed physically unpronounceable by humans. However, because any readers of my work would presumably be human, I was concerned about making the language accessible to them. Also, my story featured two interacting sentient species, one of which did have the same basic articulators as humans and which needed for narrative reasons to be able to speak the more alien language, Vixzrinddyig, at least "after a fashion." For these reasons, I decided to add a single feature to Vixzrinddyig (the feature is represented in the orthography as <x>, and so the pronunciation of the language name itself requires an understanding of the feature). As the language evolved, I decided to also restrict the more alien language in a particular way as well, so as to balance the linguistic obstacles on each side of the sentient equation.

I use the broader Conlang Wiki (Conlang_terminology) definition of exolang: "A language spoken by fictional nonhuman aliens." It happens that Vixzrinddyig is, further, a language that "also violates human language universals," but it's unclear whether Vulcan likewise does.

In this article, I first briefly discuss how human physiology and psychology limit our phonetic palette. Then I discuss exolang phonology, using my strategies with regard to Vixzrinddyig specifically to illustrate the development of a language that's alien, but not *too* alien.

Phonological restrictions in natural languages

The sounds of human language are created primarily by pushing compressed air rapidly first through the larynx (voicebox), then through the oral cavity which has been configured to produce specific sounds (Perkins and Kent, 6-7). This simple description, however, belies the actual complexities. In practice, our oral cavity is being configured at a rate perhaps twice as fast as we can consciously control (Perkins and Kent, 4). A number of muscles and bones are involved in articulatory configuration, adjusting five basic active articulators (Crystal, 130-131):

1. The pharynx, the tube in the throat above the larynx; pharyngeal fricatives are common in the Semitic languages, such as Arabic.
2. The velum (or soft palate), the soft back portion of the roof of the mouth, which can be opened for nasal sounds or closed for non-nasal sounds.
3. The mandible (or jawbone), which can be moved up or down to a variety of angles.
4. The tongue, which can be raised or lowered, pulled backward or forward, and shaped flat, in a trough, or curled backwards.
5. The lips, which can be rounded, pressed against the teeth, relaxed, jutted forward, and so forth.

These articulators are called active because they are moved during the speech process to create constrictions in the airflow, adjusting the contours of the sound waves created by air passing through the larynx out of the lungs. The most important passive articulators (that is, the parts of the vocal tract that don't move) are the upper teeth, the alveolar ridge (the angled portion of the roof of the mouth directly behind the teeth), and the hard palate (the roof of the mouth) (Crystal, 130).

While there are other ways to make predictable sounds using the human articulatory system, the overwhelming majority of sounds which appear in human languages use the egressive pulmonic airstream described above.

The palette of sounds available to a human is limited by our anatomy; we cannot, for instance, trumpet as fully as an elephant, even if some of us can do a passable impression. Likewise, when there are anatomical defects to some portion of a human's vocal tract, their palette is limited; for instance, having a cleft palate can noticeably affect language production: "The characteristics of cleft palate speech include hypernasality, nasal emission, weak or strong expiratory air, weak pressure consonants (oral obstruents, e.g., stops, fricatives, affricates), and compensatory glottal replacement, glottal reinforcement, and backing" (Shahin, 1). Similar sorts of compensation would be necessary for non-humans; since non-primate mammals have cleft upper lips, which in humans make it more difficult to produce bilabial stops such as [p] and [b] (Nagarajan et al.), a cat like Puss in Boots could not accurately say his own name.

As mentioned above, we do further limit our sound palette beyond anatomical restrictions. For instance, the click is widely produced as a dismissive sound effect (spelled "tsk-tsk" or "tut tut") among English speakers and others, so there is no obvious reason why it couldn't be a part of a language's sound palette. However, clicks only appear in the phonemic system of a handful of languages, most famously in southern Africa. Clicks are produced by creating and releasing a small pocket of air in the vocal cavity, and do not rely on the greater pulmonic airstream for production (indeed, clicks can be made while either inhaling or exhaling through the nose) (Crystal, 126).

Likewise, other sounds found rarely or never in human phonemic inventories include whistling, sucking, yawns, and so on. Humans can make these noises fairly reliably with their mouth, but generally choose not to use them as meaningful linguistic signs. Certain articulator combinations are also rare or unknown, such as pressing the lower teeth against the upper lip or placing the tip of the tongue on the front of the upper lip. These are not unusual mouth positions (my infant, for instance, regularly includes a consonant formed by hitting his lower gumline against his upper lip), but are nonetheless generally excluded from phonemic inventories.

Following the Critical Age hypothesis as it relates to phonetics (e.g., Hakuta et al.), it is more difficult for adults to learn to produce sound distinctions that are foreign to their native languages than for young children. Hence, if a language were encountered that contained speech sounds not present in human languages, even if they could be produced by the human mouth, it would be theoretically be fairly difficult for adult humans to learn to produce.

Returning to the issue of whether humans can properly articulate Vulcan, another relevant restriction relates to perception. As Beckman (226) writes, "Certain sorts of acoustic continua are perceived categorically or continuously depending on whether the subjects are instructed to hear the stimuli as speech or as nonspeech." For example, while the human mouth can make a virtually infinite number of articulatory distinctions between canonical [da] and canonical [ga], the human brain will tend to cluster artificially created sounds between [da] and [ga] into /da/ and /ga/. This is not a universal, but is a very strong tendency, in contrast to similar language specific perceptual distinctions (such as, for instance, the English speaker's perceptual conflation of [p] and [p^h] into /p/, while many other languages distinguish these as different phonemes).

The limits of exolang phonetics

There are thus three major reasons why a human being would be obstructed from satisfactorily producing the sounds from a non-human language, such as Vulcan:

1. The non-human has articulators which humans do not have analogs for, and therefore humans are physically incapable of adequately replicating the sounds.
2. The non-human language uses types of articulations that humans are not as a rule accustomed to using as speech, such as clicking or whistling.
3. The non-human language distinguishes sounds which are perceptually indistinguishable by humans.

If the differences were limited to the second sort, the exolang could be pronounceable by a human with some degree of practice, and could theoretically be learned by a human child growing up with that language as a native one. If the differences included the third sort but excluded the first part, it's unclear the degree to which a human (even a child) could learn to speak it fluently. Exolangs with differences of the first sort might be approximated but never fully mastered by humans.

While we're theoretically limited in developing human-based spoken conlangs based on our articulatory and perceptual limitations, there's no such restriction when creating languages spoken by other creatures.

On the one hand, this gives us a great deal of freedom when creating exolangs, limited only by our imaginations. We could create creatures with long snouts and tongues, double sets of lungs, very flexible lips, and so on. We could create different modes of making noise through a variety of anatomical nuances. Any anatomical details could have ramifications on the phonology of the exolang. For example, imagine a creature with a long snout and a flexible tongue. While humans tend to only distinguish six points of constriction along the palate (represented by the voiceless fricatives [θ], [s], [ʃ], [ʂ], [ç], and [x]), such a creature could distinguish a dozen or more. A creature with multiple lungs or an otherwise more complicated breathing system might be able to mix multiple airstreams for more complex coarticulations than what is available to humans.

On the other hand, though, the most likely audience for our languages is other human readers, so the stranger we make the language, the more difficult it will be for readers to auralize. Of course, it's possible that our primary goal is to explore the limits of communication, and the ability for others to auralize how the language will sound isn't particularly important to us, at least when compared to other considerations. When I designed Vixzrinddyig, I was focused on creating a language that would be used in fiction to be read by others, and therefore reader accessibility was a central consideration.

The Indzugand articulatory system

The Indzugand ([ɦ˜øn ɟɯ ŋ˜ɤn]) are a hominid race of my own creation. They have a vaguely human bone structure, except for certain facial features resembling bats, gills in the upper throat used in articulation, and vestigial wings; they share the planet Galladus with another sentient race, Arbans, who much more closely resemble humans (including having an articulatory system that would allow humans to satisfactorily fully reproduce their languages). Both Indzugands and Arbans have multiple languages; this addresses another of my complaints about exolangs, i.e., that in science fiction, planets are often and unrealistically monolingual, to the degree that the names of planets are the names of languages (e.g., the Star Trek world, where Vulcan is spoken on Vulcan, Klingon is spoken on Klingon, and so forth).

The two main characteristics of the Indzugand articulatory system that affects human reproduction of the sounds are the aforementioned gills and filtration webbing in the voicebox which prevents Indzugands from being able to fully devoice sounds. This provides an intentional balance between Indzugand and Arban phonetics, since there are sounds each species can make that the other can't adequately reproduce.

During speech, the default state for Indzugand gills is to be closed, as with the velum (that is, just as nasalization is the marked state in human languages, both nasalization and gilling is marked in Indzugand languages). Opening the gills during speech creates a softened, blurred effect, something like an exaggerated hiss on a poorly mastered audio tape (and not completely unlike a breathy voice). Both the gills and the velum can be opened at the same time, although this is not done in Vixzrinddyig (native Vixzrinddyig-speaking Indzugands have difficulty with gilled nasals for the same reasons English speakers have difficulty with clicks, and tend to see such sounds as humorous or primitive).

Indzugands evolved on a part of the planet with oxygen-poor air that required a good deal of filtration. Their larynges hence evolved with complex musculature that facilitates such filtration but greatly impedes their ability to create an open airstream. Because there is always some level of constriction of the voicebox, Indzugands have no clear perceptual sense of a voiceless sound, although some of them can approximate whispering.

Overview of Vixzrinddyig phonology

When developing Vixzrinddyig, I wanted to create a language that was adequately accessible to people with no specific linguistic background but also had some underlying complexities for people with a deeper knowledge of linguistics. To that end, I gave it a completely phonemic orthography (so that an understanding of specific pronunciation wasn't necessary to read it) and some phonotactic rules I found interesting. Since this is an exolang from a creature with an articulatory system that is different from that of humans, any phonetic representation will necessarily be approximate.

The phonemic inventory is relatively small. Setting aside nasalization and gilling for the moment, consonants have three places of articulation (labial, coronal, and velar) and three manners of articulation (stop, fricative, and glide). There are also three vowels (front, mid, and back). This yields twelve phonemes:

	Labial	Coronal	Velar
Stop	b	d	g
Fricative	v	z	ɣ
Glide	w	ɹ	j

	Front	Mid	Back
High	y		ɯ
Mid			
Low		a	

In most cases, these correspond to the characters used in transliterations (Vixzrinddyig also has its own orthography). The exceptions are /ɣ/, /ɹ/, /j/, /y/, and /ɯ/, which are written as <j>, <r>, <y>, <i>, and <u>, respectively.

There are several phonetic processes which occur at the syllable level. Syllables have the phonemic structure ((C)C)V(C(C)); in other words, syllables have exactly one vowel, at most two consonants in the onset, and at most two consonants in the coda. When present, consonants appear in this order: Fricative, stop, glide, vowel, glide, stop, fricative.

Any morphological process that would result in a violation of either the maximum number of consonants or the correct ordering of consonants leads to a phonological rule correcting the flaw, such as by inserting a vowel or re-ordering consonants.

Phonetically, phonemes assimilate to stops or vowels based on this priority: The vowel assimilates to the onset stop (if present), otherwise to the coda stop (if present), otherwise not at all. Then onset consonants assimilate to the onset stop (if present) or the vowel (if no onset stop is present); coda consonants likewise assimilate to the coda stop (if present) or the vowel.

Assimilation occurs by moving one step in the direction of the phoneme being assimilated to. For these purposes, "front" and "labial" are the same position, "coronal" and "mid" are the same, and "back" and "velar" are the same. These phones occur based on these rules:

	Labial	Dental	Alveolar	Palatal	Velar
Stop	b		d		g
Fricative	v	ð	z	ʝ	ɣ
Glide	w	l	ɹ	ɻ	j

	Front		Mid		Back
High	y				ɯ
Mid		ø		ɤ	
Low			a		

Note that the same phone can occur from different underlying phonemes. For instance, /vdy/ -> [ðdø] and /zba/ -> [ðbø].

Additionally, vowels must be preceded by a consonant at the phonetic level; when a phonemic consonant is absent, [ɦ] is inserted (that is, /$V/ -> [$ɦV]). This occurs after the assimilation rules.

In Vixzrinddyig, nasalization and gilling are syllable-level supersegmentals. All phonemes except fricatives in the same syllable will either be nasalized or not, and will either be gilled or not (fricatives are never nasalized or gilled). Syllable breaks as placed based on the following rules:

1. VV -> V$V
2. VCV -> V$CV
3. VCCV -> VC$CV
4. VCCCV -> VC$CCV unless this would create an illegal cluster, in which case VCC$CV
5. VCCCCV -> VCC$CCV

Since nasalization and gilling are applied at the syllable level, they are indicated in the orthography by a diacritic on the vowel, which is shown in transliterations as a letter following the vowel (<n> for nasalization, <x> for gilling); these transliterated letters do not represent consonant phonemes and therefore should not be taken into consideration when determining syllable breaks.

For example, then, let's consider the pronunciation of Vixzrinddyig. First, we place the syllable breaks: <vixz rind dyig>. The first break is based on rule 3, since we have …izri… (disregarding the <x> marking gilling); the second break is based on rule 4, since we have …iddyi… . Converting the transliteration to its phonemic representation (and using # to represent gilling), we have /vyz# ɹyd~ djyg/. We next apply the assimilation rules, giving us [vyð# lød~ dɭøg]; spreading the gilling and nasalization gives us [v⁺y⁺z⁺ l̃ø̃n dɭøg]. One potential downside of the decision to use a completely phonemic transcription is that nasalized stops can be confusing: <dunb>, for instance, is properly pronounced [nɤm], which is not superficially intuitive.

As another example, consider the pronunciation of Indzugand. First, we place the syllable breaks: <ind zu gand> (rule 3 on …idzu… and rule 2 on …uga…). Next, we convert to its phonemic representation: /yd~ zɯ gad~/. Applying the assimilation rules yields [ød~ ɟɯ gɤd~]. Since the first syllable starts with a vowel, we add a glottal fricative, yielding [ɦød~ ɟɯ gɤd~]. Finally, spreading the nasalization yields [ɦ̃øn ɟɯ ŋ̃ɤn].

Overall, these rules are simpler than those of a natural language. My goal was to make a language that had some interesting information for a linguist but was reasonably accessible for more casual readers. That is to say, the casual reader who was disinterested in the underlying linguistics would be able to read the text and assign their own (unquestionably incorrect) pronunciation, while a rigorous linguist with an interest in phonology would have something of depth to explore. Other people, when creating their exolangs, may prefer a more naturalistically arbitrary and complex phonological rules system.

Summary

This article has discussed, through a specific example, how a modification to the physical anatomy of a speaker of an alien language might affect the phonology of that language. With only two minor changes to the articulatory stream—the addition of gills which can add a slurred resonance and the constriction of the vocal cords—the phonological profile of the language has changed sufficiently to give it an alien feel. More significant anatomical changes could have a more profound impact on how an exolang is pronounced, and sounds, but with that comes increased difficulties for the human audiences of the language to imagine how it ought to sound.

Specific anatomy only provides an outer limit of what is possible, however. Natural human languages have a much more restricted palette of sounds in use than what is possible for the human mouth to create, and presumably this would be true of any languages spoken by extraterrestrial intelligences as well. Creating a fully robust and convincing exolang consists of first creating plausible anatomy, then deciding how that would affect the possible sound palette, and then finally restricting the palette to a manageable subset (as we do in human languages). I do not pretend that Vixzrinddyig is perfect in this regard, but I offer it as an illustration nonetheless.

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