

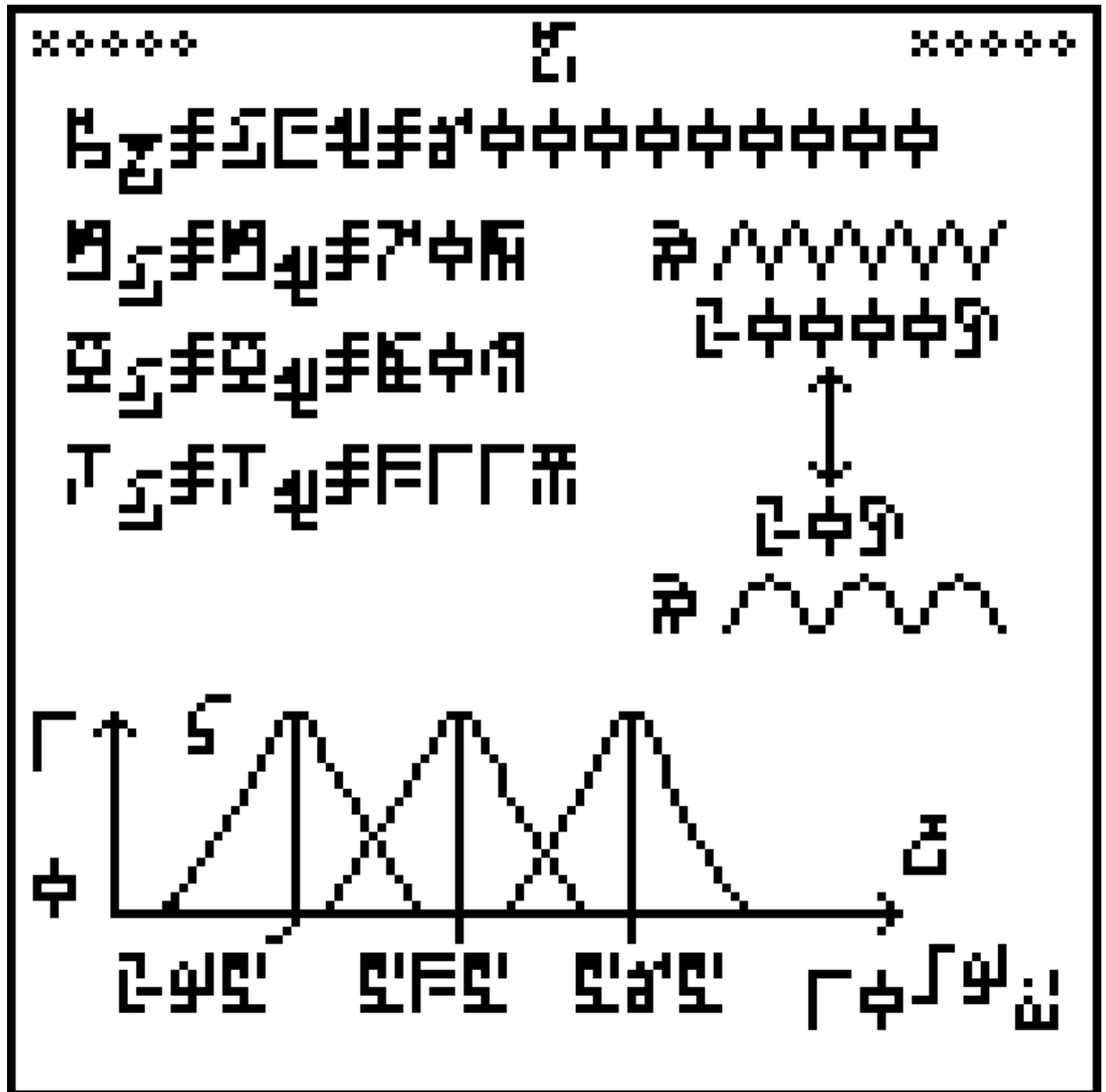
The Universe of Discourse

Wed, 30 Sep 2015

A message to the aliens, part 16/23 (vital statistics)

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This is page 16 of the [Cosmic Call](#) message. An explanation follows.




The 10 digits are:


0 1 2 3 4 5 6 7 8 9

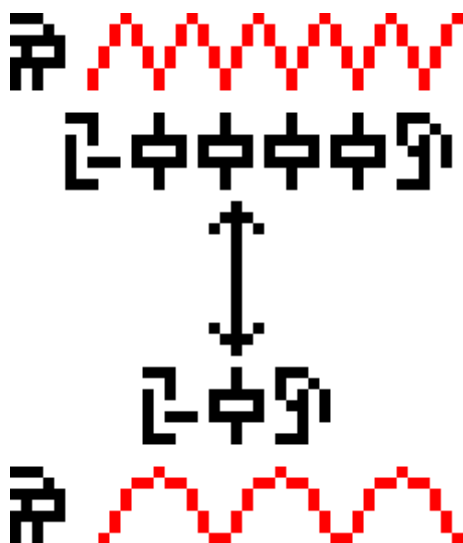
This page, about human vital statistics and senses, is in three sections. The text in the top left explains the population of the Earth: around 6,000,000,000 people at the time the message was sent. The three following lines give the life

expectancy (70 years), mass (80 kg), and body temperature (311K) of humans. In each case it is stated explicitly that the value for men and for women is the same, which is not really true.

The glyph used for life expectancy  is the same one used to denote the age of the Earth back on page 13 even though the the two notions are not really the same. And why 311K when the commonly-accepted value is 310K?

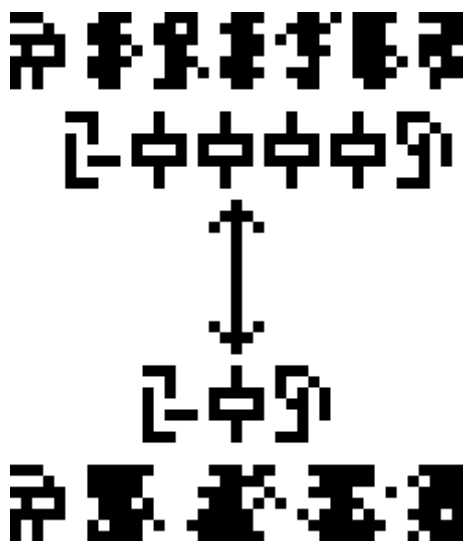
The diagram at right attempts to explain the human sense of hearing, showing a high-frequency wave at top and a low

frequency one at bottom, annotated with the glyph for frequency  and the upper and lower frequency limits of human hearing, 20,000 Hz and 20 Hz respectively. I found this extremely puzzling the first time I deciphered the message, so much so that it was one of the few parts of the document that left me completely mystified, even with the advantage of knowing already what humans are like. A significant part of the problem here is that the illustration is just flat out wrong. It depicts transverse waves:




but sound waves are not transverse, they are compression waves. The aliens are going to think we don't understand compression waves. (To see the difference, think of water waves, which are transverse: the water molecules move up and down—think of a bobbing cork—but the wave itself travels in a perpendicular direction, not vertically but toward the shore, where it eventually crashes on the beach. Sound waves are not like this. The air molecules move back and forth, *parallel* to the direction the sound is moving.)

I'm not sure what would be better; I tried generating some random compression waves to fit in the same space. (I also tried doing a cartoon of a non-random, neatly periodic compression wave, but I couldn't get anything I thought looked good.) I think the compression waves are better in some ways, but perhaps very confusing:





On the one hand, I think they express the intended meaning more clearly; on the other hand, I think they're too easy to confuse with glyphs, since they happen to be on almost the same scale. I think the message might be clearer if a little

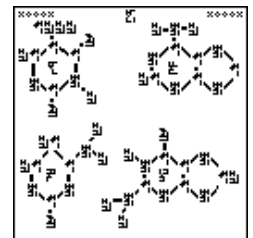
more space were allotted for them. Also, they could be annotated with the glyph for pressure , maybe something like this:



This also gets rid of the meaningless double-headed arrow. I'm not sure I buy the argument that the aliens won't know about arrows; they may not have arrows but it's hard to imagine they don't know about *any* sort of pointy projectile, and of course the whole purpose of a pointy projectile (the whole point, one might say) is that the point is on the *front* end. But the arrows here don't communicate motion or direction or anything like that; even as a human I'm not sure what they are supposed to communicate.

The bottom third of the diagram is more sensible. It is a diagram showing the wavelengths of light  to which the human visual system is most sensitive. The x-axis is labeled with "wavelength"  and the y-axis with a range from 0 to 1. The three peaks have their centers at 295 nm (blue), 535 nm (green), and 565 nm (often called "red", but actually yellow). These correspond to the three types of cone cells in the retina, and the existence of three different types is why we perceive the color space as being three-dimensional. (I discussed this [at greater length](#) a few years ago.) Isn't it interesting that the "red" and green sensitivities are so close together? This is why we have red-green color blindness.

The [next article](#) will discuss page 17, shown at right. (Click to enlarge.) Try to figure it out before then.



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