Conclusion

picture taken by Lily Swift

This project has taught me many interesting things. I think by the end of the experiment I had more new questions than answered ones, but I'll get to them later. First, I'll summarize my findings.

The humpback's songs had several similarities. They seem to prefer frequencies

between 400 and 600 Hz because those frequencies were displayed very loudly in all eight samples. The other prominent characteristic was the use of overtones or harmonies. I believe them to be harmonies because the upper frequencies were multiples of the lower ones. Another interesting pattern was that several songs had a pattern of pausing after a certain number of milliseconds. On average, these pauses occurred every 20 to 30 ms. although longer instances did occur. Overall, the sonograms seemed to exhibit a rather simplistic style of song. All the sounds started out quietly and got louder before fading out again. There was little, if any, rapid frequency changes.

The human songs also had many similarities with each other. All the songs had a base frequency between 300 and 900 Hz (most at 300, 500, and 900 Hz). One of the most consistent characteristics in the human music was the use of clicks (vertical lines). They were normally spaced in even increments, as in perhaps a rhythm or beat. They also tended to start loud and then drop down in both frequency and loudness. Human overtones covered a wide variety of frequencies and tended to be short in duration. They sometimes, but not always, resemble harmonies.

In comparison, the humpback and human songs were similar in that they both employed the use of patterns or rhythm in their songs and both used a low frequency base. In the humpback song I noticed a sequence that resembled the grand crescendo in classical music. Harmonies seem to be pleasant to both whales and people because there was a great many in these samples. There were many contrasting musical traits between the two species as well. The human songs covered a much higher range of frequencies, perhaps suggesting that the whales can not hear those highest pitched sounds. The whale songs were also more simplistic in their patterns. Their sounds only went from quiet to loud, while the humans could start quiet or loud. The human samples also frequently used clicks (shown as vertical bars), while the whale songs did not.

The results from my survey show that everyone who has returned the surveys believes humpback whale communication to be essential. The rest of the questions had more variety in the answers. The strongest thought throughout the answers was that the songs are to attract females to the males for mating because of the quality or length of their song, and that other forms of vocalizations are used to convey location, identity, and other pertinent information. I found it interesting that no one believed there to be any similarities between human and humpback songs, especially after I found some similar structure between the two species songs.

Taking into consideration what I have learned and presented about forms of whale communication other than songs, and the results of my experiment and survey, I believe that I have come to a logical conclusion. I believe that humpbacks do not have a philosophical level of communication. One of the main reasons I came to this conclusion was because of the number of differences between the humpback whale songs and the human song samples. Although there were similarities, such as the presence of a beat, I did not think they constituted enough evidence for support of a philosophical conclusion. This is supported by my survey. Everyone who returned it believed humpback communication to be essential, mainly because the number of recorded vocal sounds does not seem to be big enough for a philosophical form of communication.

My research seems to suggest that the humpbacks have a very sophisticated form of essential communication. I say this because the whales have a wide variety of vocalizations that seem to influence a specific behavior from other whales. The sophistication of their communication is also shown in their rapidly evolving songs. Only a few other species even sing songs of this complexity, and humpbacks are one of the few species who learn to change their songs. If they didn't have some sort of complex social reason for communication through song, then the songs would not be worth the energy expended to produce them, and evolution would have most likely favored against whales who sang. Another thing that would support my conclusion that humpback whales have an advanced form of essential communication is that they have several "levels" of communication. Like humans, they use body language to convey messages and sing songs. However, my own experiment demonstrated that the humpback songs were not as complex as the human songs. The difference that I believe does not allow humpback communication to be philosophical is the everyday language of humans. Humpbacks do "speak" to one another, but their exchanges seems to serve only to get a specific behavioral reaction, not to examine questions and feelings such as the meaning of life. I am not saying that whales are not capable of this level of thinking, just that so far no evidence has been found to support that theory.

During the course of this experiment, several questions popped up. Throughout all my research, I was not able to find anything that said how whales can vocalize. I would be interested to find out how they do. It seems like they may have a mechanism that will allow a vibrating string to pause or separate it into two different frequencies (harmonies). I believe something can pause because of the seemingly deliberate pauses shown in several of my whale song samples. If you lightly place a finger on the vibrating string of a guitar, you can create a harmony of the different notes. There must be something within the whale that is doing the same type of thing if their "voices" are in fact producing harmonies.

The other idea that aroused my interest was from a book that suggested humpbacks base their songs to the rhythm of the ocean. Thinking that the ocean swells are pretty slow, I wonder if the whales' whole life is slower than ours is. If that is true, than perhaps their songs are slower, and I needed to look at a longer period of time to see the same types of patterns I see in a shorter amount of time in human songs. If I was to continue this experiment, that would be one of the things I would do, to try and look at a whole song, or several minutes of recording, not just several seconds. Perhaps by comparing the same relative amount of time I would have gotten different results.

Another thing I read is that Mozart's compositions stimulate brain growth and activity. Since the humpback songs had some similarities to Tchaikovski's Swan Lake, I would be interested to compare the humpback sonograms to ones of songs by Mozart. If they too are similar, then perhaps the songs of humpbacks would stimulate brain growth as well.

If I had the time and resources, I would love to continue this study by going out in the field. There I would study humpback whale communication by observing the behavior that comes in response to a communicative vocalization. I believe that if we can break the barrier and figure out just what one particular sound means, then the rest will come much more easily.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| [Home](http://docs.google.com/home.html) | [About Humpbacks](http://docs.google.com/about.html) | [Introduction](http://docs.google.com/intro.html) | [Hypothesis/ Perdiction](http://docs.google.com/hypoth.html) | [Experiment](http://docs.google.com/exper.html) |
|  |  |  |  |  |
| [Data](http://docs.google.com/data.html) | [Recommendations](http://docs.google.com/recom.html) | [Bibliography](http://docs.google.com/biblio.html) | [Special Thanks](http://docs.google.com/spthank.html) | [Links](http://docs.google.com/links.html) |