Universals and Variation in Question Intonation: A Comparative Study of Hawaiian and HCE Speech Melodies

Kelly Murphy
University of Calgary

1. Introduction

Two languages spoken in the Hawaiian Islands are the focus of this comparative study. One is Hawaiian, referring to the language of the native people of Hawaii, a Polynesian language reportedly spoken by approximately 16,000 people as of the census years 2006-2008 (US Census, 2010). The other is Hawaii Creole English (HCE), referred to in Hawaii as "Pidgin", a creole language consisting of a combination of elements from English, Chinese, Portuguese, and Hawaiian. HCE is spoken by approximately 600,000 people out of a population of around 1.3 million people in Hawaii (Drager, 2012). The pidgin in Hawaii was heavily influenced by native Hawaiian speakers in it's development (Roberts, 1995) from pidgin to creole, and still maintains it's influence today as seen in the lexicon and heard in the intonation. This paper provides results from a comparative study of Hawaiian and HCE in order to better understand the methods used to differentiate questions from statements as both languages have falling intonation in all utterance types.

2. Question Universals

Phonologists such as Bolinger (1978, 1989), Gussenhoven (2002), and Ohala (1984) have made claims that intonation patterns are universal. Bolinger stated that generally declaratives have falling intonation patterns while interrogative or question intonation patterns have rising intonation patterns, as suggested in the Strong Universalist Hypothesis (SUH) in Bolinger (1978) as well as Bolinger (1989:425) " It seems reasonable to say (and we can assume) that the unmarked intonation for yes/no questions is rising, while the marked intonation is falling. The reverse is true of wh-questions."

Cross-linguistically, the intonation of questions is frequently characterized by a sharp final rise in pitch (Haan, 2002:41) and more specifically approximately 70% of the world's languages have rising intonation contours for questions while rising intonation for statements is quite rare (Bolinger, 1978; Gussenhoven, 2002). However, the languages with falling question intonation contradict the SUH. This paper investigates the way in which Hawaiian and HCE use intonation to differentiate questions and statements. By investigating language that perhaps don't behave as the majority often do, we can start to

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understand what is universal among languages. Is there something that all languages have in common with regards to question intonation? How do languages differentiate between statements and questions? How do variation and universals occupy the same theoretical space?

3. How do Languages Use Intonation to Convey Questions?

Overall it has been shown that rising intonation at the end of an utterance is a common strategy to indicate a question while falling question intonation is not as common (cf. Gussenhoven, 2002). In some languages, the use of high pitch at the onset is the most salient and is the key factor producing categorical differences (cf. Haan, 2002). Perhaps, instead of looking at the right edge of an utterance to identify typological differences (rising or falling intonation), we may find that more languages use higher onset pitch to signal questions, along with other cues such as high peak as well as a globally higher register (cf. Chen, 2005). It would seem straightforward and efficient to present the question cue at the onset so that the intent is relayed as soon as possible, accentuating the need for information and cooperation in the conversation exchange between speaker and listener. Whatever the way in which languages phonetically implement the categorical distinction between questions and statements, it has been observed that all distinctions exhibit some kind of height difference. According to Haan (2002) this high pitch can appear locally, for example in the onset, mid- utterance or final position of the utterance. It can also be seen globally, as an overall higher pitch register spanning across the entire utterance. It can also be seen in the absence of f0 downtrend, which is commonly seen in statements.

4. Question Variation

As already mentioned, the final rise intonation is used in many of the world's languages, including English. However, not all languages implement this distinction in the same manner. Grabe's (2001) intonational study of variation in English (IVIE) spanning across nine dialects of English in the British Isles demonstrates that the way in which question intonation is implemented in a language can vary greatly over relatively short geographic distances. This suggests that although languages can appear quite similar, there can be striking variations in their prosody in a relatively small geographic space. For example, Belfast English has rising intonation in both statements and questions (Grabe et al., 2003).

When investigating a language, which appears to have the same intonation in both questions and statements, the question arises; what cues does the speaker use to differentiate between statements and questions? While all utterance types, (i.e. statements, questions, as well as declarative questions) in Belfast followed a similar contour, there are distinctive differences. One of the cues found to differentiate grammatical categories, is the frequency of high final pitch use, as well as overall higher f0 averages (cf. Grabe et al., 2003). Haan (2002) also suggests a hypothesis to explain the height differences among different types of utterances. This Functional Hypothesis was tested on Dutch and the findings suggest that there is a latitudinal distinction that correlates to the amount of question marking either syntactically or lexically. For example, statements have on average lower fundamental frequency (f0, measured in hertz) measurements than questions. Declarative questions, which are not marked syntactically or lexically have the highest average f0. Yes/no questions, which may implement syntactic marking such as

subject-verb inversions, were discovered to have a slightly lower f0 average than declarative questions. Wh- questions, which usually have some kind of question marking have a lower average than yes/no questions. Declarative questions lack all syntactic and lexical marking for questions because they are in essence the same structure as a statement, however posed as a question. To clarify; the ordering of utterances based on average height of f0 proceed as follows going from highest average to lowest: declarative questions, yes/no questions, wh-questions, declaratives (statements). This hypothesis also plays out in the averages of f0 measurements as well in Grabe's IVIE studies (cf. Grabe, 2002), as well as the frequency of high final pitch use. These studies suggest that when the structure lacks lexical and syntactic markers for questions, it is the intonation that must do the work and is phonetically implemented as high pitch.

4.1 Falling Question Intonation

Falling question intonation, while not as common as rising question intonation is found in several languages across the world; Hungarian (cf. Ladd, 1996), Chickasaw (cf. Gordon, 2003), Neapolitan Italian (D'Imperio and House, 1997), to name a few, as well as Hawaiian and HCE which are the focus of this comparative study. Hawaiian and HCE both share the same intonation patterns (Murphy, 2012) and have falling intonation in both questions and statements. As previously mentioned, when a language has similar contours for both questions and statements, there are other cues that help make the distinction and Hawaiian and HCE are no exception. The purpose of this study was to identify the most salient cue that makes the distinction between questions and statements in both Hawaiian and HCE and to see if the two languages have any differences with regards to these question cues.

5. Methodology

Since the most naturalistic language data was necessary for the study, the use of audio files that would provide examples of spontaneous speech and not lab controlled or read aloud speech were needed. The reason for doing this was because the most accurate measure of height comparison was crucial to the analysis and innate qualities of questions require that one speaker asks another speaker for information, signaling a particular request for cooperation. This request is grammatically different than statements and as such, needs proper attention from the person to whom it is posed. Thus, for this reason, naturalistic data was crucial to the study. While the type of methodology (controlled lab speech vs. spontaneous speech) may be of little difference for studies on focus, stress alignment, or pitch accent alignment, for an intonation study that relies on naturalistic height such as mine, it is imperative that the most naturalistic environment is observed. In other words, if a participant is merely reading a question or statement of which is being recorded, the naturalistic height used to cue questions might not come through in these narrated examples. While having an experiment in a controlled environment has its benefits for some research, I think that the best data for this particular study was data that proved to be the most naturalistic.

The sources used were mostly publically accessible, with the exception of one, which there was special access provided. For Hawaiian data, Clinton Kanahele interviews conducted in 1970, from the Brigham Young University archives were used. For the HCE data, samples from a podcast (Anykine Kine podcast) which features natural conversation between two HCE speakers were used. The other sources used were interviews conducted

by Katie Drager of University of Hawaii, Manoa. The examples were analyzed using PRAAT software, which is free software and widely used for the analysis of speech.

6. Results

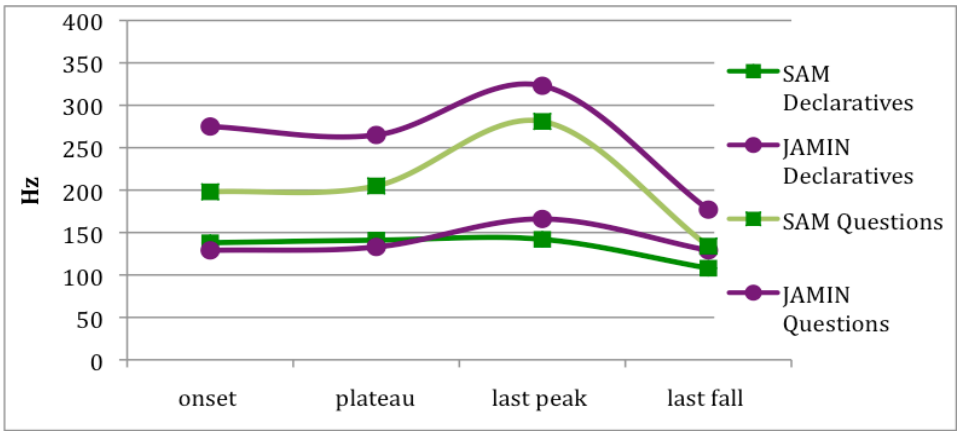
Preliminary observations using PRAAT software confirmed that Hawaiian and HCE share the same strategies for differentiating statements and questions. They both use a latitudinal variation in height that achieves the categorical distinction. Questions start at a higher pitch and maintain a high plateau before peaking at the last stressed syllable and then falling dramatically over the last syllables of the question. A statement starts lower than a question, rising gradually (plateau appears to gradually rise) to the last stressed syllable and then falls over the remaining syllable or syllables. So while questions and statements have a similar contour, the question contour starts higher, stays higher, peaks higher, resulting in a more dramatic fall. The results of my study provide a look at these contours.

To obtain comparable points in Hawaiian and HCE, measurements from four target areas: onset, plateau, last peak and last fall. All measurements for the target areas are measured in hertz. For the onset measurement, the point in which the utterance began was measured. Gaining onset measurements were crucial to see if the languages signaled questions early. The next measurement was taken by averaging the measurement for the entire length of the plateau, before the point in which the pitch rises. The next measurements taken were that of last high peak and the final fall, or the point at which the utterance ended. Results showed that in both HCE and Hawaiian, questions were differentiated from statements using higher onset, high plateau, followed by a higher pitch peak on the last peak and a sharper fall or wider pitch movement to the ending low pitch.

6.1 HCE Data

The following example shows two HCE speakers comparing their average measurements from 10 samples of questions and statements (20 total utterances for each person) for the four target areas. All audio samples were taken from spontaneous speech. Both speakers are males. Sam is in his 20's and Jamin is in his 40's.

(1) HCE Comparison of Two Male Speakers



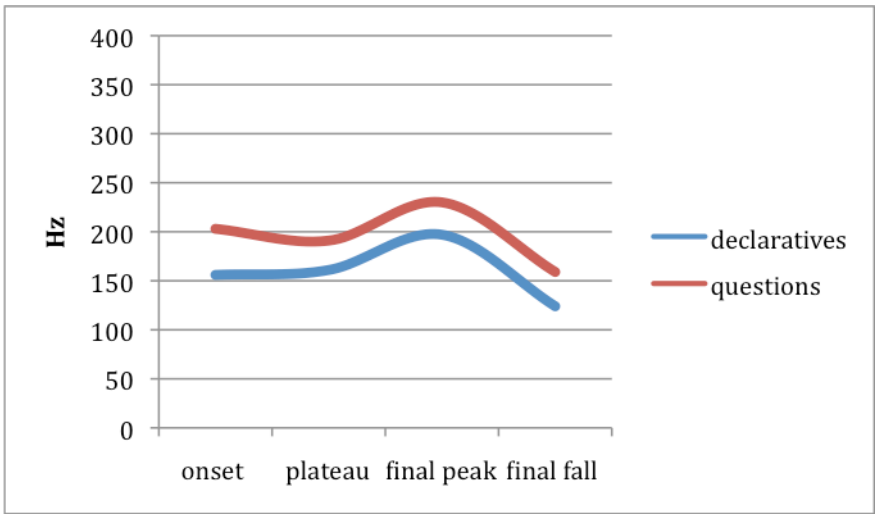
It is quite easy to identify the differences between questions and statements for these speakers of HCE. As mentioned before, HCE makes a categorical distinction between questions and statements using an overall higher pitch, but as well, highlighting a high onset and high last pitch. In addition to these differences is a wide pitch movement from the last peak to the last fall.

6.2 Hawaiian Data

For the Hawaiian data, collected from the publically accessible Brigham Young University archives, I collected samples specifically from Clinton Kanahele, a native Hawaiian speaker from Laie. The interviews were conducted in 1970, which made Clinton in his 60's at the time. Being the interviewer, the amount of questions he asked, both wh- and yes/no was robust. I averaged a total of 20 questions and 20 statements (40 total utterances) to measure each target area (onset, plateau average, last peak and last fall).

One important fact about Hawaiian to consider, is that yes/no questions and statements are structurally (syntactically) the same, it is the intonation that provides the distinction. To expand, yes/no questions have no lexical or syntactic markers for questions, leaving the intonation to do all the work to signal the question. The Functional Hypothesis, as per Haan (2002) would indicate that given the lack of question markers, the question f0 measurements would be predictably higher than the statements in order to make the distinction. The following results fall in line with this hypothesis. These results suggest that Hawaiian, much like HCE, uses higher pitch to signal questions even though both questions and statements have falling intonation.

(2) Hawaiian Statement and Question Intonation

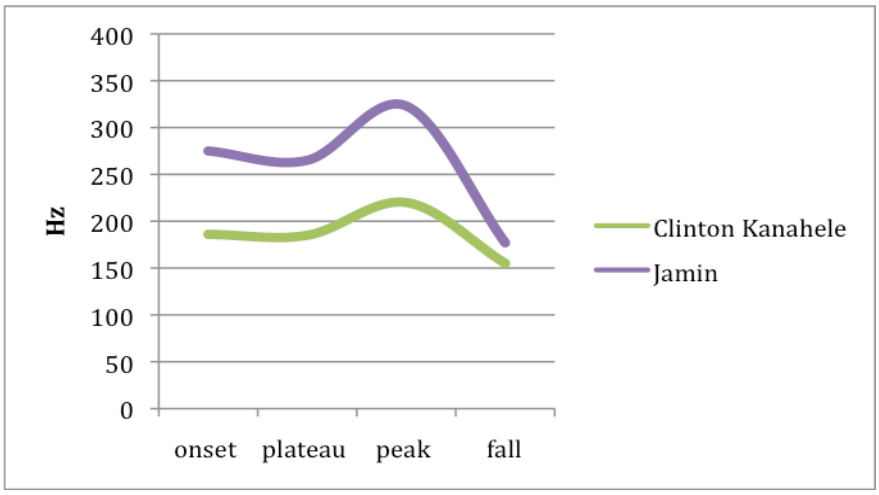


As can be seen in the example above, Hawaiian questions and statements share a similar pattern in Hawaiian, however, questions have a higher register than statements, starting with a higher pitch onset. This example represents 20 questions and 20 statements with average f0 measurements taken from four areas. Questions were not divided by type.

6.3 Comparison

The latitudinal question/statement distinction in Hawaiian is similar to that of HCE, however, it appears, at least from this amount of data, that Hawaiian does not display the wide pitch range that HCE does in questions. Below is an example of only question averages from Clinton Kanahele and Jamin (SOLIS, Drager interviews, 2012).

(3) Hawaiian and HCE Questions Compared



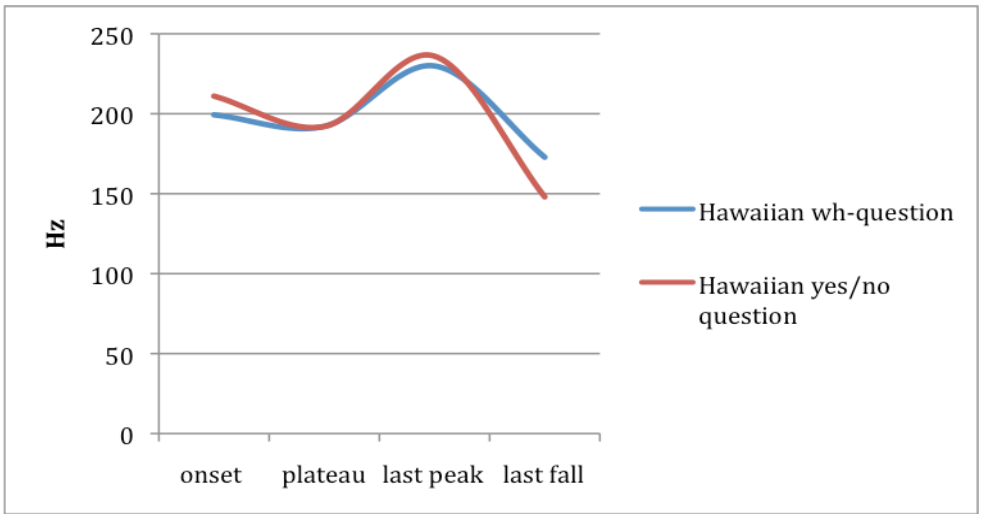
When Clinton's average question measurements are compared with Jamin's, it was discovered that the pitch differences were quite striking. Initially, this was attributed to the possibility that Clinton's statements were impacted by politeness factor that would need to be compared to some other interviews he conducted, where he was more familiar with the interviewee. However, when compared to two separate interviews with two different interviewees, the measurement did not have a noticeable difference in question pitch averages. Jamin's interviews were conducted with his sister, in a comfortable and familiar environment. Gussenhoven (2002) explains that higher pitch can also be a sign of politeness, however, that would not explain the much higher pitch of Jamin's questions over Clinton's? Jamin was mostly conversing with his sister in the interview, which was in a comfortable environment, without need for overt politeness. Further research is needed to find the answer to the overall differences in Hawaiian and HCE, but perhaps these answers can be found in a historical comparison, which could put the development of HCE into perspective.

6.4 Functional Hypothesis

When looking at specific differences in yes/no questions and wh-question pitch height, a series of 10 yes/no questions and 10 wh-questions in Hawaiian were compared, all of which came from Clinton Kanahele. No substantial differences in average f0 measurements were found. If the hypothesis was born out in Hawaiian, then the prediction would be that yes/no questions would be higher than wh-questions, due to the lack of syntactic and lexical markings in yes/no questions. In fact, Hawaiian does not have any structural difference between yes/no questions and statements, as I have mentioned before, creating an environment where intonation is the only indicator signaling questions. Yes/no questions, therefore, are much like declarative questions and given the predictions of the Functional Hypothesis, should have on average, the highest f0 measurements. What was

found is that yes/no questions were only slightly higher than the wh-questions, but not substantially higher.

(4) Hawaiian Wh- and Yes/No questions Compared



Further investigation would be necessary in order to see if the hypothesis plays out in a lab-controlled environment in Hawaiian as well as in HCE, replicating Haan (2002).

7. Summary

Evans and Levinson (2009:429) speak of the topic of variation such that ''languages differ so fundamentally from one another at every level of description that it is very hard to find any single structural property which they share." True indeed that languages vary, but the more they differ it seems the more they are the same, at least in terms of question intonation. As mentioned previously, according to Gussenhoven (2004), there are language universals but conformity to such universals is language specific, attributing to the variation. This variation can be seen in questions cross-linguistically as mentioned some languages have final high pitch (rising question intonation) while others have a final low pitch (falling question intonation) but all maintain the use of high pitch in some part of the question, be it high onset, high plateau, high final peak or high final rise. HCE and Hawaiian support this as well. Although it would appear that falling question intonation goes against a SUH, it turns out that HCE and Hawaiian adhere beautifully to what all languages use, which is the use of high pitch to provide grammatical category distinctions. Hawaiian and HCE, while having falling question and statement intonation, differentiate utterance types with the use of higher pitch found in onset, plateau (medial) and final peak. These phonetic implementations of question marking is consistent with the Functional Hypothesis as described by Haan (2002) and also applied by Grabe (2002), but more analysis needs to be done to provide a more thorough representation (i.e. yes/no questions higher than wh-questions). While, falling question intonation is not a common intonation contour among the world's languages, languages such as Hawaiian and HCE use high pitch in other locations in order to make question/statement distinctions. Also, as I have demonstrated comparing target pitch measurements, HCE has a higher pitch register in questions than does Hawaiian. Hawaiian does not have question words in the yes/no

question and so it is up to the intonation to carry the burden of differentiating statements vs. questions. Likewise, it is very common in HCE that question words are omitted and yes/no questions sound like declarative questions. This study is just the beginning of more investigation into the phonetic and phonological topics in Hawaiian and HCE.

References

Bolinger, D. (1978). Intonation across languages. *Universals of human language*, 2: 471-524. Stanford University Press.

Bolinger, D. L. M. (1989). *Intonation and its uses: Melody in grammar and discourse*. Stanford University Press.

Chen, A. (2005). *Universal and language-specific perception of paralinguistic intonational meaning*. Utrecht: LOT.

D'Imperio, M., & House, D. (1997). Perception of questions and statements in Neapolitan Italian. In *Proceedings of Eurospeech '97*, pp.251-254.

Drager, Katie (2012) Pidgin and Hawai'i English: an overview. *Journal of Language, Translation, and Intercultural Communication*, 1(1): 61-73

Evans, N., Levinson, S., (2009). The myth of language universals: language diversity and its importance for cognitive science. *Behavioral and Brain Sciences*, 32: 429-448.

Gordon, M. (2003). The phonology of pitch accents in Chickasaw. *Phonology*, 20(2): 173-218.

Grabe, E., Post, B., & Nolan, F. (2000). Modelling intonational variation in English: the IViE system. In *Proceedings of Prosody* (Vol. 5), pp. 1-57.

Grabe, E. (2002). Variation adds to prosodic typology. In *Proceedings of Speech Prosody 2002*, pp. 127-132.

Grabe, E., Kochanski, G., & Coleman, J. (2003). Quantitative modelling of intonational variation. *Proc. of SASRTLM*, pp. 45-57.

Gussenhoven, C. (2002). Intonation and interpretation: phonetics and phonology. In *Proceedings of Speech Prosody 2002*, pp. 47-57.

Gussenhoven, C. (2004). *The phonology of tone and intonation*. Cambridge University Press.

Haan, J. (2002). *Speaking of questions. An exploration of Dutch question intonation*. LOT Dissertation.

Ladd, D. R. (1996). *Intonational Phonology*. Cambridge University Press.

Murphy, K. (2012). The Hawaiian Prosodic Imprint on Hawaii Creole English. In *Proceedings of the Twentieth Annual Symposium About Language and Society-Austin,* pp. 62-71.

Ohala, J. J. (1984). An ethological perspective on common cross-language utilization of F0 of voice. *Phonetica*, 41(1): 1-16.

Roberts, J. M. (1995). Pidgin Hawaiian: A sociohistorical study. *Journal of pidgin and creole languages*, 10(1): 1-56.

SOLIS (2012) Drager Interviews.

U.S. Census (April 2010). "Table 1. Detailed Languages Spoken at Home and Ability to Speak English for the Population 5 Years and Over for the United States: 2006-2008" American Community Survey Data on Language Use. Washington, DC, USA: U.S. Census Bureau. Retrieved May 7, 2012.

Kelly Murphy
kmurphyparks@gmail.com