

Endangered Navajo Language

New Mexico Supercomputing Challenge Final Report

April 4, 2007

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Executive Summary

The Navajo culture is a big part of what shapes the South West. Their food, language, legends, and customs are everywhere. But there is a problem that is now occurring and will continue until something is done. In each generation the number of people who know how to speak the Navajo language is declining at a dramatic rate. There are many reasons for the decline but one of the main reasons is the rest of the country is using the English language. Because of the widespread use of the English language, the Navajo language is becoming obsolete in day-to-day life.

We used a survey to gather research to figure out the rate of decline in each generation. Our task is to model the decline of the language and predict how soon this noble language will become a dead language. Not only will we lose the language, we will also lose some of the qualities of the legends and customs of the Navajo that only their language can capture.

In our program, the chance of each generation learning Navajo is based on a probability that we obtained through our surveys. The probability takes into account the offspring's parent's ability to speak Navajo along with the grandparent's abilities. Using this probability, we can model the decline rate of the Navajo language.

Introduction

The Navajo language is one of the top five hardest languages to learn in the world. The Navajo language is a tonal language. This means that the vowels rise and fall when you pronounce a word. The meaning of a word can change with the pitch of the vowels when the word is spoken. The language is also a very descriptive language. It has a word for older brother and a different word for younger brother.

Because the language is so difficult to learn, along with the widespread use of English, the number of Navajo speakers is on the decline. We got the idea of modeling this decline from our language teacher, Mr. Thompson. His original idea was to map the location of Navajo speakers in different regions and types of terrain. We didn't think this would make a good computer program, because it could be done with pencil and paper. We liked the idea of doing something with language, and the decline of the Navajo language is apparent in the very halls of Bloomfield High School. We formulated our idea and presented it back to some of our teachers and our sponsors, Mrs. Crockett and Mrs. Pope. Everybody thought the idea was good so we went forward with the project.

With our project, we are trying to model the decline rate of the Navajo language using StarLogo. We are using probabilities that we have obtained from analyzing surveys that we have distributed to the Navajo population in our school and the surrounding schools.

The survey used is as follows:

NATIVE LANGUAGE SURVEY

For each household to complete

Circle the answers that best describe the language(s) spoken by your immediate family members:

Husband's father's father--

Navajo only Navajo & English English w/ little Navajo English only

Husband's father's mother--

Navajo only Navajo & English English w/ little Navajo English only

Husband's mother's father--

Navajo only Navajo & English English w/ little Navajo English only

Husband's mother's mother--

Navajo only Navajo & English English w/ little Navajo English only

Wife's father's father--

Navajo only Navajo & English English w/ little Navajo English only

Wife's father's mother--

Navajo only Navajo & English English w/ little Navajo English only

Wife's mother's father--

Navajo only Navajo & English English w/ little Navajo English only

Wife's mother's mother--

Navajo only Navajo & English English w/ little Navajo English only

Husband's father--

Navajo only Navajo & English English w/ little Navajo English only

Husband's mother--

Navajo only Navajo & English English w/ little Navajo English only

Wife's father--

Navajo only Navajo & English English w/ little Navajo English only

Wife's mother--

Navajo only Navajo & English English w/ little Navajo English only

Husband --

Navajo only Navajo & English English w/ little Navajo English only

Wife --

Navajo only Navajo & English English w/ little Navajo English only

Your children (Please indicate the age of each child)

Child #1 (Age _____)

Navajo only Navajo & English English w/ little Navajo English only

Child #2 (Age _____)

Navajo only Navajo & English English w/ little Navajo English only

Child #3 (Age _____)

Navajo only Navajo & English English w/ little Navajo English only

Child #4 (Age _____)

Navajo only Navajo & English English w/ little Navajo English only

Child #5 (Age _____)

Navajo only Navajo & English English w/ little Navajo English only

Child #6 (Age _____)

Navajo only Navajo & English English w/ little Navajo English only

Description

Our project has many factors that we are not able to incorporate into our program. Some of these factors are the willingness of each generation to learn, willingness of the parents or grandparents to teach, who the children live with (grandparents vs. parents), necessity to learn the language, and the social environment. The survey may incorporate some of these factors, but they don't have their own factor in our program.

We also could not find life information that was specific to the Navajo people. We tried to find average life span, average number of children, and average marriage age. We could find them for the average person so those are the numbers we are using. We could find the estimated number of Navajo speakers and the number of people claiming Navajo ethnicity.

Distributing, recollecting, and analyzing our surveys has so far been the most time consuming process in our project. It took much brainstorming and planning to decide on how we wanted to arrange our data and use it in our programming. We finally decided to use a ratio of number of children that speak Navajo in a certain situation involving their parents and grandparents compared to the total number of children in that situation. With this ratio we were able to make a randomized program.

With this program we should be able to predict how many generations it may take for the Navajo language to die.

Results

We have yet to finish our program, but with the data we received back from the surveys, the problem is much more serious than any of us would have thought. With the data from the surveys, our two highest probabilities came from children with two Navajo speaking parents and either three or four Navajo speaking grandparents. Our ratio for the four grandparents and two parents was about 1:4. Our ratio for three grandparents and two parents was about 3:7. Our ratio for one parent and two grandparents was 1:5. All the rest of the situations were 0:1.

What these numbers mean is that about every one out of four children whose whole family speaks Navajo will learn to speak Navajo themselves. With each generation there are going to be less and less speakers per the total. Because the ratios will be applied to these speaker's children, the next generation's number of speakers will be even lower than the previous, even though there are more people.

We are still in the process of gathering more surveys, so our ratios may change after further analysis.

Conclusion

Because the number of speakers is decreasing per generation at an alarming rate, we feel that something should be done to preserve the Navajo language. The language, stories and culture of the Navajo people should be written down so that it is never lost to the world like the language and culture of other ancient civilizations. If we wish to preserve the Navajo language, we had better do something soon, or else there won't be anyone left to gather the history and language from.

Our most significant original discoveries were the probabilities of each generation of learning the Navajo language. We could not find anything like this anywhere and hope that our project will cause an increased perception of the problem that is facing the Navajo people.

Recommendations

One thing that could be done is to put in more variables than we originally used. Language spoken at home, language spoken at school, language classes, and forgetting the language over time are a few variables that we didn't include.

We would also like some life statistics, such as life span, number of children, and childbearing age that is unique for the Navajo people. With these numbers we would be able to make a more accurate program for the life cycles of the Navajo people.

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