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CS 240
section 3
Extra Credit

Learning the Language

Church's thesis is that all computer programming languages can be broken down into a turing machine. The linguists Sapir and Whorf developed the hypothesis that the language we learn affects how we think and how we view the world. I will attempt to compare and contrast these two ideas.

A spoken language, any language, can be broken down into morphemes. A morpheme is any sound made in any spoken language, usually represented by a combination of letters. There are two types of morphemes, bound and free. Bound morphemes have no significance alone, they must be combined with other morphemes to form words in order to make any sense. Free morphemes have significance on their own. The interesting thing is that there are a limited number of morphemes that the human voice can make and distinguish. A baby is born able to make all the morphemes, but as they grow, they become accustomed to a certain subset of morphemes that their native language uses. There is no language on earth that uses all the available morphemes. Some use more than others, and some morphemes can be found in multiple languages.

This is taking Church's thesis from the other side, set to subset. Church went from subset back to the original set. Church broke all computer languages down into a basic set, and found that all programming languages originally came from the same set of computer "morphemes." In both spoken and computer languages, morphemes are combined to form different types of words. In spoken languages some of the different types of words we have are nouns, verbs, adjectives, adverbs, prepositions, conjunctions, etc. The same thing occurs in computer languages. There are key words, commands, operators, variables, constants, methods, functions, etc.

And how does the Sapir-Whorf hypothesis fit into all of this? I will illustrate this with two personal examples, starting with one from the spoken language. My native language is English, but I have also learned Spanish and Portuguese in recent years. English grammar has its base in the Germanic languages, and Spanish and Portuguese in Latin languages. In the Germanic languages, the adjective always comes before the noun. The tension mounts as you read the adjectives. You learn that it is big, red, mean, hungry, and then you find out what "it" is. In Latin languages, they prefer to think the other way. They want to know what "it" is before they found out the description of it. This reflects two different ways of not only thinking about language, but also about the world in general.

As I have learned the other two languages, there have been several things that I feel I can better express in Spanish or Portuguese than I can in English. Spanish and Portuguese have several words that all mean the same thing in English, but mean slightly different things in their language. There are two different words for "to know" in Spanish and Portuguese, expressing the difference in how and what you know. There is no distinction of this in the English language. And there are some words that do not translate hardly at all, in which case I wish that everyone spoke the other languages so that I could tell them exactly how I feel rather than trying to explain around it because English has no way of expressing the idea.

When I first began to program, I learned how in Pascal. The thought process of how to organize a program and what the key words and symbols are in that language have expanded to be included in other areas of my life as well. When I am sitting in religion class and I want to make a comment in my notes about what the teacher was saying, I will include my comment in brackets { } just like I write comments in Pascal. This causes problems when I am trying to write comments in C++ because those symbols have an entirely different meaning in C++ than they do in Pascal. Simply learning a programming language changed how I thought about and organized other things in my life. I started to think through my thinking process when I was learning something new, as if I was going to have to later tell a computer how to do the steps that I do subconsciously. I applied my process of writing a computer program and thinking things through from the back end (what were the steps I took to arrive at that conclusion) in order to learn Portuguese (if this is the verb form I use here, why would I do that).

Church's thesis and the Sapir-Whorf hypothesis, are not mutually exclusive. In fact they are probably looking at the same problem, just from opposite ends.