Language and Cognition

Is the Sapir-Whorf Hypothesis a valid interpretation of the impact of language on perception?

Word Count: 3786

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Abstract

A prominent question throughout human history has been whether or not language shapes our perception of the world. This investigation explores the question: is the Sapir-Whorf Hypothesis a valid interpretation of the impact of language on perception? Two interpretations of the hypothesis, linguistic relativism and linguistic determinism, were evaluated. The results of previous studies conducted on native speakers of different languages were analyzed to determine whether determinism or relativism best described the impact of language on cognition.

Studies revealed that the categorization system for colors within a language impacts people's speed in distinguishing between them, and that advantages in color distinction originate in the language centers of the brain. It was determined that the system of direction in a language significantly impacts people's geographic perception of themselves and of objects in space and even their memory. Gendered language was shown to influence the development of gender identity in children and how people perceived objects labeled with gendered nouns. Finally, studying the impact of a future tense in languages revealed that countries speaking languages without a future tense tended to have higher savings rates than others, but there was not evidence of a direct causation.

These studies in color, geographic, gender and temporal perception suggested a significant impact of language on perception, confirming the validity of the theory behind the hypothesis. However, non-linguistic factors such as personal experience and memory can also significantly impact how people think. It was thus concluded that linguistic relativism, not determinism, accurately describes the impact of language on perception.

Word Count: 253

Introduction

The relationship between language and thought has been contemplated since as early as in Classical Greece. The philosopher Plato argued that the role of language is to reflect the ideas in the world as accurately as possible, challenging existing sophist claims that language actually determines people's minds and is the only channel through which one can experience the world. The role of language in influencing thought has been debated throughout history as humans have sought to understand the connection between the processes that occur within their minds and the realities they construct.

As a way of knowing, language enables us to communicate knowledge and interpret the world around us. From a young age, most people use spoken or written language as their primary mode of communication and it provides a means for them to relate to one another, interact and exchange information. Language is used to establish initial connections between people, maintain relationships and resolve conflicts. It also changes and evolves over time to adapt to changes in the structure of society and human needs. Since language plays a dominant role in our lives, it can be postulated that it actually influences the way we view the world and process things we observe. The Sapir-Whorf Hypothesis, based on the works of Edward Sapir and Benjamin Lee Whorf, suggested exactly this in the early 20th century. The hypothesis states that a person's native language shapes their cognition of the world, and its accuracy has been debated ever since its proposal.[1] Research surrounding the hypothesis slacked for a few decades, but advances in cognitive psychology and linguistics during the 1980's and 1990's sparked renewed interest.

[1] "Language and Thought." *Linguistic Society of America*. Linguistic Society of America, n.d. Web. 22 Aug. 2016.

There are significant cultural implications to the Sapir-Whorf Hypothesis. In order to understand cultural differences, it is necessary to understand how language affects cognition and if there are possible differences in perception held by those who speak different languages. Across the world, roughly 7,000 languages are spoken, each with different grammatical structures and conveying messages uniquely, and all of which have their own history and cultural heritage. The Sapir-Whorf Hypothesis can thus be utilized to examine the impact of language on perception and therefore culture, providing insight into conflicts and disagreements between cultures.

There are two main interpretations of the Sapir-Whorf Hypothesis and its explanation of the cognitive impact of language. Linguistic relativity, or a "weak" interpretation of the hypothesis, states that the structure of a language affects the speaker's cognition, but does not entirely construct it.[2] This has consistently been the more widely accepted theory regarding language and perception. It implies that members of different language communities experience the world differently. Linguistic determinism, or a "hard" interpretation, states that language actually determines and limits the cognition and knowledge of the speaker. This suggests that the differences in cognition between the members of different language communities are directly caused by language. Both interpretations suggest influences on culture, as regions that developed speaking different languages may have developed cultural distinctions related to the languages themselves and their effects on the perception of their speakers.

Opposition to the Sapir-Whorf Hypothesis has generally refuted its claim that language has a significant impact on perception. Steven Pinker, a cognitive scientist, psychologist and linguist, states that there are mental processes that occur prior to language acquisition that are far more important to a person's cognition than language, claiming that language is "a superficial

[2] Linguistic Society of America

embroidery upon deeper processes of consciousness" and plays a secondary role in shaping perception as the hypothesis implies.[3] Others have simply claimed that language plays little to no role in shaping cognition. In addition, many argue that Whorf used circularity of evidence when claiming that language impacts perception. According to Roger Brown, Whorf asserted that there exist non-linguistic cognitive differences between people, while the data he collected did not include non-linguistic evidence.[4] Regardless of arguments against the methodology behind the Sapir-Whorf Hypothesis, a combination of linguistic studies conducted on people who speak different languages, and research in cognitive psychology have suggested that language does have an impact on how people view the world. This investigation will thus examine whether or not the Sapir-Whorf Hypothesis accurately describes the effect of language on cognitive perception and assess the vital question of its relevance in modern linguistic, psychological and cultural studies. The main categories in which the impact of language on perception has been investigated are color perception, geographic perception, gendered language, and temporal perception.

Color Perception

Evidence of differences in color perception between native speakers of different languages has been used to support the Sapir-Whorf Hypothesis. The most research suggesting a strong connection between language and perception has been done in this sector of linguistics and psychology. Different languages refer to colors using distinct methods of categorization of shades across the color spectrum. This raises questions about whether these differences can change people's actual perception of the color, along with their ability to distinguish between

[3] Alford, Danny K. H. "Demise of the Whorf Hypothesis." *Regarding Benjamin Lee Whorf*. Phoenix Associates, n.d. Web. 07 Nov. 2016.
[4] Ibid.

colors and learn or remember them, and cause cognitive differences between people of different native languages.

A study conducted on Russian and English speakers explored the effect of color categorization structures within language on perception and color distinction.[5] All the subjects were selected from the Boston area and were between 19 and 39 years old to cover a large enough range of people without introducing major differences in reaction time. In the Russian language, there is a distinction made between light blue and dark blue, each referred to with a different word, unlike in English, where the word "blue" can refer to any shade of the color. In Russian, light blue is called *goluboy,* and dark blue is called *siniy*. The two words are not interchangeable and there is no generic word in Russian to cover all shades of blue. Russian speaking children learn this distinction early on when they are developing and learning the language and the two terms for blue are used just as any other color names.

The subjects of the study were presented with a triad of colors out of a range of twenty shades of blue all within the *goluboy* to *siniy* range, and they had to identify which of the bottom two colors was identical to the top color as quickly as possible. All of the colors fell within the same basic linguistic category for the English speakers: blue. The study minimized the effect of subjective judgments and color memory, because only distinction was to be tested, by giving the subjects a simple, objective task. First, there was a clear correct answer: only two of the shades of blue were identical. Second, the colors were presented simultaneously, allowing the subjects to make decisions without significant use of their memory.

This stage of the study revealed that Russian speakers were quicker to distinguish between two shades of blue that fell into different categories (*goluboy* or *siniy*) than shades that

[5] Adelson, Rachel. "Hues and Views." *American Psychological Association*. American Psychological Association, Feb. 2005. Web. 22 Aug. 2016.

would be named with the same word.[6] The English speakers did not show this difference in speed and ability in distinguishing between shades of blue, demonstrating that color categorization in Russian impacts speakers' ability to distinguish between shades.

The next stage of the study sought to determine the source of the Russian speakers' advantage in distinguishing between colors, specifically what cognitive process contributed to it. This was achieved by examining how the subjects would perform in the original color distinction task when presented with specific types of distractions in order to determine which distractions would hinder their color perception. The first distraction, a verbal-interference condition, required that the subjects silently rehearse strings of digits while completing the original color discrimination task. The second distraction, a spatial-interference control condition, required that the speakers keep a spatial pattern in their memory while doing the color discrimination task. In the Russian speakers, their speed in distinguishing between colors persisted when they were presented with the visual distraction, but the verbal distraction caused them to have more trouble distinguishing shades that fell into the two different categories.[7] This demonstrated that their advantage in distinguishing between shades of blue originated in the brain's language centers, since their speed diminished while rehearsing strings of digits and speaking aloud. The results of the study demonstrated that language does indeed play a key role in color perception, and color categorization within a language influences how people distinguish between colors even in simple tasks like distinguishing between shades of blue, with the influence originating in the language centers of the brain.

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[6] Winawer, J., N. Witthoft, M. C. Frank, L. Wu, A. R. Wade, and L. Boroditsky. "Russian Blues Reveal Effects of Language on Color Discrimination." *Proceedings of the National Academy of Sciences* 104.19 (2007): 7780-785. Web. 7 Nov. 2016.

[7] Winawer, J., N. Witthoft, M. C. Frank, L. Wu, A. R. Wade, and L. Boroditsky

There have been multiple other studies conducted on people of different native languages, including African languages and Turkish, which explore the effect of native language on color perception and support the theory of linguistic relativity. In addition, many have demonstrated that the categorical nature of color perception is learned and not innate to humans, and can therefore be modified or improved.[8] This suggests that an individual's process of learning color categories, and changes in their understanding of color categorization, can shift their perception of the colors themselves, due to the connection between color language and perception. A study conducted by Debi Robertson and the University of Essex on young English children and semi-nomadic children from Namibia, on the southwest coast of Africa, revealed that children of both cultures learned colors in the psychologically same way, and did so through color categorization. In addition, their memory of colors improved as their linguistic competence increased through schooling and with age, linking color memory to language development. This evidence supports that color names are learned relative to culture and language, and changes in linguistic understanding of color categorization impact perception and memory. The large impact of language on color perception also suggests that it plays a large role in other cognitive processes.

Geographic Perception

The English language uses the egocentric system of coordinates, referring to objects in relation to each other using words such as "front", "back", "left" and "right". Without using a map or a compass English speakers determine direction based on their own location and the orientation of objects relative to each other. However, not all languages are like this. In the remote aboriginal tongue, Guugu Yimithirr, which is spoken in north Queensland, egocentric

[8] Özgen, Emre. "Language, Learning, and Color Perception."*Current Directions in Psychological Science* 13.3 (2004): 95-98. Web.

coordinates are not used at all. Instead, the language utilizes cardinal directions, referring to north, south, east and west to describe the location of objects.[9] People who speak this language orient themselves using this system of directions, requiring a mental compass that can be used unconsciously without looking around at the surroundings. Around one-third of the languages in the world similarly rely on absolute directions for space,[10] and have raised interest in researching how the language influences how people cognitively orient themselves in space.

In a geographic language such as Guugu Yimithirr, children learn from a young age to pay constant attention to their physical surroundings until using geographic directions to orient themselves becomes second nature and effortless. In addition, the directional sense of people who speak languages using egocentric coordinates is unique to their specific village. For example, in the 1930's, musicologist Colin McPhee arranged the dance instruction of a young boy from a village in Bali which relied on geographical coordinates, but when he arranged for the boy to stay with a teacher in a different village, he was unable to understand the instruction given to him there because the landscape in the new village was unfamiliar, disorienting him.[11] The sense of direction embedded into cognition by language even affects memory; people who speak the language refer to events in the past using cardinal directions to describe them. Psychological experiments studying speakers of Guugu Yimithirr-style languages have suggested that they even remember a different reality than people who speak languages like English which use egocentric coordinates. Guy Deutscher explains this concept clearly using the analogy of two people staying in a hotel, one whose native language uses egocentric coordinates and the other whose native language is like Guugu Yimithirr, using cardinal directions:

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[9] Deutscher, Guy. "Does Your Language Shape How You Think?" *The New York Times*. The New York Times, 28 Aug. 2010. Web. 20 Aug. 2016

[10] Boroditsky, Lera. "Does Language Influence Culture?" *The Wall Street Journal*(n.d.): n. pag. *Lost in Translation*. Dow Jones & Company, 23 July 2010. Web. 22 Aug. 2016.

[11] Deutscher, Guy

"Your friend is staying in the room opposite yours, and when you go into his room, you'll see an exact replica of yours: the same bathroom door on the left, the same mirrored wardrobe on the right, the same main room with the same bed on the left...In short, you have seen the same room twice. But when your friend comes into your room, he will see something quite different from this, because everything is reversed north-side-south. In his room the bed was in the north, while in yours it is in the south; the telephone that in his room was in the west is now in the east, and so on."[12]

This description summarizes the significance of geographic language on shaping spatial perception, as structures of orientation within a language can drastically impact people's perception of location of things around them. While the magnitude of this impact has been debated, differences between how languages refer to space and orientation and the consequent processes of orientation undertaken by those who speak them seem to suggest that language does in fact impact perception, as the linguistic relativity interpretation of the Sapir-Whorf Hypothesis suggests.

Gendered Language

Perhaps the most prominent example of a foundational difference between languages is how they incorporate gender into their grammatical structure. For example, while English does not use gendered nouns, languages such as Spanish, German and French assign either a feminine or masculine identity to all nouns. Because the gender system within a language directly impacts nearly all sentences that can be formed, it follows that it may have an impact on how people perceive objects and gender.

[12] Deutscher, Guy

Having gendered nouns alters the context in which statements are given. In English, one might say that they were going out to eat lunch with a friend. However, in Spanish, French or German, they would be obliged by the language to specify the gender of that friend. The use of gendered nouns in language has an effect on even the most basic of communications, impacting people starting at a very young age. A 1980 study of Hebrew and English speaking children revealed the impact of gendered language on gender identity and perception. In the study, Hebrew speaking children, whose language differentiates between masculine and feminine nouns, demonstrated gender identity development about half a year ahead of English speaking children.[13] The gender distinction in the nouns they used when speaking affected their perception of themselves and was applied to the world around them, allowing them to make more gender distinctions at a younger age than the English speaking children.

Differences in *how* nouns are gendered also affect perception. In the 1990s, psychologists compared associations between speakers of German and Spanish, languages in which the nouns referring to the same objects are given opposite genders. In characterizing certain nouns, Spanish speakers characterized words such as bridge and clock, which are both masculine nouns as having more "manly" or masculine properties such as ruggedness, sturdiness and strength, whereas German speakers characterized the words, which are assigned feminine gender in German, as being slender, intricate or elegant. A similar trend was shown when French and Spanish speakers were asked to voice different objects in a cartoon. Both groups of speakers tended to speak in a higher woman's voice when imitating objects defined by feminine nouns in their language, and a lower male voice for those defined by masculine nouns.[14]

[13] Deutscher, Guy.
[14] Ibid.

Gendered language clearly has an impact on how people perceive objects. However, this perception is shaped by non-linguistic factors as well, such as personal experience, mood and memory, and therefore it cannot be argued that gendered language absolutely determines people's perceptions of objects. Instead, research concerning gendered language and perception once again strongly supports the theory of linguistic relativism of the Sapir-Whorf Hypothesis, as gendered language plays a role in shaping, but does not determine, perception.

It is also possible that gendered language significantly impacts sexism, stereotypes and gender roles. For example, masculine language is quite common in the English naming of occupations, such as in the words "policeman" and "fireman". By giving these occupations male connotations, perceptions of who is most suitable for the jobs may be impacted. It has been argued specifically that girls' ideas of themselves and what they are capable of in their future careers is damaged by the dominance of masculine occupation names such as these, because they are taught by these names from a young age that certain jobs are meant only for men. This argument has been advanced by feminist movements, as women progress into higher positions in the workforce with more frequency, and demonstrates how gendered language can have a significant impact on perception. However, the relationship between gendered language and perception in this case is multifaceted. While gendered language and the assignment of male connotations to occupations can serve to limit young girl's career aspirations, gendered language is itself shaped by existing gender stereotypes, illustrating a two-way impact.

Temporal Perception & the Future Tense

Languages differ greatly in how they refer to the future. For example, while English requires explicit reference to the future and the use of a future tense when referring to events that have not yet occurred, German does not make this distinction. The literal translation of

communicating that it will rain tomorrow, from German to English, is "it rain tomorrow". This begs the question of how speakers of future and futureless languages differ in their perception of the future. Accompanying this is the question of whether and how a language refers to the future can affect people's propensity to save or spend.

The effect of language on temporal perception and savings was explored in an extensive study conducted by Keith Chen in April 2013, in which he investigated the effect of language on economic behavior. He studied families within dozens of different countries, comparing those with nearly identical relationship structures, religion, size and location to see if their savings habits were related to whether they spoke a future or futureless language.[15] Chen hypothesized that languages which require explicit reference to the future would cause speakers to take fewer future-oriented actions such as saving, than speakers of languages that do not have a future tense. Using mathematical regressions and reports of retirement wealth and national savings rate, the study revealed that there is a strong correlation between language and wealth and savings. Families who spoke a futureless language responded that they saved money 30% more than families who spoke a language requiring a future tense.[16] As a whole, out of the countries studied those speaking futureless languages demonstrated higher savings rates than those speaking languages requiring future reference. There was not enough evidence to claim a direct causation between language structure and propensity to save, because not all variables could be controlled and it was possible that other factors contributed to the savings rates of the families, and Chen concluded that the effect of language on savings behavior was not due to inherent cultural or cognitive differences between linguistic groups. He argues that while language can affect savings behavior, it does not do so by directly altering people's cognitive perception. However, the

[15] Chen, M. Keith. 2013. "The Effect of Language on Economic Behavior: Evidence from Savings Rates, Health Behaviors, and Retirement Assets." *American Economic Review*, 103(2): 690-731.
[16] Ibid.

significant difference in propensity to save between the countries studied suggests that the structure of a language has some degree of influence on its people's perception of the future.

There is also the possibility of cultural metaphors affecting economic behavior. For example, English metaphors liken time with money, and frequently relate "up" with "good" and "bad" with "down", which could subtly play into how people perceive changes in their savings levels and income.

Conclusion

While the theory behind the Sapir-Whorf Hypothesis is still relevant and valid, there are various limitations to the effect of language on perception. Some cases suggest a direct influence on cognition, whereas others suggest only a correlation and instead emphasize the importance of other, non-linguistic factors, in influencing cognition. The cultural implications of language's impact on perception are perhaps the most compelling, and will continue to be investigated in the effort to understand cultural differences between regions speaking different languages.

Prominent evidence of an impact on perception caused by language has been provided by studies in color, gender, and geographic and temporal perception. The ability to categorize colors and distinguish between different shades is shaped by the words assigned to colors within a language and originates in the language centers of the brain, drawing a direct connection between language and visual perception. In addition, the ability to distinguish between shades and colors was demonstrated to improve with increased linguistic competence and schooling, suggesting that the development of language within an individual can constantly influence their perception.

One of the most striking relationships between language and perception is evident in the field of geographic perception. The system of coordinates used in a language, whether it be

egocentric directions or geographic coordinates, can impact people's sense of orientation and how they perceive the location of objects around them. It even affects how they remember events from the past, as they incorporate relative locations or specific directions when describing things that have occurred.

Studies in gendered language revealed how gendered nouns can impact people's perceptions of objects around them and even their self-perceptions. Speakers of languages using gendered nouns were shown to perceive objects according to their gender assignment, and their own gender identity development was advanced by their use of gendered language. In addition, the assignment of genders to occupation names may have an impact on people's career aspirations from a young age and shape their perceptions of their own abilities and place in society.

Finally, the grammatical structure within languages relating to the future tense likely impacts savings patterns within countries. While language referring to the future might not directly impact perception to the extent of shaping people's cognition, it certainly has some influence on how they view the future and choose to save.

The evidence from these case studies supports the theory of linguistic relativism, not linguistic determinism, as derived from the Sapir-Whorf Hypothesis. Despite the existence of other important factors that contribute to perception, the strong correlation between language structure and patterns and cognition indicates that language does play a role in shaping how people view the world around them. While the Sapir-Whorf Hypothesis has been challenged repeatedly over time, its underlying principle of linguistic relativism and its theory of language shaping reality can be observed in all languages and cultures, in varying degrees and in direct and indirect manners. Ultimately, because language is the primary mode of communication

between nearly all people beginning at a very young age, it undoubtedly has a significant impact on cognition and perception of the world.

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