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The Effects of Bilingualism and
Multilingualism on Lexical Retrieval

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Abstract

This research reviews literature that has been written concerning the positive and negative cognitive impact bilingualism has on the speaker. It then takes this research one step further asking whether increasing the number of languages one speaks slows down the person's lexical retrieval. Methods include an interview and two tests, the data from which strongly supports the hypothesis mentioned in the literature review that bilingualism slows down lexical processing. This research concludes that having more languages does increase a person's difficulty with retrieving words on demand.

Key terms: bilingualism, lexical retrieval, RIF, retrieval induced forgetting, aphasia, tip of the tongue, presque vu

The Effects of Bilingualism and Multilingualism on Lexical Retrieval

Introduction

In the last few decades, great interest has been placed on the cognitive effects of bilingualism. Researchers debate back and forth about the effects of bilingualism. For some scholars the bilingual effect is positive (Alterriba & Heredia, 2014; Bubalo, 2011; Kroll & Bialystok, 2013, p. 497; Yoshida, 2008), others say negative (Bialystok, Craik, & Luk 2008; Calvo, Iváñez, & Garcia, 2016; Gollan, Montoya, Cera, & Sandoval 2008; Gollan, Fennema-Notestine, Montoya, & Jernigan 2007; Luo, Luk, & Bialystok 2010; Sandoval, Gollan, Ferreira, & Salmon 2010), and still others look at specific areas of interest impact, saying bilingualism has both positive and negative effects (Engel de Abreu, 2011). The net value of bilingualism has been the topic for years, yet it has not lost its relevancy. The full complexity of the bilingual effect is yet to be searched out.

Parents wonder if it is really good for their children to be raised bilingual. Psychologists and doctors have observed intriguing differences in the monolingual and bilingual brain. And, numerous studies have been conducted to analyze the impact of bilingualism on executive function. This study focuses on the effects of bilingualism and multilingualism on lexical recall. The main question is whether increasing the number of languages one speaks slows down the person's lexical retrieval.

Literature Review

In general, recent studies show that learning two or more languages has positive effects on a person's cognitive abilities (Engel de Abreu, 2011; Kroll & Bialystok, 2013, p. 497; Yoshida, 2008). Bilinguals are said to have better metalinguistic skills and better executive function than monolinguals, among other benefits. Yet, bilingualism appears to slow down lexical processing (Bialystok, Craik, & Luk 2008; Calvo, Iváñez, & Garcia, 2016; Gollan, Fennema-Notestine, Montoya, & Jernigan, 2007; Gollan, Montoya, Cera, & Sandoval 2008; Luo, Luk, & Bialystok, 2010; Sandoval, Gollan, Ferreira, & Salmon 2010). More study is needed to better understand this phenomenon and to better comprehend the effects bilingualism has on lexical recall.

The Bilingual Effect

Researchers agree that there is a bilingual effect, but they debate whether this effect is positive or negative. There are well respected scholars on either side of the debate. Many factors go into the overall effect of bilingualism, and many aspects that factor in when considering assessing the net effect of bilingualism on cognition.

Looking first at the positive side, it is currently accepted in linguistic circles that bilingual children have more developed metalinguistic skills than their monolingual peers (Hulit & Howard). It is also commonly stated that bilinguals have an advantage over monolinguals in acquiring new languages (Bubalo, 2011). Altarriba and Heredia in their research on bilingualism

and memory, speak of “the cognitive richness that is afforded by being bilingual or multilingual” (2014, p 9). Bilinguals are also believed to be better at executive control functions (Engel de Abreu, 2011; Yoshida, 2008).

The field of neuroscience contributes several interesting observations to the discussion on bilingualism. Jahagirdar (2014) suggests that the first and second languages are not stored together in the same location in the brain. Language is generally considered to be lateralized, or “localized in one half of the brain” (Jahagirdar, 2014, p. 257). Broca’s area, associated with speech production, and Wernicke’s area, associated with language comprehension are both typically located in the left hemisphere of the brain (Jahagirdar, 2014, p. 258). Yet, in bilingual individuals the location for these functions seems to be a little more flexible” (Jahagirdar, 2014). This has been tested using Sodium Amytal tests, or Wada tests. In these tests, Sodium Amytal is injected into specific parts of the brain, causing temporary numbing. The part or parts of the brain that are numbed result in the individual experiencing a number of momentary impairments, depending on which part of the brain underwent the treatment (Jahagirdar, 2014). In this way, the Wada test can be used to determine what part of the brain is used for what function. In using this test on bilingual participants, Jahagirdar’s research (2014, p. 2580) gives evidence that different locations in the cortex “may be involved in storing different languages.” This research does not explain everything about how bilingualism affects lexical recall; it does show that bilingualism has a significant impact on the brain and therefore an impact on linguistic memory retrieval. In

fact, other neuro-linguistic researchers use these tests to suggest that unintentional “switching between languages may occur due to disruption of brain areas that mediate switching as opposed to inhibition of native or L2 [second language] selectively” (Kho et al. 2007 as cited by Jahagirdar, 2014, p. 260)

This observation that there is a difference between the bilingual and the monolingual brain is neither positive nor negative. Research has been conducted to examine the effect of the differences in the bilingual brain. Early research from the 1900s typically spoke very negatively about bilingualism (Hills, 1928; Sear, 1923). Scholars from this time believed that early bilingualism could be hazardous to the child’s cognitive function, and cause verbal and intellectual retardation (Sear, 1923).

Though this strong negative view is no longer generally held, it is helpful to look at this early research to notice oversights that were made, leading to these strong negative conclusions. In many studies, language dominance and socioeconomic status were not taken into consideration. More current researchers have been careful to consider these factors when comparing monolingual, bilingual and multilingual people. Even with these factors taken into consideration, many researchers still conclude that bilingualism appears to slow down lexical processing (Bialystok, Craik, & Luk 2008; Gollan, Fennema-Notestine, Montoya, & Jernigan 2007; Gollan, Montoya, Cera, & Sandoval 2008; Sandoval, Gollan, Ferreira, & Salmon 2010; Luo, Luk, & Bialystok 2010).

Alterriba (2013, p. 357) reports, “Many bilingual speakers often claim that once they have adopted a new language they have difficulty accessing words in their native language.” Engel de Abreu (2011, p. 529) finds, “bilinguals are generally found to underperform on standardized vocabulary assessments.” In fact, “findings indicate that bilingual speakers may rely on short-term memory resources to support word retrieval in their native language more than monolingual speakers” (Kaushanskaya, Blumenfeld, Marian, 2011, p. 408).

The cause and extent of the lexical processing delay has not yet been determined. It is important to note that the level of proficiency in one’s second language, L2, is shown in many studies to have a great impact on the shift in cognitive patterns. Those with a weaker L2 tend to resemble monolingual cognitive patterns rather than bilingual patterns (Athanasopoulos & Avelo, 2013, p. 246)

Memory Retrieval Theories

Runqvist and Costa (2012) would suggest that the slowness of retrieval that bilinguals display could be due to the style of testing. They propose the idea of RIF, retrieval-induced forgetting, in which the retrieval strategy greatly affects the success and speed of lexical retrieval. They conclude that “the inhibition occurs at the level of phonological representations and not at the level of lexio-semantic representations” (Runqvist & Costa, 2012, p. 367). In other words, they believe that bilinguals have more difficulty finding words when they search for them based on phonological terms instead of semantic ones. Other researchers postulate that

bilingual people may have more difficulty recalling specific words because they label concepts in one language more often than the other. The language used more for the concept will come to mind first and the speaker will have to consciously tell his brain to continue to search for the word in the other language. Runqvist and Costa have tested this hypothesis by having participants practice naming flashcard pictures in either L1 or L2 consistently. Their test results “suggest that speaking a second language protects rather than harms the memory of our first language” (Runqvist & Costa, 2012, p. 365).

Other scholars, for example Calvo, Iváñez, and Garcia (2016), suggest speaking of the specific tasks bilingualism may affect positively or negatively, instead of claiming a net positive or negative result. Specifically, they concede, “bilingualism seems detrimental to vocabulary skills” (Calvo, Iváñez, & Garcia, 2016, p. 3). Yet, they suggest that when the testing methodology assesses working memory with tasks that do not have “high verbal requirements” then bilinguals tend to excel (Calvo, Iváñez, & Garcia, 2016, p. 2). The positive or negative effect of bilingualism on these working memory tasks is dependent on the testing method.

Several different theories have been put forward on bilingual working memory as relates to lexical retrieval. Linguists debate how interconnected bilingual memory really is. The neuroscientific evidence above along with other “current bilingual models postulate[s] separate but interconnected systems” (Heredia & Cieślicka, 2014, p. 11) Three of the most common models for nonphysical bilingual memory storage structure are compound structure, coordinate

structure, and subordinate structure. Heredia and Cieślicka depict the differences between these structures in their diagram (see Chart 1). Since they looked specifically at Spanish-English bilinguals, their examples come from these languages.

Compound structure occurs when one concept pulls up the lexical expression for that concept in both languages with the same ease and with two completely independent lexical signifiers for the concepts. Coordinate structure occurs when the person sees the two lexical signifiers as standing for two different but similar concepts. One concept brings up a word in a given language and the other concept draws on the other language. The third model is Subordinate structure in which the concept is identified first in one language and then translated in the speaker's mind to render the lexical representation of that word in another language.

Generally, it is considered that this third model of Subordinate structure is most commonly found in bilinguals who have a strong dominance in one of their languages over the other. And, in each of the other two models, it appears as if word recall access is fairly direct (Heredia & Cieślicka, 2014, p. 13).

Need for further Research

The structures that Heredia and Cieślicka have mentioned all seem to have direct access to the lexicons of both languages, with the exception of the last model which could be considered as a language learner and not a fully fluent bilingual person. This makes the bilingual disadvantage in lexical retrieval seem rather unexpected. More research is needed to further

solidify and better understand the bilingual disadvantage in lexical retrieval. Is the disadvantage due to testing style as Runnqvist and Costa (2012) would suggest? Also, does the delay in lexical retrieval continue to extend as a person acquires more languages?

Methods

This study asks whether learning more languages increases the occurrence of difficulty with lexical retrieval. There were three main data gathering methods used to determine whether or not multilingualism significantly affects lexical retrieval. Two of these methods specifically consider Runnqvist and Costa's belief that using phonological prompts causes more difficulty for bilinguals than the semantically prompted retrieval that people come across in daily life.

Thirty-four students from various majors at Cedarville University participated in this research. They were all between the ages of nineteen and twenty-five, and English dominant. It is important that all the participants be English dominant because the tests and interview are conducted in English. To have participants who are dominant in other languages would introduce more variables, and possibly skew the results against those individuals who are not dominant in the test language.

The participants were divided into categories by how many languages they speak. For this research, students who are currently studying a language, but do not yet consider themselves fluent, counted their new language as half a language.

Interview

My first data point was obtained through an interview taking a subjective look at the situation. The interviewee was a simultaneously bilingual female, age 20, who grew up in a mainly English speaking home in São Paulo Brazil, surrounded by Portuguese speakers. I chose a participant who was constantly exposed to both languages, hoping that having spoken a different language in the home than she spoke in church and at school, her language situation would cause the effects of bilingualism to be more prominent.

In the interview, the participant was asked to tell about her linguistic experience in changing between cultures. She was specifically asked whether or not she felt that she has trouble finding the right word more or less when she has recently switched languages. I also asked her to tell me about how often she felt that “tip of the tongue” feeling when she knows she has the right word for something, but for some reason has difficulty getting it out. The interview was over an informal, friendly dinner.

Test One and Two

After the interview, I administered two tests to assess the lexical retrieval comparison between people who speak different languages. Before each of these tests, metadata was recorded concerning age, year, major, country of origin, number of languages spoken and ratings of their languages as to a level of dominance. In asking about language dominance, space was

left for the participants to indicate whether they believe themselves to be more dominant in one language for specific topics, but more dominant in another language for other topics.

The first test (see Appendix 1) had participants fill out a chart where the twenty participants play a word game in which they raced to fill out the chart of words. Across the top of the chart, several categories were listed: Adjective/verb, object from nature, proper name, location, and food. Down the side of the chart, the letters *L*, *E*, and *T* were given one at a time.

In this situation, each letter represents one round of the test. For each letter, the individual participants were timed on how fast they completed the row with words beginning with that letter and fitting into each of the respective. Even though the test itself was given in English, participants are allowed to draw from any language they choose. As the participants took the test, I timed each of them with a stopwatch. At the end of each row, I gave them their time, and they recorded it in the margin at the end of the row.

This test was given in similar public locations on campus and was presented as a game. The resulting data was then divided up into four groups: speakers of one, one point five, two, and three languages. There were roughly five participants in each category.

The research done by Runnqvist and Costa (2012) suggests that bilingual individuals have more difficulty retrieving words from their memory when the prompt is phonological. This test prompts the participants to retrieve words based on phonology and semantics, showing just how strongly phonology and semantics really affect multilingual speakers.

The second test had fourteen participants and was more natural. In the first test the situation was simulated to make the participants rapidly search for words. In this test, participants were simply asked to keep track for one week of all the times both in speaking and writing that they found themselves struggling to remember a word that they knew and wanted to use.

This test is the most objective and natural of the three data gathering methods. This test did not include the participants doing anything out of their daily routine except keeping a tally of how many times they experience difficulty with lexical retrieval.

With the use of these three data gathering methods, I was able to clearly and objectively address the main research question of whether increasing the number of languages one speaks slows down lexical retrieval, taking into account the previous research findings and suggestions from other linguists who have recently conducted research in the area of bilingualism and memory.

Data and Discussion

Interview

In the interview, the student was asked about her language background. I find that she is a simultaneous bilingual who is strongly English dominant. She was bilingual at the age of three, but when her parents came to the U.S. for a year for furlough, she lost Portuguese. At the age of five she began relearning it in a Brazilian Portuguese speaking school. She continued to relearn

by immersion in her church, leisure, and academic activities, while speaking English at home until she entered middle school. In middle school she was enrolled in an international English speaking school where she continued to study Portuguese as a second language through high school.

When specifically asked if she feels that she has trouble finding the right word more or less when she has recently switched languages, she answered with a story. When she lived in Brazil, her family always spoke English in the home, but Portuguese vocabulary, especially school related vocabulary, often worked its way into her family's vocabulary. When she first came to school here in the U.S., she had trouble finding words, not because she was having difficulty retrieving them, but because she had never realized that certain words were not English. For example, she mentioned the word *pasta*, the Portuguese word for *folder*. She asked her friend in class to pass her the pasta, and the friend looked at her as if she was crazy. In her family they had always used *pasta* to refer to *folders*. The word *folder* was new to her and she had to learn it when she began college in the U.S. even though English was by far her dominant language. This is not an example of aphasia or of retrieval induced forgetting. In this case, her non-dominant language is still dominant in certain areas of her life.

The interview concluded with one last question about retrieval induced forgetting, specifically addressing the idea mentioned by Runnqvist and Costa (2012) that the more often a word is retrieved in a L2, the more difficulty the speaker will have retrieving it in their L1. I

asked her directly if she felt that she had difficulty recalling words when she has recently switched languages. In answer to this she surprisingly says “no.” In fact, she believes that she has the least difficulty with lexical recall when she is free to codeswitch between the languages at will.

Test One

Twenty individuals participated in test one. Of the twenty, five were monolingual; six were monolingual but actively learning a second language; five were bilingual; and, the remaining four fluently spoke three languages. I did not have enough participants in the two point five languages group to consider them in this data. Each of the participants were asked to fill out each column as quickly as possible upon receiving the letter. Words were both semantically and phonologically retrieved, meaning that the words participants were asked to retrieve must both begin with the letter they are given and fit into the categories that are listed.

Looking at the results of this test, the recall time did increase gradually as the number of languages increased (see Table 1). This evidence supports the hypothesis that learning more languages does increase difficulty with word retrieval.

There was an interesting response observed from the multilingual participants upon hearing that they were allowed to pull from any language they wished. Of the four, all of them expressed pleasure at being allowed to use any language, but the multilingual participant who completed the test in the shortest amount of time mentioned that her strategy was to pick only

one language at a time and run with it. She believes that it would slow her down if she tried to pull from multiple languages at the same time.

Test Two

The results from test two were even more dramatic than those from test one (see Table 2). Fourteen participants took part in this test. Participants who had only one language had trouble retrieving words one point two times a day. For those who spoke two languages, the occurrences of retrieval induced forgetting, RIF, increased to two point three times a day. And, at three languages the daily occurrences jumped all the way to four point eight, almost five times a day.

This data strongly supports the idea that the more languages a person has, the more often he or she will struggle with retrieval induced forgetting. Yet, it is interesting to observe that the number of times a person had difficulty with lexical difficulty significantly drops when a person is actively involved in learning a new language. According to this data, the number of languages a person speaks significantly increases the amount of times they experience retrieval induced forgetting.

Conclusion

Both of the previous tests show a correlation between the acquisition of more languages with a person's difficulty retrieving words. This fits with the research of other scholars who have found bilingual individuals to have more difficulty with lexical processing and vocabulary tests (Bialystok, Craik, & Luk 2008; Calvo, Iváñez, & Garcia, 2016; Engel de Abreu 2011; Gollan,

Fennema-Notestine, Montoya, & Jernigan 2007; Gollan, Montoya, Cera, & Sandoval 2008; Luo, Luk, & Bialystok 2010; Sandoval, Gollan, Ferreira, & Salmon 2010)

As seen in Table 2, the more languages a person knows, and the slower he or she recalls individual words phonetically and semantically. The results of the second test imply that this difficulty is even more dramatic in everyday life when people are attempting to recall words for the sake of communication. The more dramatic trends in the data could possibly be due to fewer participants. Yet with the fourteen people that were tested, the evidence clearly points to increased difficulty with lexical retrieval for those who have more languages. This research concludes that the more languages an individual has, the more difficulty that person will have with lexical retrieval.

Limitations and Further Research

It would be helpful for these same tests to be conducted again with more participants to add to the data pool. In this research, all the participants were self-proclaimed English dominant and the tests themselves were both conducted in English for all participants regardless of what other languages they speak. This was in order to cut down on any skewing that may be caused by non-test language dominance. Yet, this is also a limitation. In future studies, it would be interesting to expand this group to include speakers who are dominant in other languages tested in their language of dominance and to see how results compare.

The data from this research showed an intriguing trend for active language learners (see Table 2). More research focusing on this category is needed. It would be beneficial to conduct research that specifically focuses on active language learners and with more participants in this category to see if trend would continue.

It would be interesting to conduct this same research with participants from other age and socioeconomic groups to see if the results would reflect those of this research. It could be that these factors could significantly exaggerate or level the results.

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Chart 1

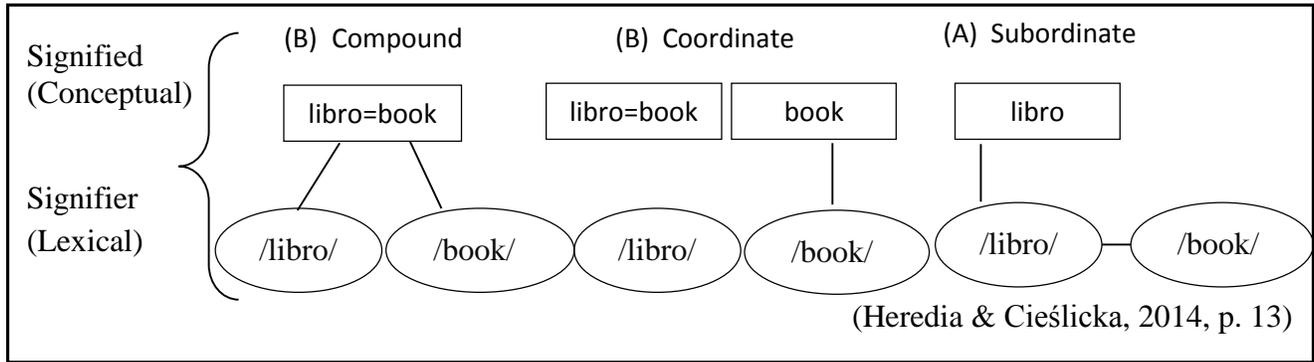


Table 1

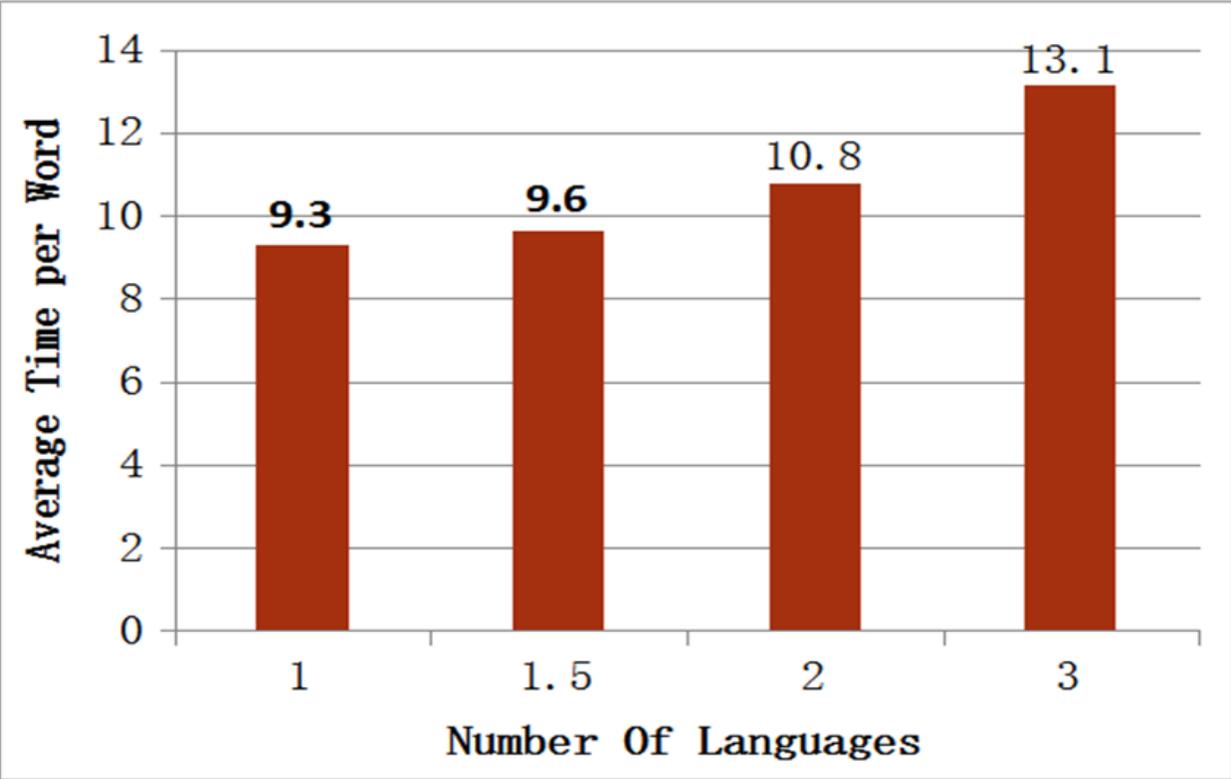
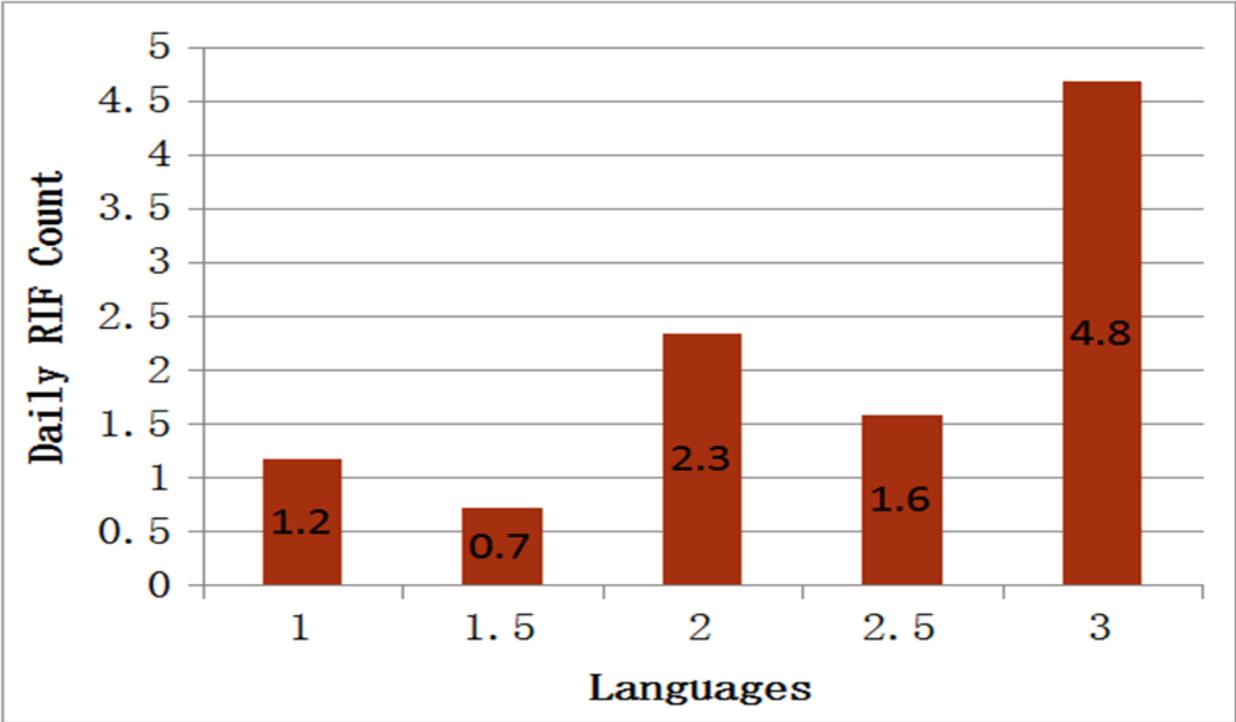


Table 2



Appendix 1

TEST #1

Fill in the boxes with a word starting with each letter (as seen in the example). You may use any language and aside from the first letter, spelling does not matter. Write your times to the right of the chart.

Adjective/ Verb	Object from Nature	Proper Name	Location	Food
Ex: Walk	Water	William	Washington D.C.	Wheat

Age:_____, Gender:_____, Major:_____, Year:_____.

Country of origin:

Number of languages spoken:

List languages in order of fluency (indicate one language is stronger than another in certain areas but not in others):