

How Can Different Languages of News Affect Bilingual Readers' Perception?

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Abstract

It has been suggested that due to several reasons such as language fluency and second language anxiety, language of a text could affect bilingual people's perception and comprehension of its contents. This could also apply for short texts posted on social medias, such as news articles. To experimentally explore what kinds of effect (if there is any) of bilingual people's first language (L1) and second language (L2) can have on their comprehension, memory and opinion when reading the same piece of news, this study was conducted. Results showed that when reading the same contents with an appropriate difficulty in different languages, there is a significant difference in people's memory levels (i.e. how much correct information they can recall from the text), but no significant difference was found in people's opinions towards the specific event described in the news. This study would be meaningful to discover how exactly the effects of different languages have been acting on bilingual people's perception of these contents, since increasing numbers of posts on social medias are becoming one of the most crucial and preliminary source of information currently.

Keywords

First language, second language, news article, perception, reading comprehension, social media.

1. Introduction

Since the COVID-19 outbreak in China in December 2019, information and debate about COVID-19 has spread quickly on the internet and has rapidly become a focus of worldwide interest, especially on social media [1]. With people have to stay in their homes, news and information on social media becomes their primary source of information. Previous studies have found a link between electronic news media outlets and the outbreak of infectious diseases, such as Ebola, that can have an influence on social media activity [2].

Several studies now show that the source attribution of the news will affect readers' perception on online news stories [3]. The poorly sourced stories on the internet will be evaluated negatively by readers, and the more reliable sourced stories will get more positive feedback from readers. In the form of information, text length and media of the message are likely to influence readers' reading comprehension levels [4]. When participants read texts in electronic format, there is a negative correlation between speed and reading comprehension. All of these researches are based on the format and transmission of the information to analysis people's cognition.

This study could give new insights into possible associations between different language of a pieces of news and readers' attitudes and opinions of its content.

1.1. Literature Review

1.1.1. Foreign Language Reading Anxiety (FLRA) and Reading Comprehension

FLRA is a kind of anxiety which readers experience in reading foreign languages texts [5]. Many researchers think FLRA will be the factor that influence readers' reading performance and reading comprehension.

Mohd. Zin (2010) carried out the research to investigate (a) the anxiety level of low-skilled learners when reading L2 text; (b) the relationship between low-skilled ESL readers' anxiety level and their level of cognitive interference; and (c) the relationship between low-skilled ESL readers' anxiety level and text comprehension. [6]. Mohd. Zin (2010) utilized two questionnaires to measure the anxiety level of ESL students and the interference in their cognitive systems [6]. The Foreign Language Reading Anxiety Scale (FLRAS) developed by Saito, Garza, and Horwitz (1999) was used to measure the subjects' anxiety level, and Cognitive Interference Questionnaire (CIQ) developed by Sarason, Sarason, Keefe, Hayes and Shearin (1986) to measure the interference level in the subjects' cognitive systems caused by anxiety level during their engagement in the reading tasks [5,7]. In the end, the result showed that the comprehension performance of L2 readers with low proficiency are more likely to be influenced by reading anxiety. This result is helpful for our to know the relationship between FLRA and reading comprehension, and provide a new insight for us to study the effect of bilingual and their perception of an article.

The purpose of Azizah Rajab (2012)'s study is to identify the level of reading anxiety amongst students learning English as a second language [8]. In Azizah Rajab (2012)'s research, students were asked to read for Specific Purposes classes, and then test the Foreign Language Reading Anxiety Scale (FLRAS) [8]. The data shows that the L2 reading anxiety level of undergraduates was at a low level indicating that these learners experience little or minimal anxiety when performing reading in a second language. However, the sample of this study is too specific so the further research should choose more samples.

1.2. This study

This study aimed to find the how the different language of a pieces of news affect readers' perception toward the content, and find out the factors that caused the result. To measure participants' perception, understanding and opinions concerning given information, the study will be constructed in an experimental setting. Considering the independent variable, which is the language of the text, participants will be randomly assigned to two groups, a reading English news group and a reading Chinese news group. The dependent variable for the study are the understanding and memory accuracy of subjects, and opinions and attitudes of subjects. To control two control variables in the experiment, the content of the news and language proficiency, we will make sure both groups of people are going to read the same content of news and they will be asked to finish the pretest about both Chinese and English language to make sure that they have same language level. In congruence with precious studies, it was hypothesized that:

H1. Chinese native speakers who are bilingual would understand and memorize the content differently when reading texts with the same contents in Chinese and English respectively.

H2. Chinese native speakers who are bilingual would have different opinions or attitudes towards the content after having read texts with the same contents in Chinese and English respectively.

2. Method

2.1. Pretest Methods

In order to ensure the participants' language ability, we designed a pretest which measures both Chinese and English ability. The questions are based on other researches which are proved effective. The pretest was based on Wenjuanxing platform. Each test taker was assigned a test number so we could match one participant's pretest score with his/her understanding and opinion.

2.1.1. English Pretest

The English pretest was adapted from LexTALE test (<https://www.lextale.com>). A large-scale study (Lemhöfer & Broersma, 2012) attested the validity of the test [9]. The results of the LexTALE were compared with those of the Quick Placement Test (QPT) and the TOEIC test. The correlation was substantial and highly significant. Therefore, the scores in the test could be an indicator of the test takers' English proficiency.

The test consists of a set of English words which are either authentic words or words coined by test makers. Test takers are asked to identify which words are real by answering Yes/No questions. For instance, the word "dispatch" is a real word, while the word "fellick" is coined by the test makers. Then, test takers' correctness are recorded and converted to a score to indicate their vocabulary size. In our pretest, we scored the answers and set a lower limit. Test takers with a score higher than the lower limit could participate in the rest of the experiment. In this case, we assumed that a test taker's vocabulary size was directly linked to his/her language proficiency. Test takers who had a large vocabulary size could read the English passage fluently.

2.1.2. Chinese Pretest

The Chinese pretest was adapted from another test (Zhao et. al., 2017) [10]. The test was designed to measure the test takers' reading fluency by asking whether a statement is true or false based on their common sense. For example, the statement "Milk is red" is false, whereas the statement "People use keys to open locks" is true. By this test, we indirectly measured participants' Chinese vocabulary and their reading fluency. We also set a lower limit to ensure our participants could read fluently and could understand the Chinese passage.

2.2. Questionnaire

2.2.1. Consent Form

We designed a consent form to acknowledge participants the purpose of our study. In the consent form, we also tried to dismiss some of their concerns, such as their privacy. In addition, we provided our e-mail so they could contact us whenever they had questions. Participants could choose either agree or disagree to participate in the experiment. Only participants who chose agree would continue the following steps.

2.2.2. Randomization & Demographic Questions

We randomly assigned the participants into 2 groups according to their test numbers. The test numbers were given previously. In the randomization, participants with odd test numbers (e.g. 105, 123) were given the questionnaire in English, and others with even test numbers (e.g. 110, 118) were given questionnaire in Chinese. In spite of the difference in languages, the two questionnaires were the same.

Then, the participants filled in some basic demographic questions, such as age, gender, and educational level. We promised not to report the data individually. These questions ensure that our participants were in a variety of people, so we could make more general conclusions.

2.2.3. Reading Material

Participants were asked to read a passage either in English or in Chinese according to the randomization. The reading material in our experiment was adapted from BBC News in English about a country under the pandemic of COVID-19 (Source: <https://www.bbc.com/news/world-europe-53149762>). We had translated it into a Chinese passage for the Chinese reading group. In order to avoid bias, we covered the places and the names in both passages (e.g. Country-A, District-X), so readers were not able to identify where had the news taken place. Moreover, the reading material was converted into images, so participants were not able to copy and paste the passage for translation. We also told them not to use dictionary during the test. Even though we could not make sure about the dictionary use, we tried to prevent it.

2.2.4. Understanding

Then, we tested the participants' understanding about the passage. We chose several details in the passage and made some multiple-choice questions based on those details. After reading the passage, the passage was hidden to ensure participants truly memorized the information we tested. Next, the participants would complete those questions in the same language as the reading material. For example, a question asked "What does R number measure?" Then, 4 options were offered. In addition to specific answers, there was also an option "I don't remember" among the choices. This was to avoid guessing. The choices were converted to points later, so we could measure the correctness with quantitative data.

2.2.5. Opinions

We also asked about the participants' opinions based on the passage by some questions. For example, we asked them "Do you think there is a serious epidemic in country A?" The participants then choose a 5-option Likert-type question from totally disagree to totally agree. Their responses were converted to scores from 1 to 5 to indicate their opinions. In addition, there were boxes for extra reasoning about the choices, so the participants were able to explain why they chose a specific option.

3. Result

3.1. Pretest Scores Analysis & Correlational Test

Firstly, to avoid participants' cheating in reporting their TOFEL scores, we adopt an authoritative English vocabulary test LexTALE test to test the English level. Then, to get corresponding TOFEL scores, we recruited 11 volunteers who are willing to send their TOFEL score report to us and gave them compensation.

We employ linear regression to test the correlation. The r-squared value of the model is 0.746, which means that English pretest scores can explain the 74.6% change cause of the Corresponding TOFEL scores. When the model is tested by F, it is found that the model can pass the F test ($F=26.444$, $P=0.001<0.05$), which indicates that English pretest scores must have an influence on corresponding Tofel scores. The Corresponding formula of the model is: English pretest scores= $0.009 + 0.008 \times$ English pretest scores.

The control variable of our experiment is English and Chinese reading fluency, so to make sure every participant can understand the content in English and Chinese, their corresponding TOFEL scores must be above 80 and Chinese pretest scores above 70.

After filtering, with the valid sample, we first do a descriptive analysis. As shown in table 2, the minimum scores of corresponding TOFEL scores of Chinese and English participants are 80.6 and 83.4 respectively, which are both above 80, and the standard deviation within each group is 8.267 and 7.17 respectively, which means there is no huge difference. Then we use paired t-test (table 3) to find the difference between two groups, which shows that there's also no

significant difference ($p\text{-value}=0.171>0.05$). Hence, we can assume that the English level of every participant is almost the same.

In the descriptive analysis, as shown in table 4, the minimum Chinese pretest scores of English and Chinese participants are 78 and 82 respectively, which are both above 70, and the standard deviation within each group is 4.257 and 4.517 respectively, which also means there is no huge difference. Then, the paired t-test (table 4) shows that there is no significant difference between different groups ($p\text{-value}=0.134>0.05$). Hence, we can assume that the Chinese reading fluency is controlled among all participants.

Table 1. Linear regression test of English pretest scores and corresponding Tofel scores

	Unstandardized		Standardized	t	p	VIF	R ²	Adj R ²	F
	Coefficients B	Std. Error	Coefficients Beta						
Constant	0.009	0.138	-	0.063	0.951	-			
English pretest scores	0.008	0.002	0.864	5.142	0.001**	1	0.746	0.718	F(1,9)=26.444, p=0.001

Dependent Variable: Corresponding TOFEL scores
D-W: 1.514
* $p<0.05$ ** $p<0.01$

Table 2. Descriptive analysis of corresponding Tofel scores

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Corresponding TOEFL score (Chinese)	48	80.6	112.8	94.133	8.267	94.6
Corresponding TOEFL Score (English)	36	83.4	111.4	96.467	7.17	97.4
Chinese pretest (Chinese participants)	48	78	100	95.958	4.257	98
Chinese pretest (English participants)	36	82	100	94.778	4.517	96

Table 3. Paired t- test between corresponding Tofel scores of English and Chinese participants

Items	Paired (M±SD)		Mean Difference (Paired1-Paired2)	t	p
	Paired1	Paired2			
Corresponding TOEFL Score (English participants) Paired Corresponding TOEFL score (Chinese participants)	96.89±7.11	94.52±8.01	2.38	1.4	0.171

Table 4. Descriptive analysis of Chinese pretest scores

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Chinese pretest (Chinese participants)	48	78	100	95.958	4.257	98
Chinese pretest (English participants)	36	82	100	94.778	4.517	96

Table 5. Paired t-test between Chinese pretest scores of English and Chinese participants

Items	Paired (M±SD)		Mean difference (Paired1-Paired2)	t	p	Items
	Paired 1	Paired 2				
Chinese pretest (English participants)	94.79	96.48	-1.7	-1.536	0.134	Chinese pretest (English participants)
Paired Chinese pretest (Chinese participants)	±4.69	±3.50				Paired Chinese pretest (Chinese participants)

We first presume the pretest scores as a variable that can affect participants' performance in the experiment. We uses linear regression to test the correlation between pretest scores and corresponding memory and opinion scores. The result (table 6, table 7, table 8, table 9) shows that there is no significant correlation ($p=0.985>0.05$, $p=0.791>0.05$, $p=0.659>0.05$, $p=0.791>0.05$). And the r-square is all smaller than 0.001, which means less than 1% of the change in memory ad opinion scores can be explained by the difference in pretest scores and can be omitted. Hence, it corroborates that the language level is not a confounding variable in this experiment.

Table 6. Linear regression test of corresponding Tofel scores and English memory

	Unstandardized Coefficients		Standardized Coefficients Beta	t	p	VIF	R ²	Adj R ²	F
	B	Std. Error							
Constant	8.817	7.976	-	1.105	0.277	-			
Corresponding TOEFL Score (English)	-0.002	0.082	-0.003	-0.019	0.985	1	0	-0.029	F(1,34)=0.000,p=0.985

Dependent Variable: English memory

Table 7. Linear regression test of corresponding Tofel scores and English opinion

	Unstandardized Coefficients		Standardized Coefficients Beta	t	p	VIF	R ²	Adj R ²	F
	B	Std. Error							
Constant	25.712	9.097	-	2.826	0.008**	-			
Corresponding TOEFL Score (English)	0.025	0.094	0.046	0.267	0.791	1	0.002	-0.027	F(1,34)=0.072,p=0.791

Dependent Variable: English opinion

Table 8. Linear regression test of Chinese pretest scores scores and Chinese memory

	Unstandar-dized Coeffi-cients		Standar-dized Coeffi-cients	t	p	VIF	R ²	Adj R ²	F
	B	Std. Error	Beta						
Constant	13.717	8.043	-	1.705	0.095	-			
Chinese pretest (Chinese participants)	-0.037	0.084	-0.065	-0.444	0.659	1	0.004	-0.017	F(1,46)=0.198,p=0.659

Dependent Variable: Chinese memory

Table 9. Linear regression test of Chinese pretest scores and Chinese opinion

	Unstandar-dized Coeffi-cients		Standar-dized Coeffi-cients	t	p	VIF	R ²	Adj R ²	F
	B	Std. Error	Beta						
Constant	24.025	14.212	-	1.69	0.098	-			
Chinese pretest (Chinese participants)	0.039	0.148	0.039	0.267	0.791	1	0.002	-0.02	F(1,46)=0.071,p=0.791

Dependent Variable: Chinese opinion

3.2. Correlation between Memory Scores and Opinion Scores

We assume that people's understanding of news and their opinion toward given content has some relations and adopt linear regression to analyze the correlation. As shown in table 10, there is significant correlation between English memory scores and English opinion scores (p -value=0.04<0.05). The adjusted r -square is 0.192, which means approximately 19.2% of the change in English opinion scores can be explained by the difference in English memory scores. And the unstandardized coefficient is -0.406 , indicating that the better participants understand the news, the more optimistic they would feel about the given content. For the correlation between Chinese memory and Chinese opinion, there is no significant correlation, however, the p -value is 0.072, which is relatively small. The adjusted r -square is 0.049, indicating roughly 5% change in Chinese opinion scores can be explained by the difference in Chinese memory scores. And the unstandardized coefficient is -0.463 , also showing a negative correlation.

Table 10. Linear regression test of English memory and English opinion

	Unstandar-dized Coeffi-cients		Standar-dized Coeffi-cients	t	p	VIF	R ²	Adj R ²	F
	B	Std. Error	Beta						
Constant	32.729	1.615	-	20.267	0.000**	-			
English memory	-0.53	0.173	-0.464	-3.053	0.004**	1	0.215	0.192	F(1,34)=9.323,p=0.004

Dependent Variable: English opinion

Table 11. Linear regression test of Chinese memory and Chinese opinion

	Unstandar- dized Coeffi- cients		Standar- dized Coeffi- cients	t	p	VIF	R ²	Adj R ²	F
	B	Std. Error	Beta						
Constant	32.507	2.617	-	12.419	0.000**	-	0.069	0.049	F(1,46)=3.396,p=0.072
Chinese memory	-0.463	0.251	-0.262	-1.843	0.072	1			

Dependent Variable: Chinese opinion

3.3. Difference between Chinese scores and English Scores

To test our null hypothesis, we adopt paired t-test to test the difference. We first test the difference between English and Chinese memory scores. And the result (table 12) shows the difference is significant (p-value=0.007<0.05).

Then in the t-test between English and Chinese opinion scores (table 13), the difference is not significant (p-value=0.79>0.05).

Table 12. Paired t-test between English memory and Chinese memory

Items	Paired (M±SD)		Mean difference (Paired1- Paired2)	t	p	Items
	Paired 1	Paired 2				
Chinese memory Paired English memory	10.79 ±1.69	8.82 ±3.28	1.97	3.098	0.004**	Chinese memory Paired English memory

Table 13. Paired t-test between English opinion and Chinese opinion

Items	Paired (M±SD)		Mean difference(Paired1- Paired2)	t	p	Items
	Paired 1	Paired 2				
Chinese opinion Paired English opinion	27.69±4.44	27.94 ±3.90	-0.26	-0.268	0.79	Chinese opinion Paired English opinion

4. Discussion

4.1. Memory Block Score Difference Between the English and Chinese Group

According to the result of the 2 sample t-test, significant difference was found in the score of the memory block between the English and Chinese group, with participants in the English group scoring substantially lower than those in the Chinese group. In the experiment, the score of the memory block was set to represent the participants' abilities in information extraction, processing and comprehension, so that lower scores could indicate relatively weaker ability to solve tasks in the corresponding language. Given that the participants' first languages (L1) are all Chinese while English is their second language (L2), it was therefore assumed that the participants' unequal fluency in Chinese and English might be the main cause of the score difference, that a minimum TOFEL score of 80 could have not been adequate for them to rather perfectly perform reading tasks in this experiment. In that way, people who scored higher in the pretests should have done better in the memory block since they are more proficient in the corresponding languages. However, this assumption was not backed up by our data, as there were neither significant correlation between the English pretest score and the memory block

score in the English group, nor were there significant correlation between the Chinese pretest score and the memory block score in the Chinese group.

On the other hand, it was first raised in 1978 that there could be an unpleasant experience both physically and emotionally when people are performing reading tasks by Wallbrown et al., defining this reaction as 'reading anxiety' [11], and this phenomenon was repeatedly studied as well as proved in neuroscience and psychology fields [12, 13]. Moreover, especially for people's second language (L2), further research has discovered that people who tend to be anxious when reading in their L2 can possibly have an inhibited learning and/or production of that language [14]. Zhao also pointed out that a significant negative correlation could be found between foreign language reading anxiety and its reading performance [15]. The reason for this could be that due to the limitation of humans' cognitive capacity [16], if their attention were too much occupied by recognizing foreign words, there could hardly be enough cognitive capacity left for them to comprehend the text as a whole, eventually resulting in unpleasant, stressful emotional reactions and inefficient reading outcomes with few satisfiability [17]. Therefore, in this study, since some technical terms in relation to the virus was presented in the news, the L2 reading anxiety is also considered as a crucial factor which might be the main cause leading to relatively lower scores in the memory block for the participants who are performing reading tasks in English (i.e. their L2). There still lack research focusing on reading anxiety's effect in L1 [18], but some researchers stated that reading anxiety has no effect either in L1 reading accuracy nor in L1 reading efficiency [19], so it is assumed that in this study, there was minor emotionally negative effects on Chinese group participants' reading performance, resulting in their comparably high scores in the memory block.

4.2. Opinion Block Score Difference Between the English and Chinese Group

On the contrary to the memory block, no significant opinion difference towards the epidemic and situation described in the given news article was found between the English and Chinese group. This was different to what was hypothesized, where opinion differences were assumed to be presented due to cultural, political and other reasons (e.g. people might choose to believe less in the information given in foreign language news since it is more likely to be reported by foreign authorities instead of domestic ones). According to the data we collected, participants in both groups were relatively optimistic about the situation reported in the news, as well as were rather satisfied with the government's protective measures mentioned in the news. Moreover, there was also no significant correlation between the opinion block score of either group and the participants' age, gender or education level.

To infer from the study's overall data analysis and the global pandemic, it is highly possible that there was no significant difference in participants' opinion towards the depicted epidemic since COVID-19 has been widely reported for over 6 months, that people have already been establishing their own opinion concerning the world situation using various kinds of information they could have had access to. Comparing to the amount of information people might have already acquired potentially during the pandemic, the news article given in this study can be too minor to have extensive effects on their general opinion at this time point. For the same reason, there could be little or no effect switching the language of the news on people's opinion regarding a certain epidemic situation.

Additionally, it could be surmised from other related studies that by the end of April, the infection in China has been successfully suppressed to a large extent that there has been almost no new local case reported since then [20]. Taking into consideration that a large ratio of the participants are currently living in China, they could be feeling rather relaxed about the epidemic and thus reporting optimistic views in the study. It was also demonstrated in a study that people have been becoming less aggressive since the outbreak of the covid-19 since they tend to cherish their precious, fragile lives [21], so that the increased tenderness of people

might also contributed to a less anxious opinion in this study. Since the pandemic around world is also gradually being relatively stabilized in April [22], similar opinions were also found in Serbia, where over 80% citizens stated that they are cautious about the covid-19, but not really afraid about it by the middle of April [23], indicating an internationally relatively calmed opinion by this time.

Besides, another research found out that negative and pessimistic feelings about the covid-19 increased in elder people, people with chronic disease and lower income [24], but this correlation was not presented in this study. However, the distribution of the score of the opinion block was a little bit larger in the English group, with more participants feeling extremely anxious about the situation. This could be caused by the effect of L2 reading anxiety affecting on their general emotion.

4.3. The Relationship Between Memory and Opinion Score Within the English and Chinese Groups

Interestingly, there was a significant negative correlation found between the memory block score and the opinion block score in the English group, but not in the Chinese group. This is to say that the better the participants in the English group did in the memory block, the less they tend to worry about the covid-19. The reason for this was thought to be two-folded.

Participants who did well in the memory block could have been affected less by the L2 reading anxiety, thus were in a comparably relaxed mood when turning to the opinion block, thereby were able to give more optimistic opinions. Furthermore, participants who scored higher in the memory block also memorised more information accurately and clearly from the article, so that can be more calm about the reported situation since they understand it better than those who performed less well in the reading task. By contrast, the reading anxiety problem and the information acquisition problem were both less severe in the Chinese group since these participants are solving tasks using their L1. As a result, these participants did almost equally well in the memory block, and were thus able to give optimistic answers in the opinion block.

5. Conclusion

Results showed that when reading the same contents with an appropriate difficulty in different languages, there is a significant difference in people's memory levels (i.e. how much correct information they can recall from the text), but no significant difference was found in people's opinions towards the specific event described in the news, indicating that a bilingual peoples' opinion tend to be less affected by the language of given information, but their memory and comprehension of the information could be affected, even when their language proficiency is adequate.

As for the limitations of this study, cheating could have been a major problem due to the study's online nature, that there has been no means of supervising all participants throughout the pretest stage as well as the rest of the experiment processes. Although the participants were prevented from copy and pasting texts into a translator (all texts were given in picture format), they could still make screenshots and review the texts when they are not supposed to do so. From the perspective of the questions in the questionnaire, there could also be a limitation as all questions and scoring scales were self-designed by the research group members, and the validity of them are still in need to be backed up by other literature or professional reviews.

Besides, the sample size became unexpectedly small due to the filtration of a large portion of invalid data. For the same reason, the ratio of participants in English group and Chinese group was also slightly imbalanced after finishing the data collection. Future and further studies could be done in a larger scale to better ensure the validity of the results. Off-line research could also

be done to prevent cheating and misreporting information in the demographic part, since the latter has also been a problem in this study according to our data analysis.

In addition, given that covid-19 is a complicated topic which has an ability to affect people's physical and psychological status and behaviors in many aspects, as well as the global politics and environments [25], it might not be the most suitable topic to be presented in the news article provided in this study, since the sensitive content may have complex impacts on participants' performance and attitudes.

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