

Languages flex cultural thinking

Ceri Ellis, Guillaume Thierry, Awel Vaughan-Evans and Manon Wyn Jones

Review by Adit Jain

Summary

This paper investigates the effect of bilingualism on the perception of culturally relevant statements in Welsh-English bilinguals. To carry out this task, balanced Welsh-English bilinguals were asked to categorise statements as true or false, these statements were based on their native Welsh culture. The results of this study ascertained that though participants were accurate in categorizing positive statements as True when they, in fact, were true, they had a bias categorizing the false positive statements as true regardless of the language in which they read the statements. This can be subjectively reasoned by arguing that the participants possess “Welsh Pride” which is not impacted by the language the statements were presented in.

However, contrary to expectations participants were unbiased when categorizing statements in their native language Welsh but showed a reversed bias for English - they categorized the True negative statements as false. This can be linked to the tendency of the second language to better shield the person from hurtful information regarding her culture than the native language.

Methodology

There were 16 participants, out of which 14 were females. Six participants were excluded while conducting the experiment. The different participant parameters are listed in Table 1 and explained here. The age of the participants indicates that most of the participants are young (15-28). Exposure to different languages is in years and is the age when the participant was first exposed to L1 (Welsh) or L2 (English), all participants were exposed to L1 from birth. The participants rated themselves on a scale of one to ten for literacy in both the languages, where one indicates non-literate and ten indicates very literate. The participants in this study were fairly literate in both languages. Self-reported use was also recorded which is the percentage of time the person engages in L1 or L2 as reported by them, and L1 was the most used language.

Parameter	Mean	Standard Deviation
Age	22.56	7.17
Exposure to Welsh (L1)	From birth	-
Exposure to English (L2)	5.13	3.16
Self Rating for literacy in L1 (Grand M)	9.16	1.48
Self Rating for literacy in L2 (Grand M)	8.64	1.25
Self-reported use for L1	74.69%	18.02%
Self-reported use for L2	24.69%	18.39%
Multigroup Ethnic Identity Measure (1 = indifferent response to 4 = strong cultural response)	3.4	0.88

Table 1: Participant Parameters for this study

Finally, a Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992) demonstrated a strong sense of Welsh cultural belonging. MEIM a measure of the subjective sense of membership in any group.

Stimuli

For enabling this experiment, 320 English and their Welsh translations statements were constructed. Within each language, the statements were divided into 40 sets of 8 Participants were presented with

four statements from the English sets and four statements from the Welsh sets which were not the translations of the English statements chosen.

Since the sentences were not repeated for any participant, the experimental design involved three components: a) Language, which could be English or Welsh b) The emotion or the sentiment of the sentence, which could be Positive or Negative and c) The truth value of the sentence, where the sentence could be either objectively True or False. Thus the participants were presented with 8 statements, 4 from English and 4 from Welsh.

A norming study was also performed involving 20 native Welsh bilingual speakers which helped evaluate the valence, i.e. the negative or the positive nature of the statements on a scale of 1 to 7 and the plausibility of the statements. This was done to have an estimate of what might be a natural reaction to the statements used and effectively figure out the effect that that bilingualism has. An important point to be noted here is that the plausibility of the statements used was high, and had to be so for the participants to use their mental faculty and evaluate them otherwise they might have been outrightly rejected. Finally, Cloze probability for all the statements was high enough, this is a probabilistic measure of the target word completing that particular sentence frame. This was normalized by asking people to complete the statement and if the word matched the target word a score of one was given to that statement, otherwise a zero. Mean was calculated across all accounts and came out to be 0.52(52%).

Procedure

The first clause of the statements was read in a self-paced manner and subsequent words were flashed (single-word presentation) at a rate of 200ms and with an inter-stimulus (the gap between two words) of 500ms. Once the words were done with, “++” was flashed, and the participants were required to make a true/false judgement about the presented statement. The reason for prompting “++” was to minimize eye movement. Participants were told beforehand to select a response as quickly as possible but no other physical constraint was present.

The participants and statements were randomized enough so that the final word is not the same for any sentence in a given block. The experiment involved three practice trials as well. The experiment involved two parts; four blocks of statements presented in L1 (Welsh), and four blocks presented in L2 (English) with a break in between.

Analysis

Two kinds of analysis were performed which is the standard in most cognitive linguistic studies. Firstly, a behavioural analysis which studied the accuracy, i.e. truth value matching the participant's responses and Reaction time, for understanding how long it took to respond to the prompt. Binomial logistic regression was performed for the accuracy analysis. Binomial logistic regression involves modelling the probability of correctness against different conditions. Here the regression model depended on all three factors (Language*Truth*Valence), this is also called an interaction model. The reaction time data were log-transformed and a linear mixed-effects analysis was performed. This analysis helps understand the change in the variable (reaction time here) with respect to both fixed and random effects.

Secondly, an ERP analysis (Event-related potential) was performed. The main aim of this kind of analysis is to understand the impact that the stimulus has on the different regions of the brain. Electrodes are placed on the participant's brain and the potentials are recorded accordingly. This helps study the functioning of the brain in a non-intrusive way. The data is called Electroencephalogram(EEG) activity. For cognitive sciences related to linguistics a specific kind of component of the EEG labelled as N400, this typically peaks around 400ms post stimulus. N400 indicates the brain response to words and other stimuli, including visual and auditory words, pictures etc. A greater N400 amplitude implies a greater semantic integration effort (effort to construe meaning).

Both EEG and behavioural data were collected simultaneously and then analysed. The EEG data in addition has to be filtered accordingly to obtain the frequency components pertaining to brain activity and to remove noise.

Results

The results are discussed for both the analyses, the behavioural results indicate the variation in the accuracy based on the language used, truth value and the valence of the statement. The ERP results help understand how the words are understood on a physiological level trying to explain the behaviour results through the eyes of cognition. Hypotheses are constructed which are then validated by using hypothesis testing on the given data.

Behavioural Results:

Participants display a bias for positive statements, meaning the statements which are True are categorized accurately whereas False statements are also miscategorized as True. This checks with the expectations and further, Accuracy is identical in English and Welsh, for both false statements ($b = -0.05$, $z = -0.46$, $p = .641$) and true statements ($b = 0.05$, $z = 0.29$, $p = .770$). b , p and z are parameters for hypothesis testing, generally a low p means that our hypothesis is true for most instances or there's a less chance of having an outlier, b is the regression coefficient. Participants showed a reverse bias in response to English negative statements as expected, such that they accurately categorized false statements ($b = 1.32$, $z = 9.55$, $p < .001$), whereas miscategorized true statements as false ($b = -2.44$, $z = -13.15$, $p < .001$).

Unexpectedly, for negative statements read in Welsh, the three-way interaction showed that participants were likely to be less accurate in rejecting false statements ($b = -0.51$, $z = -2.94$, $p = .003$) and tended to accept true statements ($b = 0.86$, $z = 3.37$, $p < .001$).

For positive statements, participants were faster to respond to true compared with false information, and response time was identical in English and Welsh, In negative statements responses to true information were significantly slower compared to false statements

Electrophysiological Results:

A critical analysis of ERP results would require a more academic mind than the current reviewer has to offer. Nonetheless certain facts can be stated and understood without the need to go deeper. There was a lack of symmetry in the accuracy data for both positive and negative statements with the incorrect responses of participants comprising well thought responses in addition to simple errors.

There were two other measurements, a "pride-index" which qualifies the tendency of characterizing false positive statements as true and a "defence-index" which qualifies the tendency of characterizing true negative statements as false. Difference of N400 mean amplitudes was taken between the True and False conditions for trials that displayed a correct response. The correlation between the difference in the magnitude of the defence index across languages was significant, which also supports evidence from the Behavioural results. No such correlation was found for the pride index.

Conclusion

This paper tries to research the understanding of statements which have a cultural context, this understanding is controlled by language in Welsh-English bilinguals. Positive statements are categorized accurately when they were in fact true, but have a bias when they were false, this can be because of the "Welsh Pride". The results however indicate that the second language (English here) prefers rational processing as compared with the first language (Welsh here) especially when considering negative statements with a cultural context being analysed.

Neutral words are more poorly contextualised than Emotion words in L1. Emotion Words are also better recalled in L1 than in L2. This asymmetry in language-emotion links affect cognition in bilinguals. One similar study has shown that Chinese-English bilinguals access the Chinese translations of positive and neutral words presented in English, but not that of negative words.

To summarize, bilinguals retrieve meaning more objectively in their second language when processing negative statements and thus are likely to deny undermining comments against their culture. Meanwhile, when participants are faced with the similar kind of information in their first language, the semantic system is confused by the negative statements to a greater extent, blurring the contrast between truth and falsehood, and thus causing them to be careless.