Understanding How People Attend to and Engage with Foreign Language Posts in Multilingual Newsfeeds

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Abstract

We explore how language affects people's attention to and engagement with social media posts in an eye-tracking experiment in which participants viewed a mock newsfeed containing English and foreign language posts, half with and half without images. Participants spent less time looking at foreign language posts than English posts, and more time looking at posts with images than those without images. Participants reported being more likely to like or comment on posts in English and posts with images. We suggest some new design ideas for supporting people's interaction on multilingual social media sites.

Introduction and Research Background

Social media sites provide new opportunities to encounter, understand and interact with linguistically or culturally diverse social connections (Eleta and Golbeck, 2012; Ellison, Wohn, and Greenhow, 2014; Lee and Markey, 2014). For example, Hong, Convertino, and Chi (2011) found that more than 100 languages were used on Twitter. Previous work has focused on the posts by bilingual users, for example looking at how audience and communicative goals influence language choice (Halim and Maros, 2014; Tang et al., 2011). However, less work has considered how people consume and engage with posts in different language in their social media feeds. In this paper, we use eye-tracking to understand how people attend to and engage with foreign language vs. English posts with and without images.

People might automatically filter out posts in languages they do not understand, in an early stage of cognitive processing (Treisman, 1969). Alternatively, people might try to process foreign language posts but cut this processing short due to the small amount of information that can extract from such posts. Either way, we expect that people will spend less time on posts in foreign languages than posts in English.

H1: People will spend more time viewing social media posts in English than posts in foreign languages

The amount of information a monolingual English speaker can obtain from a foreign language post, and thus the amount of attention allocated to that post, may also be influenced by structural features of the post such as the inclusion of images. Images have previously been shown to increase attention to posts (Vraga, Bode, and Troller-Renfree, 2016). We expect to replicate these results and then we explore how post language and modality interact.

H2: People will spend more time on viewing social media posts including images than posts without images

RQ1: How will post language and post modality interact with one's attention to social media posts?

Furthermore, we explore how post language influence on the interestingness of a post. Possibly, native English speakers might find foreign language posts interesting because they are relatively unusual. Also, English speakers might find foreign language posts uninteresting due to their inability to read them. We therefore ask,

RQ2: How will post language affect one's evaluation of interestingness of social media posts?

Beyond passive browsing of social media posts, people can contribute to others' contents such as clicking Like or leaving comments. Previous literature explored what factors increase engagements with posts and found that structural characteristics (Counts and Fisher, 2011; Suh, Hong, Pirolli, and Chi, 2010) predict greater engagement. Because language is also an important structural characteristic of messages, we explore how differently people would engage with posts depending on post language and modality.

RQ3: How will post language and modality affect one's willingness to engage with posts?

In addition, we presume that the amount of information and attention allocated to foreign posts may be different depending on the similarity between that language and English. For example, there may be recognizable words in

Spanish posts but no discernable information in Chinese posts. We therefore asked,

RQ4: How will different types of foreign language affect one's attention to and engagement with posts?

Research Methodology

We conducted a laboratory experiment using a 2 (Post language: English vs. Foreign language) by 2 (Post modality: Text only vs. Text with Image) factorial within-subject design. Twenty-two native English speakers (17 female) were recruited (mean age 20.04 years old). The majority browsed their Facebook newsfeeds multiple times a day and they self-reported that 6.13% of posts in their newsfeeds were in foreign languages (*SD*= 4.61). About half of the participants reported having some knowledge of a foreign language, but none were proficient.

In the experiment, participants were instructed to browse a mock Facebook newsfeed while their eye movement was recorded by a GP3 Eye Tracker with 60 Hz sampling rate. Participants were told to browse the newsfeed at their usual pace, but they could not click or type anything. After browsing, they filled out the post experiment survey. In the survey, the 40 posts were shown again in the same order as presented and they were asked to rate how interesting each post was and how likely they would be to engage with the post (i.e. Like, Comment) on 7-point Likert scales.

Materials

We created a mock newsfeed using diverse pictures from a publicly available online photo repository. We selected pictures that did not seem professionally taken and did not include human faces or objects that were culturally specific. Next, we generated the text contents of each post based on the information that we could gain explicitly from each picture in English. The length of text content was controlled (90 to 110 characters). After several iterations, we developed 40 test set posts for manipulations. These initial English posts were translated into one of four foreign languages; Spanish, German, Chinese, Korean by bilingual native speakers. Then, five different versions of posts per each test set item were created; 1) Image only post, 2) English text post, 3) English text + image post, 4) Foreign language text post, and 5) Foreign language text + image post. Then, one of types of posts were included in the newsfeed randomly while the proportion of each condition kept same. In addition to test set posts, additional 60 posts written in English (filler set) were created without much constraints to make the mock newsfeed seem more natural and plausible to participants. Total 100 posts were ordered randomly in a newsfeed.

Measures

Attention To measure the attention paid to each post, we analyzed eye fixations on each post. We defined a fixation as gaze fixed on a post area for at least 100 milliseconds. After collecting fixation data, each post was set as *area of interest* (AOI) and the fixation durations were aggregated for each AOI. Because attention scores were highly positively skewed, we log transformed the data after truncating the high end of the distribution at 2.5 SD above the mean.

In addition, three measures were extracted from the post-browsing task survey:

Post Interestingness. Perceived interestingness of a post was assessed using three questions ("This post is interesting/familiar/relevant to me"). These three questions formed a reliable scale (Cronbach's α = .84) and responses were averaged to create a measure of post interestingness.

Likelihood of Post Engagement. One's likelihood of engaging with a post was assessed by two questions ("I will click Like / comment on this post") on a scale from 1 (strongly disagree) to 7 (strongly agree).

Results

Attention

H1 predicted that people would spend more time viewing social media posts in English than posts in other languages. To test H1, we performed a Mixed Model ANOVA analysis using participant as a random factor and post language and modality as fixed factors. We found a main effect of post language on fixation duration (F[1, 637.86]= 11.414, $p < 0.01$). Social media posts in English (M= 1944.6ms, SD= 77.2) were viewed longer than posts in foreign languages (M= 1648.9ms, SD= 77.8; Figure 1).

H2 predicted that people would spend more time viewing social media posts that included images than posts without images. Consistent with H2, we found a significant effect of post modality (F[1, 277.1]= 79.683, $p < 0.01$). Social media posts including images (M= 2243.67ms SD= 71.8) were viewed longer than posts without images (M= 1349.91ms, SD= 73.2; Figure 1). There was no significant interaction between language and modality (**RQ1**).
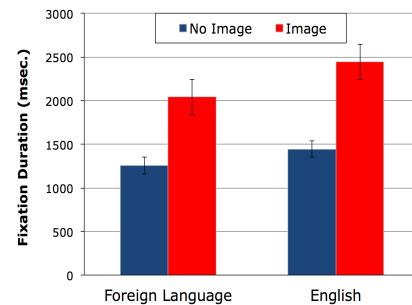

Figure 1 Mean fixation durations by language and modality

Interestingness

RQ2 asked whether post language would affect ratings of post interestingness. A Mixed Model ANOVA of the same form as above indicated a significant main effect of post language ($F[1, 558.68]= 125.77$, $p< 0.01$). English posts ($M= 3.97$, $SD= 0.09$) were rated more interesting than foreign language posts ($M= 2.77$, $SD= 0.09$). Posts with images were rated as more interesting than those without images ($F[1, 337.32]= 124.68$, $p< 0.01$). There was a significant interaction between language and modality ($F[1, 469.93]= 11.69$, $p< 0.01$). Posts in foreign languages without images were rated least interesting (see Figure 2).
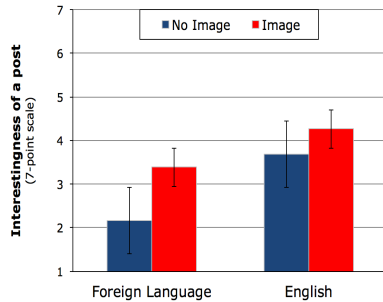

Figure 2 Mean interestingness ratings by language and modality

Engagement

RQ3 asked whether post language would affect one's willingness to engage with a post. A Mixed Model ANOVA showed a significant main effect of language for both liking and commenting on posts (Like: $F[1, 565.59]= 138.43$, $p< 0.01$, Comment: $F[1, 630.39] = 49.99$, $p< 0.01$). We also found a significant main effect of post modality for both liking and commenting (Like: $F[1, 321.47]= 85.66$, $p< 0.01$, Comment: $F[1, 252.61]= 20.95$, $p< 0.01$) such that people are more likely to engage with posts with images than without images (see Figure 3). There was no significant interaction between post language and modality.
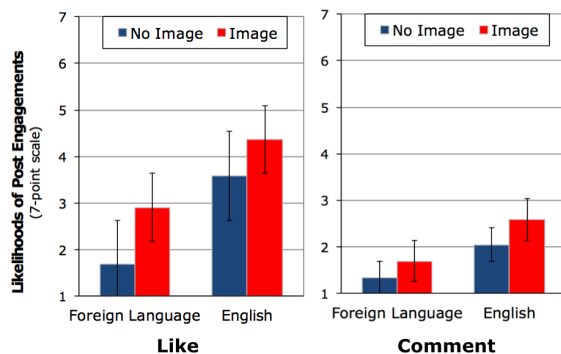

Figure 3 Mean likelihoods of post engagement

Language Type

To examine **RQ4,** we made comparisons between English vs. Western foreign languages (Spanish, German: Similar condition) vs. Asian languages (Chinese, Korean: Dissimilar condition). We found that attention to posts differed significantly between these three groups of languages ($F[2, 609.32]= 9.82$, $p< 0.01$; see Figure 4). There was no interaction effect between language type and post modality. Post-hoc LSD comparisons revealed that fixation duration to English and Western foreign language posts did not differ significantly ($p= .14$). However, Asian language posts attracted significantly less attention than others ($p< 0.01$).

Language type also had a significant effect on ratings of post interestingness ($F[2, 534.072]= 63.201$, $p< 0.01$). Post-hoc LSD analysis revealed that people rated English posts significantly more interesting than either Western or Asian language posts ($p< 0.01$ each).

Likelihoods of liking and commenting also varied significantly by language type (Like: $F[2, 536.23]= 69.08$, $p< 0.01$, Comment: $F[2, 618.11]= 24.89$, $p < 0.01$). Post-hoc LSD comparisons showed no significant difference between Western and Asian foreign languages. English posts were always more likely to be liked or commented than any type of foreign language post ($p < 0.01$ each).
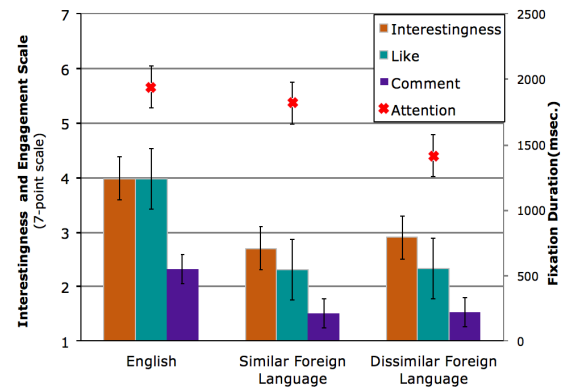

Figure 4 (Left Axis) Mean interestingness and engagement (Right Axis) Mean fixation duration by language type

Discussion

Our results indicate that language of posts has a significant effect on how people attend to, evaluate interestingness and engage with social media posts. English-speaking participants devoted more visual attention to English language posts, rated English posts as more interesting and were more willing to engage with these posts than with foreign language posts.

Interestingly, participants directed about as much attention toward posts in Western foreign languages as they did toward posts in English whereas posts in Asian foreign languages attracted the least attention. This might be be-

cause participants recognized some common or similar words from western foreign languages (e.g., mañana). However, the additional attention paid to posts in Western foreign languages in comparison to those in Asian languages did not map onto differences in likelihood to engage with those posts. One possibility is that although they could recognize some words, participants were not sufficiently confident they understood Western language posts well enough to respond.

Posts with images attracted significantly more attention than posts without images, independent of what language the post was in. In fact, images were such a large attractor of attention that foreign language posts with images received more attention on average than English posts without images. Posts including images were also rated higher in interestingness and participants reported being more likely to engage with them than posts without images, regardless of language. This suggests that images might serve as a bridge between language communities, allowing for some degree of information flow and interaction between people who cannot exchange verbal messages.

The findings suggest design implications that could help people using different languages interact with each other through social network sites. First, our findings provide opportunities to consider how people consume and interact with posts in multilingual newsfeeds with respect to curation algorithms. For example, a Facebook user's newsfeed has been iteratively curated using various metrics such as post type, activity, and relational metrics (Constine, 2016; Facebook, 2016). It is unclear how these algorithms take post language into consideration. However, if people spent less time viewing and engaging with foreign language posts, it is reasonable to assume that foreign language posts would show up less frequently in the newsfeed. If that happens, it would diminish the capacities of social network sites to connect linguistically or culturally diverse connection, instead creating linguistic clusters.

Our findings also suggest how machine translation of foreign social media posts could be improved. In most popular social network sites, machine translation features are available to translate foreign language posts. Facebook is now testing 'auto-translation' that translates foreign language posts without requiring manually clicking 'translation' button. Based on our findings, we suspect auto-translation might help attract attention to posts, though if the translation is not of high quality it may not increase interest in or willingness to engage with a post.

Our study has several limitations that we plan to address in future research. First, we only studied native English speakers and a small subset of possible languages posts might be in. Additional research is needed to determine the extent to which the findings generalize to other populations and languages. Second, our eye tracking methodology required a constrained task that may not generalize well to how people look through their newsfeeds in other settings. Finally, the posts that we used as stimuli were made up and did not include information about the posters. Therefore, we plan to address how relational factors affect attention, interest and engagements with foreign language posts in future research.

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