Asymmetrical Orthography to Phonology Correspondences Cause Equivalent Correspondence Effects - A Study Case of Chinese Character Naming

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Background and Purpose

That word frequency constrained effects of orthography to phonology correspondence is a replicable phenomenon in the experiments of naming single English words or single Chinese characters, and this fact has became the settlement of computational models of word reading. This knowledge has been challenged since Jared (1997) found equivalent correspondence effects from high to low frequency groups when the friend and enemy frequency of target word were considered.

Liu, Su, and Chen (2001) established the Chinese character corpus which summaries the quantitative information of phonetic radical to sound correspondence of the Chinese phonograms. The friend frequency and enemy frequency of a character in this corpus are the summations of character frequencies of consistent and inconsistent phonetic neighbors. Among the characters with more than one neighbors, the correlation of character frequency of these characters and their friend frequency achieves 0.84, and the correlation of character frequency and enemy frequency has only 0.04. It is apparent that the distributions of character frequency and friend frequency are perfectly matched, and both distributions are asymmetrical to the distribution of enemy frequency.

An alternative view for the ambiguous findings of interaction between word frequency and correspondence is raised from these two approaches of studies: if the formation of orthography to phonology correspondence is established on the distributions of friend and enemy frequency, the magnitude of correspondence effect will reflect the competition between consistent and inconsistent correspondences. This study is our first trial to examine the reality of this viewpoint on naming performance across broad character frequency bands, which includes very high frequency characters (about 500), high frequency characters (about 220), and low frequency characters (about 3).

Method

The experiment was a 3(character frequency: very high, high, and low) × 2(phonetic correspondences: consistency and inconsistency) within-subject design. There were six groups of 14 Chinese characters and 36 low-frequency isolated characters (no neighbors) were used. All target characters were presented in the center of a CRT monitor in a randomization sequence, and the participants were instructed to read each character aloud into the microphone as quickly as accurately. The time triggered voicekey and voices of a participant were saved in a text file and 120 single wave files for proceeding analysis.

Results and Discussion

Table 1 showed that naming latencies of consistent and inconsistent characters grew with decreasing character frequencies. The magnitudes between the two kinds of characters were almost equal from very high to low frequency groups.

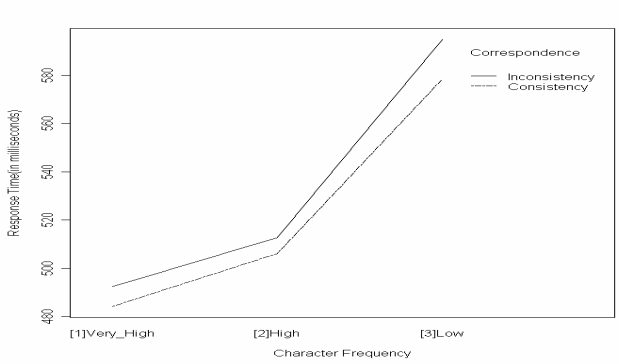

Figure 1: Mean naming latencies for three groups of consistent and inconsistent Chinese characters.

A two-factor repeated measure ANOVA indicated that the participants' naming latencies were significantly detained by lower character frequency: $F(2,54) = 301.38$, $MSe = 497$, $p < .01$, and inconsistent correspondence : $F(1,27) = 17.65$, $MSe = 263.5$, $p < .01$. Furthermore, no interaction of character frequency and correspondence indicated the equivalent consistency effects across frequency levels: $F(2,54) = 1.96$, $MSe = 202.9$, $p > .1$. The phonetic correspondence caused 8 ms effect in very high frequency group, $t(27) = 2.60$, $p < .05$; 7 ms effect in high frequency group, $t(27) = 2.08$, $p < .05$; and 17 ms effect in low frequency group, $t(27) = 3.18$, $p < .01$. These results satisfy the viewpoint that the formation of orthography to phonology correspondence is established on the basis of the neighborhood characteristics. Future relevant experimental evidences are predicted, and a computational model established on these language facts is expected.

References

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