Meanings within meanings: Skilled readers activate irrelevant meanings of radicals and phonetics in Chinese

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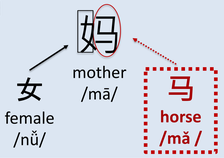
Overview: Chinese characters often contain cues to meaning (radicals) and sound (phonetics). However, both types of elements can have meanings that are irrelevant and misleading to the characters in which they occur. In two studies, irrelevant semantics interfered with performance, suggesting that they are automatically activated in character recognition.

Experiment 1

Characters such as MOTHER (妈- **mā**) consist of a radical (FEMALE; 女) and a phonetic (HORSE; 马, **mǎ**). HORSE's meaning is irrelevant, but readers may nonetheless activate it because it is a common word and a radical in other characters (驹- FOAL).



We asked: **Do readers compute the meanings of phonetics even though they are irrelevant and sometimes misleading?**

Method & Results

Preliminary data are reported from 17 adult native speakers of Mandarin. Participants briefly saw a prime and then made a lexical decision to a target.

Stimuli: A target such as REJECT 拒 contains a phonetic with an unrelated meaning, HUGE. Each target appeared with 3 types of primes:

Character semantics (CS)	否 NEGATE	Semantically related to target
Phonetic semantics – *misleading* (PS)	**大 BIG**	**Semantically related to phonetic**
Unrelated (UR)	各 EVERY	Unrelated to all of target

Trials: 30 targets X 3 primes = 90 "yes" trials, 90 trials with pseudo-character targets ("no"). Half "yes" targets were HF, half LF. Each trial consisted of a fixation point (300ms), a blank screen (500ms), a prime (57ms) and a target, visible until the lexical decision was made.

Main prediction: Facilitation in Character Semantics (CS) condition, interference Phonetic Semantics (PS) condition compared to Unrelated (UR).

Results: Figure 1 shows facilitation in the Character Semantics condition compared to Unrelated, as in previous studies (Feldman & Siok, 1999). The Phonetic Semantics condition yielded the longest mean latencies. Figure 2 shows the effects are larger for LF targets, consistent with previous studies.

Conclusions

Readers activate the meaning of the phonetic, which interferes with performance when it is unrelated to the meaning of the character. These results raise the possibility that the putatively irrelevant meaning of a sublexical component (here the phonetic) may be incorporated in the meaning of the character. In other words, there is some HORSE semantics in the meaning of MOTHER.

Figure 1

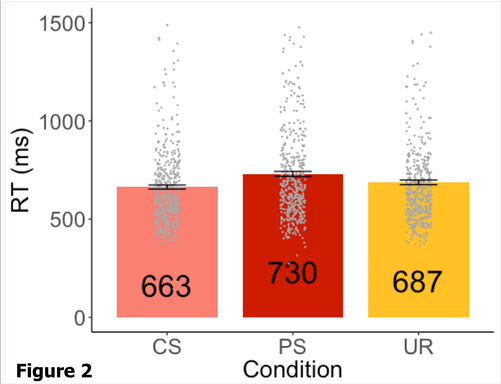


Figure 2

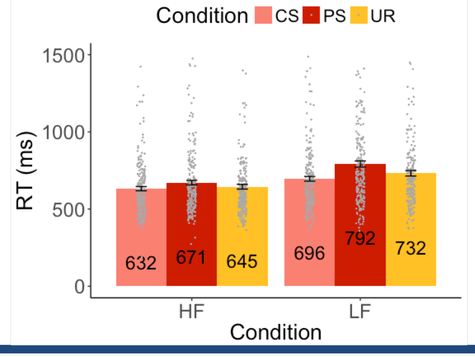


Figure 3

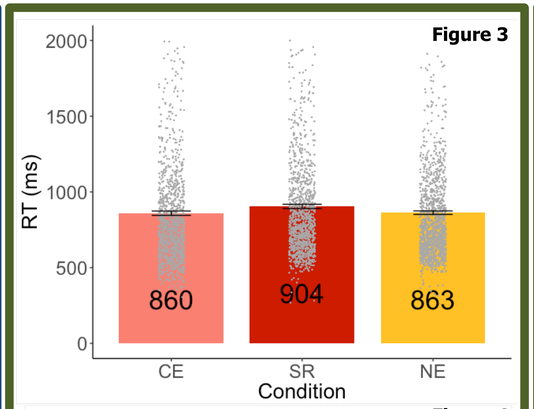
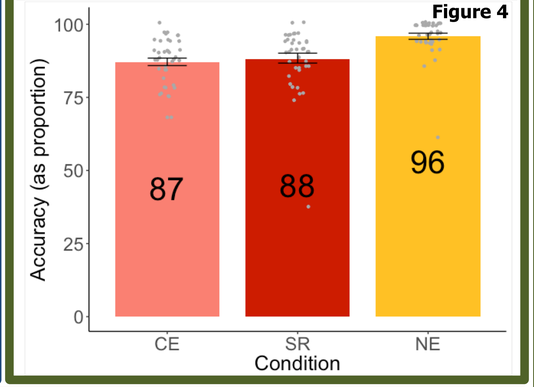


Figure 4



General Discussion

- Preliminary evidence that readers activate information that is strongly associated with an element (radical or phonetic) but irrelevant to the character's meaning.
- Activating irrelevant information (like "horse" in MOTHER or "knife" in TICKET) may alter the character's meaning.
- These effects may be smaller for higher frequency words, as in studies of other types of inconsistencies.
- All results are preliminary; we have not completed running the pre-specified number of participants required to achieve sufficient statistical power.

Experiment 2

The meanings of radicals can also be misleading. TICKET 券, for example, contains the radical meaning KNIFE (刀), which is semantically irrelevant. Readers may nonetheless activate KNIFE's meaning because it is a familiar word and a relevant semantic cue in other characters.

Parallel to Experiment 1 we asked: **do readers compute the meaning of a radical even when its semantics is misleading?**

Method & Results

Preliminary data are reported for 35 participants who performed a category judgment task (Van Orden, 1987). The conditions were:

Category: *WEAPON*		
Correct exemplar (CE)	枪 (GUN)	Semantically related to category
Semantic radical - *misleading* (SR)	**券 (TICKET)**	**Semantic radical (KNIFE) related to category**
Non-exemplar (NE)	宪 (STATUTE)	Entirely unrelated to category

Trials: 35 trials X 4 conditions (4th condition containing radicals only added to equal "yes" and "no" trials). Stimuli matched for complexity, frequency across conditions. Trials consisted of category name (1500ms), fixation cross (200ms), and a target (200ms). Participants judged whether the target was a member of the category, pressing "yes" or "no" keys.

Main predictions: Activation of the misleading radical (SR) should yield more false positives and/or longer response latencies in that condition.

Results: Figure 3 (middle right, top) shows interference for misleading semantics. Figure 4 (middle right, bottom) shows higher false positives.

Conclusions

As in Experiment 1, results suggest readers activate irrelevant semantics. Raises questions about impact on character meanings, notably in sexist character such as DISLIKE, EVIL, GREEDY which contain FEMALE radical.

References

Feldman, L. B., & Siok, W. W. (1999). Semantic radicals contribute to the visual identification of Chinese characters. *Journal of Memory and Language, 40*(4), 559-576.

Van Orden, G. C. (1987). A ROWS is a ROSE: Spelling, sound, and reading. *Memory & Cognition, 15*(3), 181-198.

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