Semantic Radical Activation in Visual Japanese Compound Recognition: Seeing the tree for the forest

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Mini Lexical Decision (with Priming)

1. Aim of the Experiment

- To investigate whether semantic radicals (orthographic morphemes) are processing units in Japanese word recognition using two-kanji character stimuli.

2. Materials

- 46 two-character prime-target word pairs with their semantic radical shared (primed)
- 46 two-character word pairs with their semantic radical not shared (control)
- 46 two-character nonwords

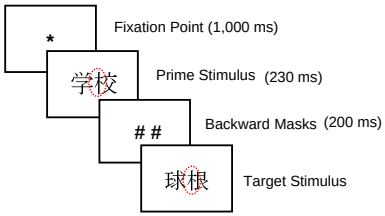
	Prime			Target			
Condition	*Word*	*Morphology/ Translation*	*Radical*	*Word*	*Morphology/ Translation*	*Radical*	*Radical Shared*
Primed	空港	*ku-ko* 'airport'	シ (water)	血液	*ketsu-eki* 'blood'	シ (water)	Yes
Control	砂嵐	*suna-arashi* 'sandstorm'	山 (mt.)	血液	*ketsu-eki* 'blood'	シ (water)	No
Non-word	額縁	*gaku-buchi* 'frame'	糸 (string)	円筆	N/A	竹 (bamboo)	No

3. Participants

- 30 native Japanese speakers participated in the experiment.

4. Procedure

- A lexical decision with priming paradigm was used.
- A semantic radical of a right character was repeatedly presented.
- Participants rated semantic transparency of each semantic radical on a seven-point scale after

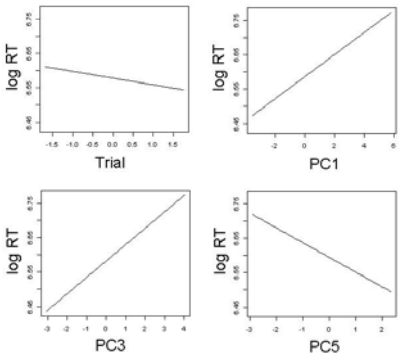


Fixation Point (1,000 ms)
Prime Stimulus (230 ms)
Backward Masks (200 ms)
Target Stimulus
Word ? or Nonword ?

5. Results

- There was no significant priming effect. In a post-hoc principal component regression analysis, 21 lexical predictors were reduced to six principal components (PC).
- Three principal components were predictive
- The semantic radical of a left character slowed down RT, while the semantic radical of a right character speeded up RT.

Principal component dimension reduction and Regression analyses of each PC in lexical decision



Loadings of the original lexical predictors on each PC

Predictor Type	Lexical Predictors	PC1	PC3	PC5
Prime	Log Prime Whole Word Freq	-0.204	0.174	0.005
Prime	Log Prime Right Kanji Type	-0.199	0.182	-0.108
Prime	Log Prime Right Kanji Token	-0.248	0.240	-0.057
Prime	Prime Right Kanji AoA	0.234	-0.282	0.292
Prime	Prime Right Kanji Stroke	0.263	-0.133	-0.033
Stroke	Left Kanji Stroke	0.036	0.152	-0.372
Stroke	Left Kanji Radical Stroke	-0.063	0.385	0.062
Stroke	Right Kanji Stroke	0.222	0.107	0.171
Stroke	Right Kanji Radical Stroke	0.256	0.042	-0.023
Radical	Log Left Kanji Radical Type	0.186	-0.117	-0.579
Radical	Log Left Kanji Radical Token	0.032	-0.016	-0.520
Radical	Log Right Kanji Radical Type	-0.325	0.046	-0.120
Radical	Log Right Kanji Radical Token	-0.326	-0.061	-0.035
Radical	Radical Transparency	0.182	0.177	-0.120
Character	Log Left Kanji Type	-0.169	0.167	0.171
Character	Log Left Kanji Token	-0.199	-0.043	0.107
Character	Left Kanji AoA	0.228	-0.179	-0.120
Character	Log Right Kanji Type	-0.257	-0.231	-0.079
Character	Log Right Kanji Token	-0.229	-0.424	-0.047
Character	Right Kanji AoA	0.299	0.252	0.134
Whole Word	Log Whole Word Token	-0.069	-0.432	0.099
	Variance accounted for (%)	27.7	11.0	7.6

Prime Properties
Stroke Features
Radical Properties
Character Properties
Word Property

Mega Lexical Decision (without Priming)

1. Aim of the Experiment

- To investigate radical activation by using the distributional and orthographic properties of semantic radicals. properties of semantic radicals, without using a priming method.
- To study the role semantic radicals against the background of a wide range other lexical effects.

2. Materials

- 708 Japanese two-character words were sampled randomly from Amano & Kondo (2003) lexical database.
- Words with homophones were excluded.
- 708 two-character nonwords were prepared:
  - 180 of these nonwords were derived from existing two-character words.
  - The rest of the nonwords were random combinations of characters.

3. Participants

- 12 native Japanese speakers were tested

4. Procedure

- A vocabulary size test, a reading proficiency test and a background questionnaire were conducted to gauge participants' language experience and proficiency.
- The study consists of three sessions.
- The location of a fixation point was varied for each session (left, right, centre)
- 472 words were presented in each session.
- Throughout the experiment, participants wore a head-mounted eye-tracker.

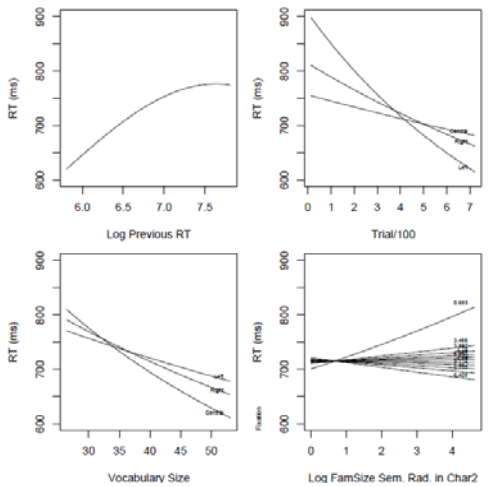
5. Results (RT analysis)

- Type frequency of 2nd (right) characters' semantic radical was found to be predictive and Interacted with family size of 1st (left) characters.
- Fixation point location interacted with Trial and individuals' vocabulary size

Estimate and p-value of Predictors

	Estimate	p-value
(Intercept)	-6.1606	0.001
TotalStrokes	0.0035	0.001
EntropyStrokes	0.1279	0.028
TotalToken	-0.0587	0.001
Char2RadicalFamSize	0.0504	0.024
Char1FamSize	0.0072	0.714
VocSize	-0.015	0.002
Char2Grades	0.0096	0.001
poly(PrevRT, 2, raw = TRUE)1	1.4728	0.002
poly(PrevRT, 2, raw = TRUE)2	-0.0964	0.002
FixationLeft	-0.0929	0.102
FixationRight	-0.0936	0.048
Trial	-0.0201	0.001
Char2RadicalFamSize:Char1FamSize	-0.0106	0.020
FixationLeft:Trial	-0.0525	0.001
FixationRight:Trial	-0.0189	0.002
VocSize :FixationLeft	0.0084	0.001
VocSize :FixationRight	0.0051	0.001

Effects of RT in Previous Trial, Fixation Location-Trial Interaction Fixation Location-Vocabulary Size Interaction, and Char1FamSize-Char2RadicalType Interaction



Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada
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This research was supported by a Major Collaborative Research Initiative Grant (#412-2001-1009) from the Social Sciences and Humanities Research Council of Canada to Gary Libben (Director), Gonia Jarema, Eva Kehayia, Bruce Derwing, and Lori Buchanan (Co-investigators).