The Time-Course of Lexical Activation and Individual Differences in Japanese Two-Character Word Recognition

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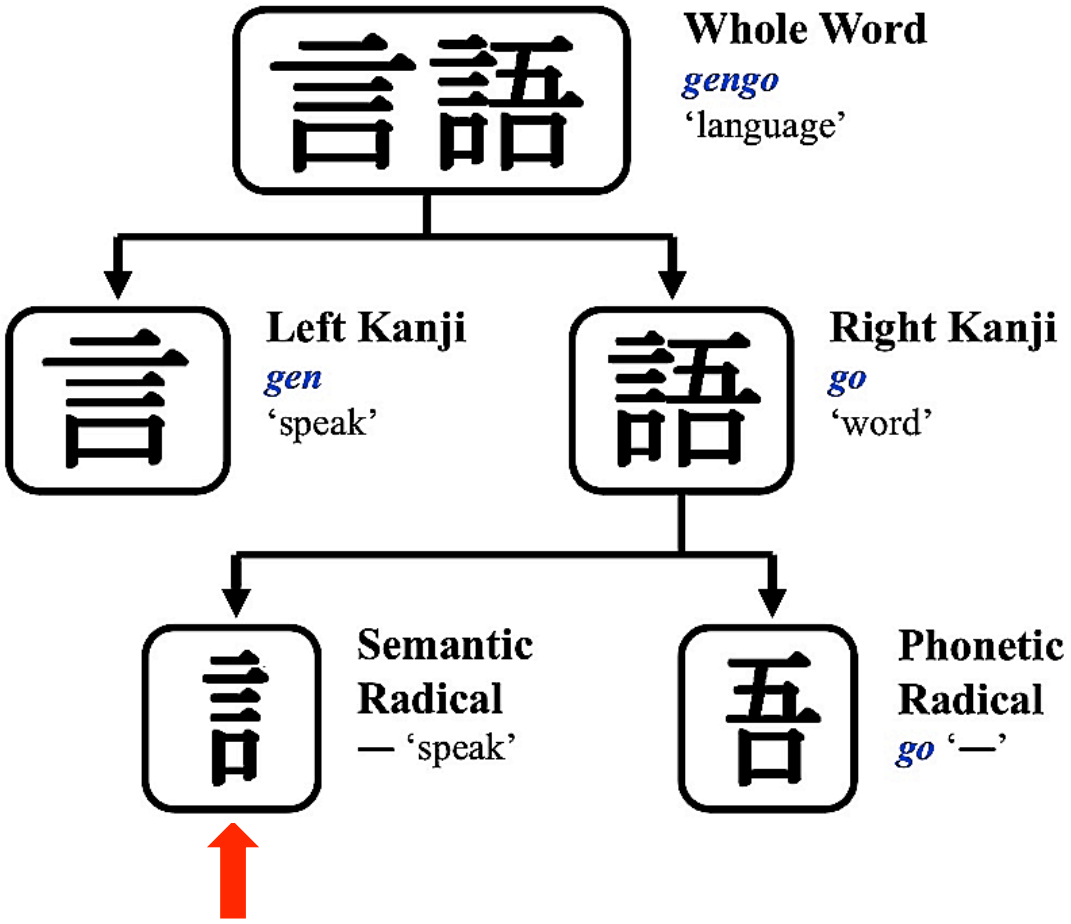
Japanese *Kanji* Logography

- An auditorily simplex word can be morphographically complex in Japanese.
- The majority of Japanese "simplex" words are complex in this sense.
- How are two-character words recognized ?



Lexical Predictors

言語

Whole Word

Whole Word Token Freq (3,620),

Google Doc Freq (49,400,000)

語

***Kanji* Character**

Kanji Neighbours (149) , *Kanji* Token Freq (15,854)

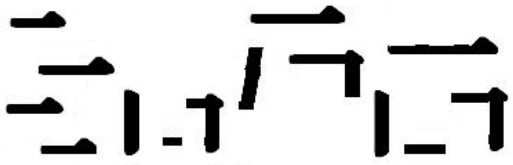
Kanji AoA (2) , *Kanji* Homophones (11)

言

Radical

Radical Combinability (60)

Radical Token Freq (493,077)



Character Strokes

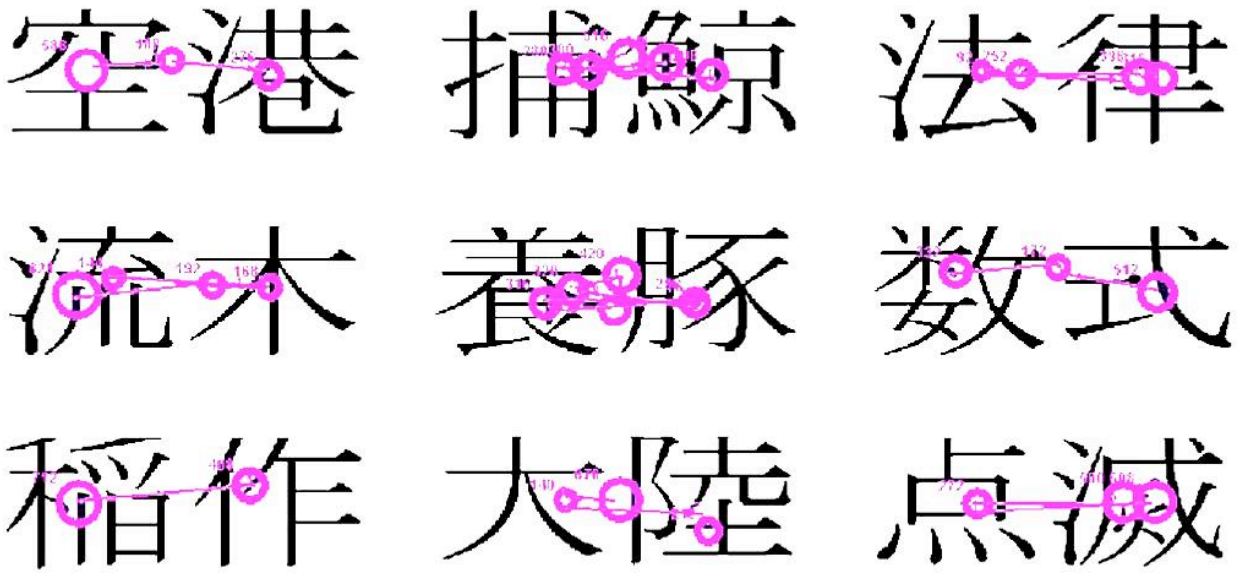
Kanji Strokes (14), Radical Strokes (7)

LDT with Eye-Tracking

- Participants
  - 15 native Japanese speakers in Canada
- Materials
  - **708** two-character words
  - **708** nonwords
- Procedure
  - 472 words in one session * 3 sessions
  - Fixation point manipulations
    (left, central, right)

Observed Eye Movements

What do these different eye-movement patterns reveal about morphographic two-character word recognition ?



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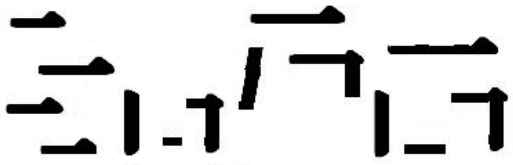

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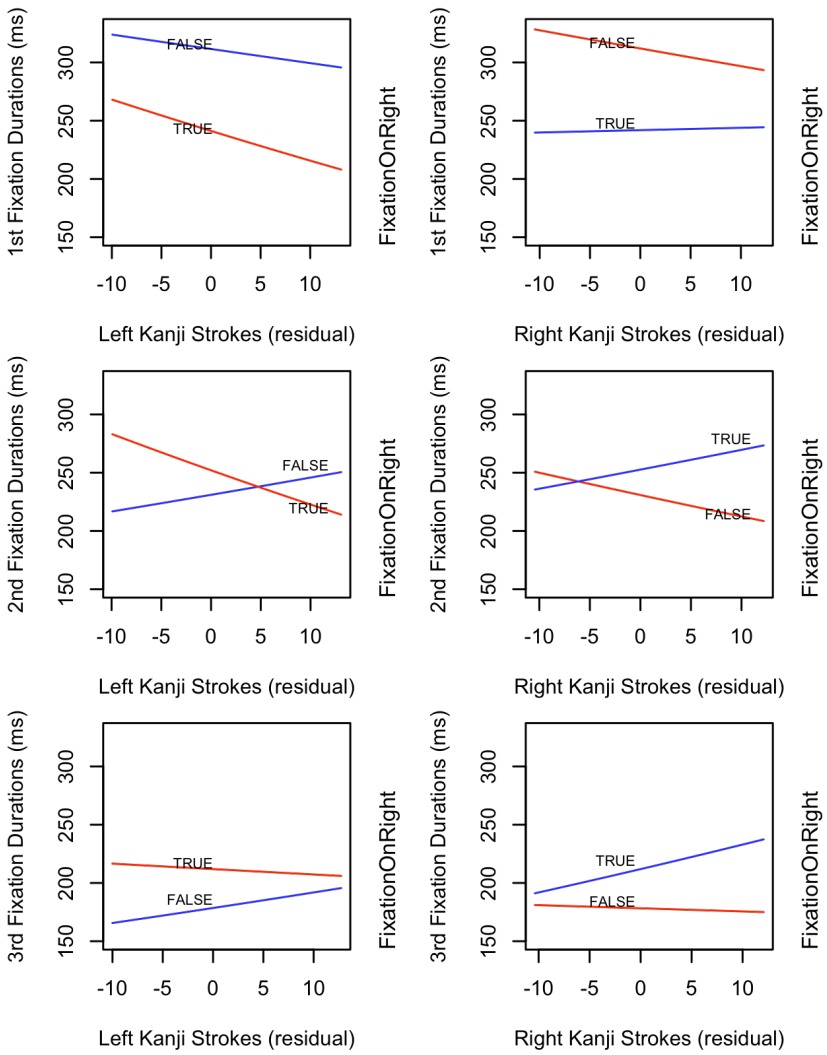
Stroke Effects



- **Blue line**

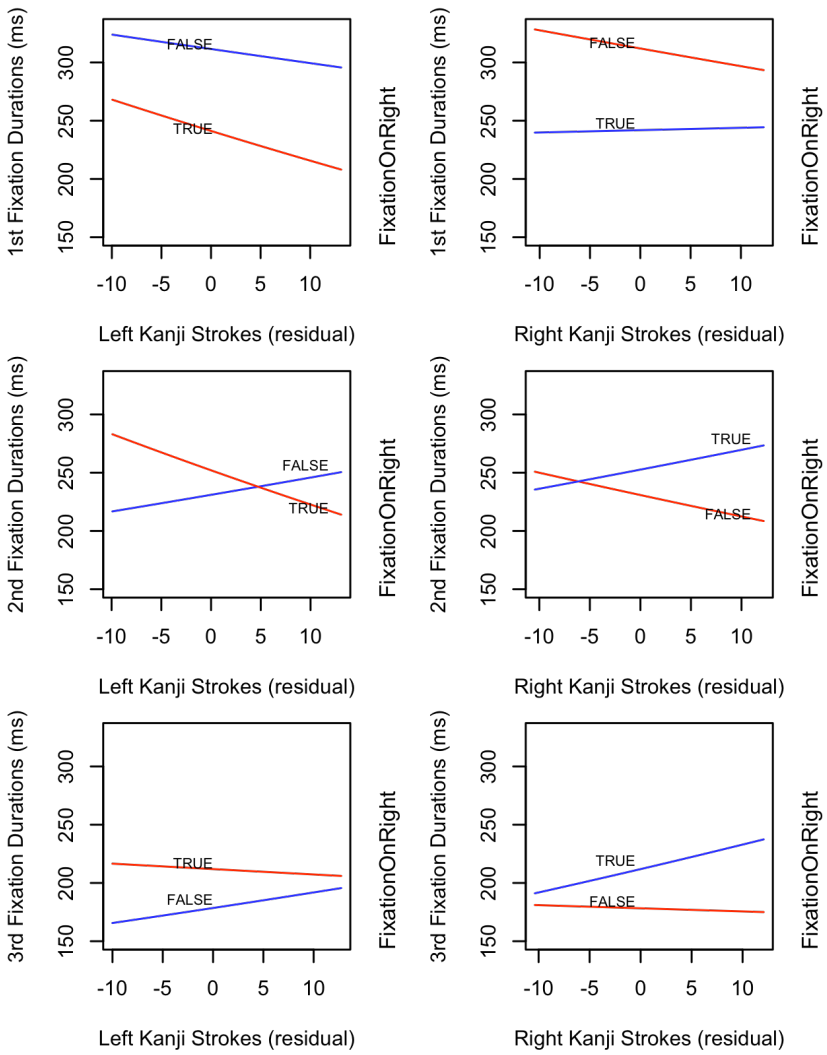
  = Fixation on the given character

- **Red line**

  = Fixation on the other character

- Mirror-image effects for the left and right characters
- The fixated character's strokes:
  - are not predictive at the 1st fixation.
  - become inhibitory at later fixations (the more complex the currently fixated character, the longer it takes to process it).

Stroke Effects



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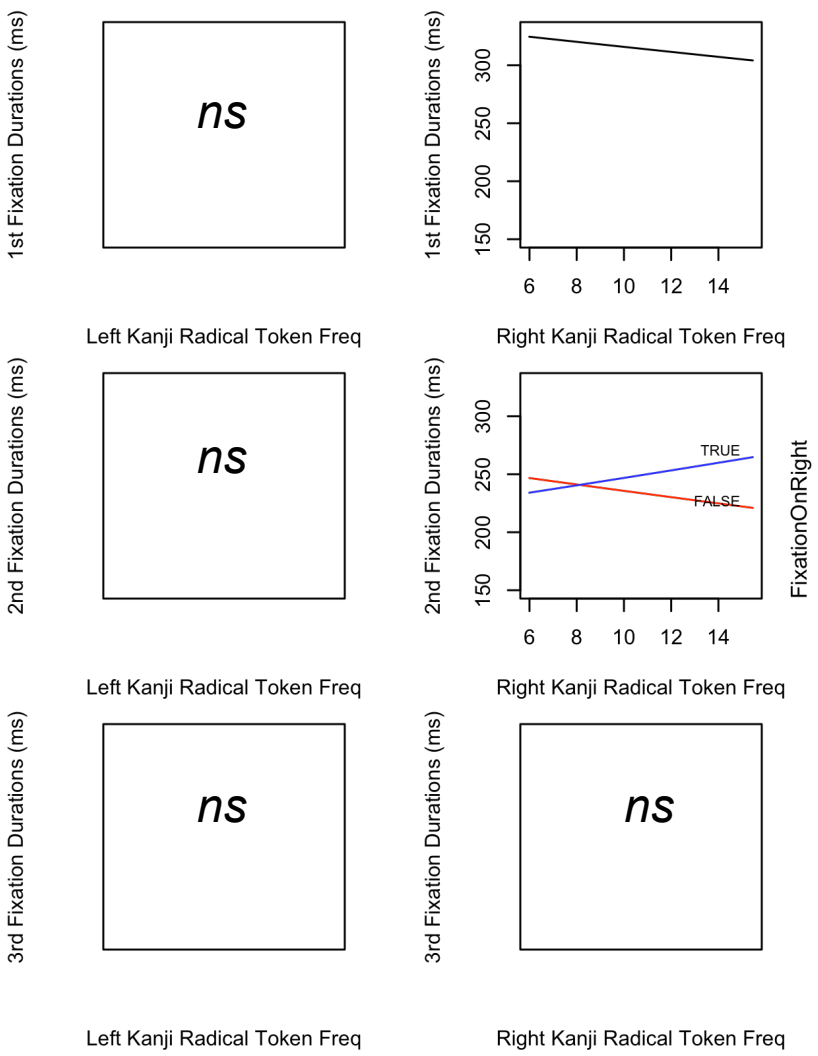
- The non-fixated character's strokes:

  - are facilitatory until 2nd fixation.
  - reflect anticipation of further required processing (You look shorter at the currently fixated character if you know that there is more complex work ahead on the other character

Semantic Radical Frequency Effects



- **Blue line**

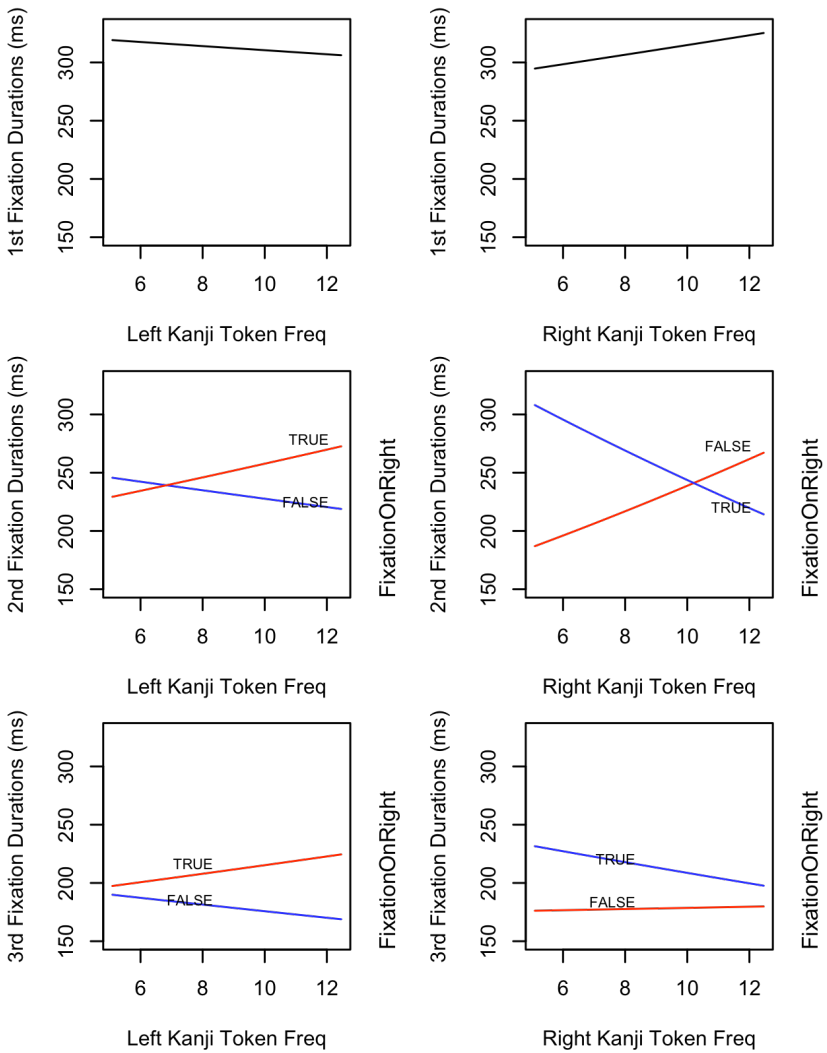
  = Fixation on the given character

- **Red line**

  = Fixation on the other character

- At the 1st fixation, the right character's semantic radical token frequency is facilitatory.
- At the 2nd fixation, this facilitatory effect remains only when the other character is fixated.
- When the right character is fixated, the effect becomes inhibitory.

Character Frequency Effects



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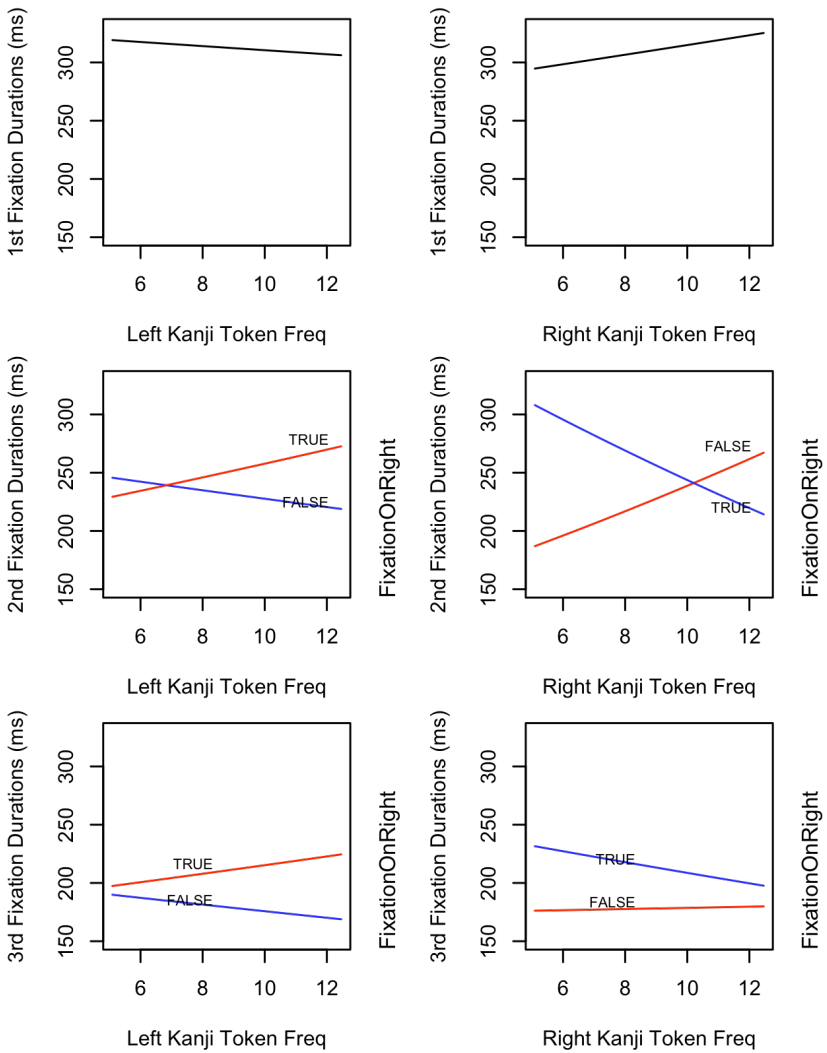
- Mirror-image effects for the left and right characters
- At the 1st fixation, the left frequency is facilitatory, and the right is inhibitory.
- Competition with its facilitatory semantic radical effects
- Hyponym (character) vs. hypernym (semantic radical)

Character Frequency Effects



- **Blue line**

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- **Red line**

  = Fixation on the other character

- At the 2nd and 3rd fixations, the fixated character revealed facilitatory effects.
- The other character emerged as a competitor with inhibitory effects.

Given the Radical and Character Frequency Effects …

① 1st fixation on the head (right) character reflects:

- Facilitatory effects of semantic radical frequency
- Inhibitory effects of character frequency

② 2nd fixation on the head (right) character reflects

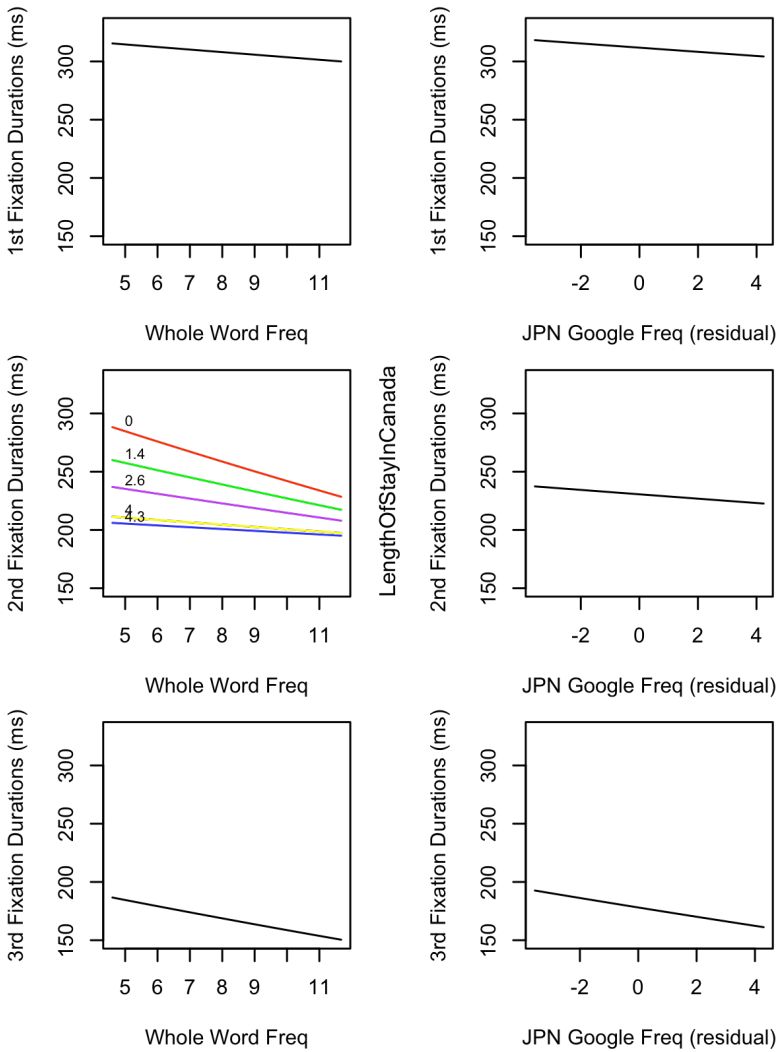
- Inhibitory effects of semantic racial frequency
- Facilitatory effects of character frequency

Reflects semantic interpretation:

① The general category (the head radical) is probably dominant first.

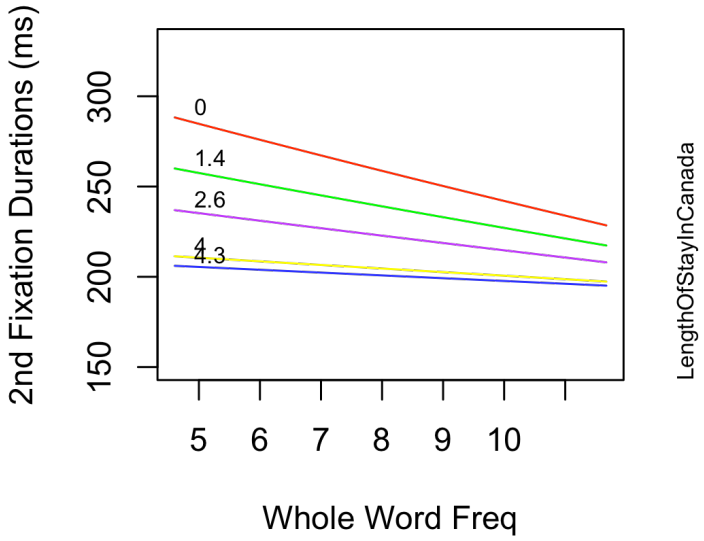
② Then the specific category (the head character) becomes dominant and remains dominant until the end.

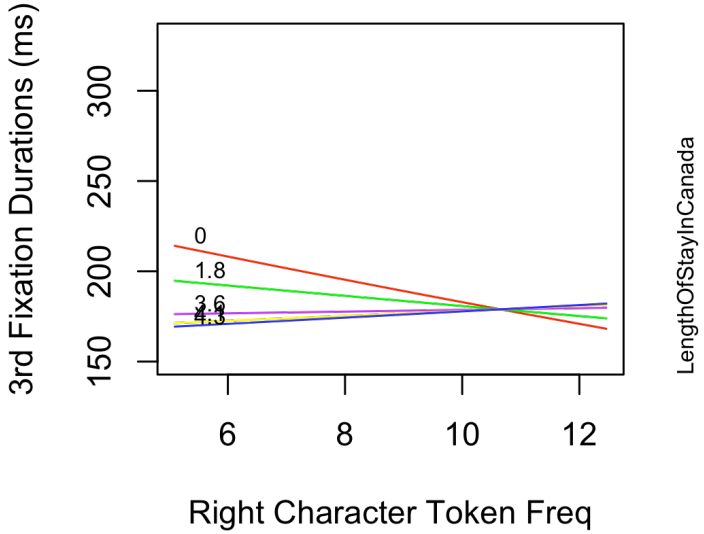
Whole Word Frequency Effects



- Whole word frequency coded by
  - Written token frequency in a newspaper for a 14-year period and
  - Google document frequency (dispersion)
- Both of these effects were observed already at the 1st fixation. (c.f. Kuperman et al. , 2008)
- Magnitude of the frequency effects increase with each successive fixation.

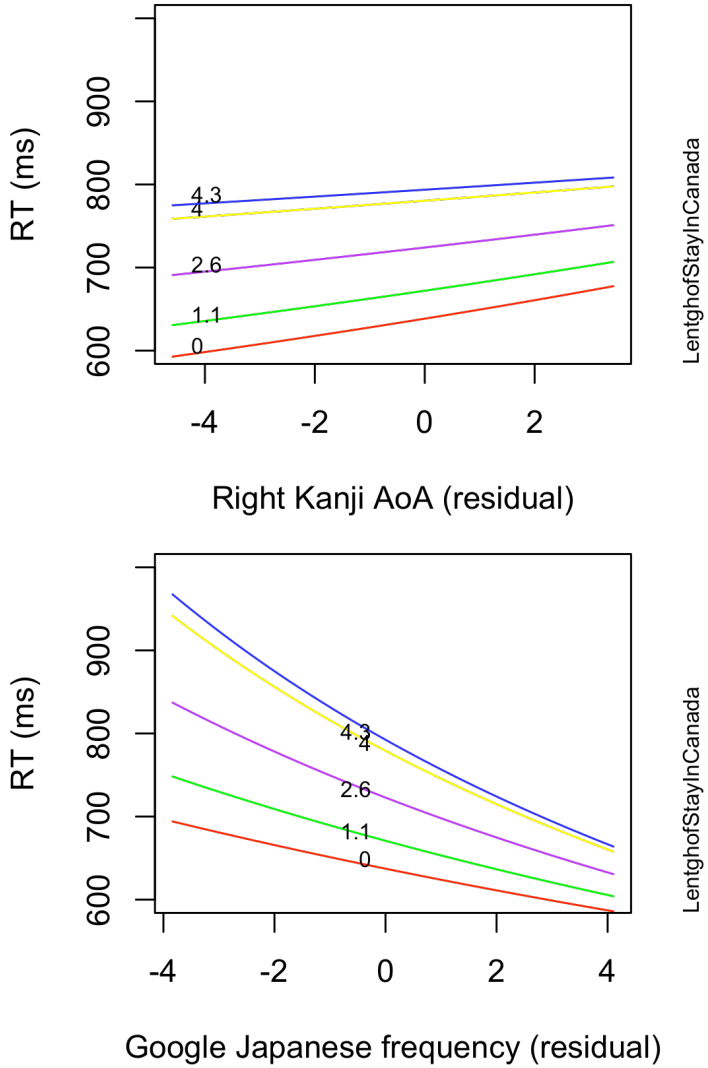
Individual Differences (2nd & 3rd Fixation Durations)





- How long the readers had been away from Japan influenced their word recognition process.
- At the 2nd fixation, whole word frequency is particularly predictive for newcomers to Canada.
- At the 3rd fixation, the right character's frequency is particularly predictive for newcomers to Canada.

Individual Differences (Response Times)



- Those speakers of Japanese who newly arrived in Canada respond more slowly to words with a right character learned late.
- Those speakers of Japanese who have lived in Canada for many years, and are subject to language attrition, show increasingly reduced effects of AoA, and increasing effects of Google document frequency

Summary

1st Fixation (Exploration)

- Finding out where the information is.
- Establishing the general semantic category.

2nd Fixation (Competition)

- Joint-competitive processing of the head and the modifier.
- Establishing the head category.

3rd Fixation (Wrap-up)

- finalizing the joint interpretation of modifier and head (largest whole word frequency effect)
- finalizing, perhaps verifying, the fixated character (without competition from the other character)

Summary

1st Fixation (Exploration)

- Finding out where the good food is.

2nd Fixation (Competition)

- competition between the two sources of food

3rd Fixation (Wrap-up)

- Finishing the meal.

Thank You

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Social Sciences and Humanities Research Council of Canada

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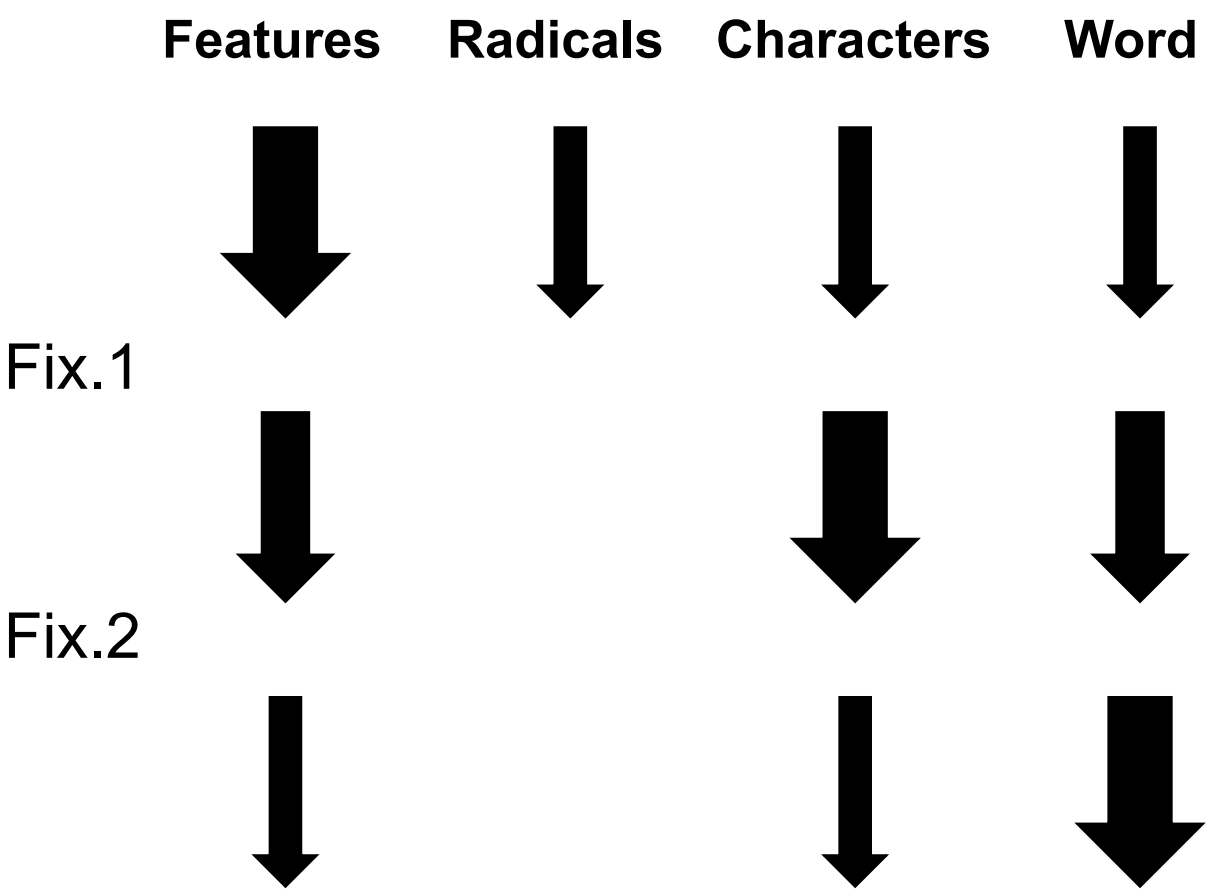
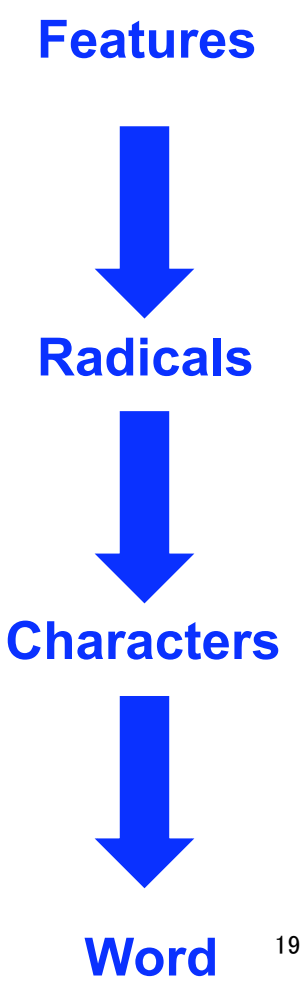
Not a simple feed-forward process





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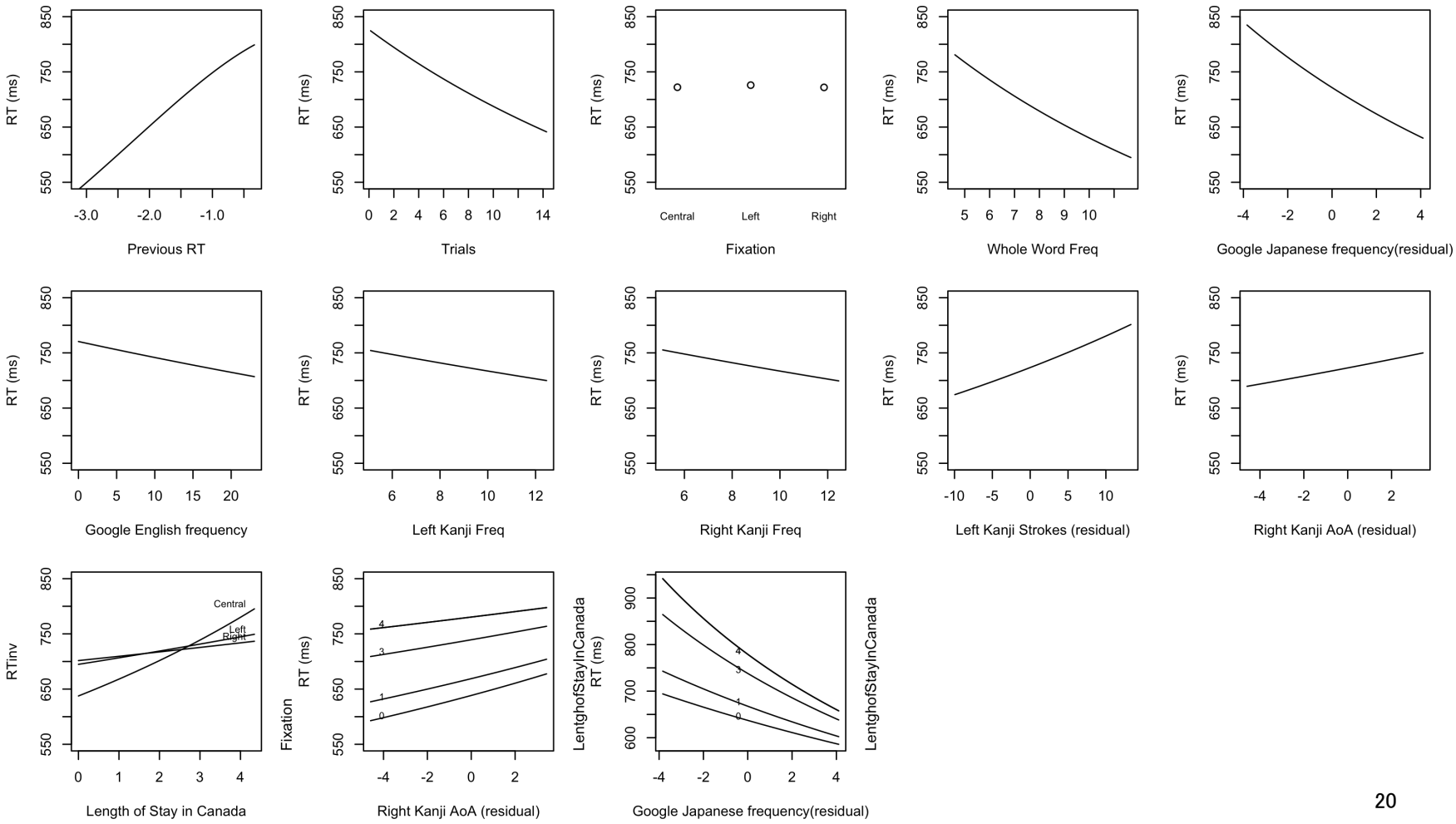

What is “Length of stay in Canada” ?