Sharing the beginning is sometimes sharing nothing at all in word recognition: Evidence from the visual world paradigm in Japanese

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Introduction

General question

How do people process words in spoken word recognition?

Incremental models

1. Lexical processing takes place continuously.
2. Gating task for rhyme effect

Participants looked at a set of four pictures on a computer screen and:

- Initial consonant sharing (See Fig. 1.)
- None (?) manipulated a specific amount of overlap
- No cohort effect

Further manipulation of the first phoneme in stimuli sets

- The length of overlap demonstrated a significant influence on cohort competitors (i.e., use of the three pictures or lack of filler)

Cohort advantage & Incremental models

Visual World Paradigm

- Assumption: When people notice a particular visual scene, it must be activated.
- Purpose: To obtain time course of lexical processing

Method

- Participants are exposed to visual scene while hearing a sentence or word and their time course of eye-movements is recorded

Previous findings

Cohort advantage & Incremental models

- The cohort competitor (a word sharing the beginning with the target) has an advantage relative to the rhyme competitor (a word sharing the end with the target) (Agenton & al., 1998). This supports incremental models (McNeill & Elman, 1986, Marslen-Wilson, 1987).

Coarticulation effect

- Cues to a phoneme are spread throughout the word
- Gating task for rhyme effect begins from the beginning (Dahan et al., 2001). This allows for early activation of rhyme competitors.
- Degree of coarticulation has an effect (Tobin et al., 2010)

Research gaps

Language specificity

- Most of the previous studies examined English or Dutch closed syllables

Length of sharing between the competitors & the target

- None of the previous studies examined a specific amount of overlap between the competitors & the target on Visual World Paradigm

Purpose of this study

To investigate:

1. How Japanese CVCV words are processed in spoken word recognition
2. The influence of amount of overlap between the competitors and the target
3. Phonemic (number of phonemes) and subphonemic (dual-phonemic) differences controlling for overlap duration

Method (Experiment 1)

Participants

1. Native Japanese speakers

Materials

- Audio words — Japanese CVCV words
- Pictures — color pictures (sets of 4 pictures)
- 16 experimental sets & 16 filler sets

Fig. 1 Example experimental set

Results & Discussion

Cohort advantage (CVCV) vs. rhyme (CV)

- The cohort shared the initial consonant with the rhyme. The rhyme shared the rest of the three segments.
- Initial syllable sharing
- No cohort effect

CVCV (cohort) & CV (rhyme)

- No cohort effect

CVV (cohort) & CV (rhyme)

- No cohort effect

CVCV: first three segment sharing

- Cohort effect (Fig. 3. Condition CVCV vs. CV (baseline))

This may suggest that lexical activation in Japanese does not require a minimum of one more of the word to match the signal.

Method (Experiment 2)

Participants

1. Native Japanese speakers

Materials

- Audio words — Japanese CVCV words (same pitch accent in a picture set)
- Pictures — color pictures (sets of 3 pictures)
- 60 experimental sets

Results & Discussion

Cohort overlap: Conditions (CVCV)

1. C (cohort) - Initial consonant sharing
2. CV (cohort) - Initial syllable sharing
3. CVC (cohort) - first three segment sharing

Cohort effect

Inconsistent with Experiment 1. Change of stimulus sets may involve in the result (i.e. use of the three pictures or lack of filler)

Segmental & feature overlap

Cohort (C) & Cohort (CV) & Cohort (CVV)

- Possible phoneme influence on cohort effect

Fig. 2. Condition C (cohort) vs. CV (baseline)

Fig. 3. Condition CVC (cohort) vs. CV (baseline)

Participants fixated the rhyming cohort competitors significantly more than those sharing only the initial consonant (p > 0.15, according to J. Prinzi). This is consistent with Experiment 1.

There may be a trend that participants fixated a cohort competitor when the competitor shares a first consonant and it is /h/ & /n/ (fricatives) or /m/ (nasal) as oppose to stops. However, more fine grained manipulation of phonemes and more stimuli sets needed to conclude.

Rhyme

1. CV (rhyme) last syllable sharing
2. VC (cohort) & VC (rhyme) last three segment sharing
3. No rhyme effect

This is inconsistent with Experiment 1 where both cases of rhyme conditions had a rhyme effect (CVCV & CVV). This may be due to the fact that participants fixated a great number of time on unrelated pictures more than rhyme competitor pictures in certain experimental sets.

General discussion

Language specificity

- It is unclear whether English listeners would also need to hear more than one segment to fixate a word’s referent

Cohort effect (length of overlap)

- No effect of first segment and first two segments sharing in Experiment 2 may be derived from ease of visual processing for three pictures instead of four picture sets

- The lack of cohort effect with two segment sharing (CVV) and its presence with three segment sharing (CVCV) in Experiment 2 suggests that the effect of overlap is not due to a one-to-one minimal word constraint

Acoustic differences between initial phonemes

- Initial step-sharing (most initial consonants in Japanese are stops) is no overlap at all: the cues to the identity of the stop are in the following vowel

Rhyme affects and coarticulation

- It is still unclear there were early and strong rhyme effects in Experiment 1

- The rhyme effect in Experiment 1 suggests an effect of coarticulation. However, Experiment 2 did not demonstrate a rhyme effect. Further examination needed.

Conclusions and future work

Conclusions

- The length of overlap demonstrated a significant influence on cohort competitors
- Overlap in just an initial step is no overlap at all

Future work

- Further manipulation of the first phoneme in stimuli sets
- Use of four picture set
- More participants
- Gating task for rhyme effect
- Double phoneme to avoid coarticulation between vowels

References


For further information

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