Modality-related issues in the processing of morphologically-complex words: Evidence from Bengali

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Introduction

Representation and access of morphologically complex words remain controversial and, thus far, there is no universally accepted way of modelling morphological processing (cf. Amenta & Crepaldi 2012 for a review).

Much of the experimental data provides evidence for a central role of morphological decomposition but many precise aspects of this process are not yet well understood. Factors which have been investigated include:

- direction of processing (Marslen-Wilson et al., 1994)
- frequency effects (Colé et al., 1989)
- modality (Feldman & Larabee, 2001).

Asymmetrical results from priming task with morphologically-complex words have raised questions about both the locus of morphological processing as well as the shape of lexical representations (Feldman, 2000; Allen & Badecker, 1999; Rueckl & Galantucci, 2005) and the effect of modality on the comprehension process (McKone and Dennis, 2000).

The present research focuses on how modality and affix position affect processing of complex words during language comprehension.

Factors under investigation are:

- affix position and combination (i.e. suffix or prefix)
- direction of priming (stem → affixed item; affixed item → stem)
- task modality (cross-modal and visual-visual)

Research Questions

- Is the access of the stem via decomposition equally efficient in morphologically complex prefixed and suffixed words?
- Does task modality affect the processing of complex words during language comprehension?
- If so, what does this tell us about morphological processing during word recognition?

Experimental Design and Stimuli

- Two types of priming tasks consisting of three experiments each:
  - cross-modal (auditory prime and visual target)
  - visual delayed (visual prime and visual target)
- All stimuli are derivationally complex (semantically transparent) Bengali words.

	Exp1	Exp2	Exp3
Structure	affixed form → stem	stem → affixed form	prefix ⇔ suffix
Prime	dur-aʃa *'without hope'*	dɔea '*compassion*'	ɔ-bitʃar *'injustice'*
Target	aʃa *'hope'*	dɔealu '*compassionate*'	bitʃar-ok '*judge*'
Stem	aʃa *'hope'*	dɔea '*compassion*'	bitʃar '*judgement*'

⇔ indicates presentation in both directions

Participants

Participants

- 64 adult native speakers of Bengali for both tasks
- all university students at Jadavpur University or Bethune College, Calcutta, India

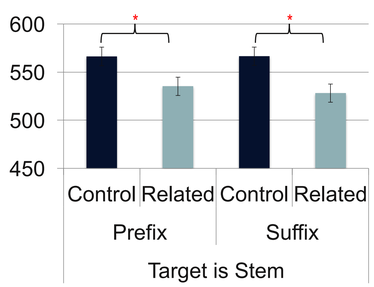
Predictions

- In the cross-modal experiments, we expect prefixed targets to elicit stronger priming effects than suffixed targets when preceded by a stem prime.
- If the effects in the cross-modal experiments are based on morphological overlap, the visual delayed tasks should show identical patterns since delayed priming allows for the isolation of morphological priming effects.
- We predict that the absence of the auditory prime in the delayed experiments will have cohort-related consequences for the processing of affixed targets.

Results

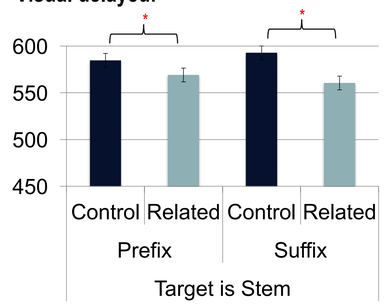
Experiment 1: *Affixed form → stem*

Cross-modal:



- Main effect of relatedness $p < .001$
- No interaction

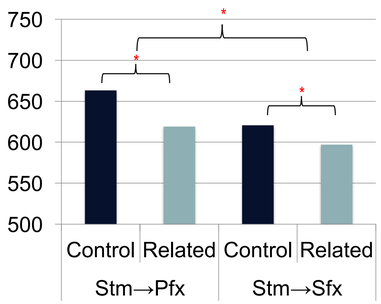
Visual delayed:



- Main effect of relatedness $p < .001$
- No interaction

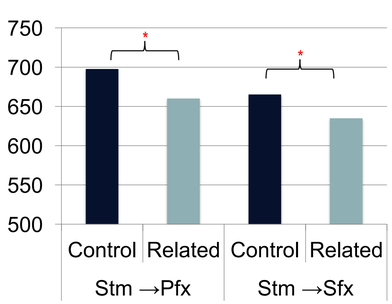
Experiment 2: *Stem → affixed form*

Cross-modal:



- Main effect of relatedness $p < .001$
- Interaction, p=.036

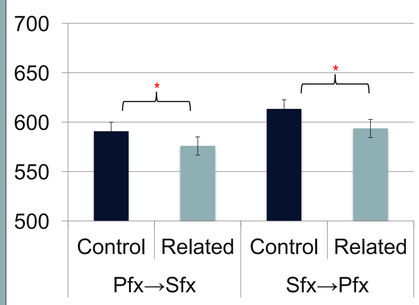
Visual delayed:



- Main effect of relatedness $p < .001$
- No interaction

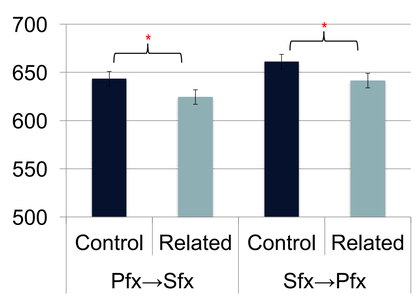
Experiment 3: *Prefix ⇔ suffix*

Cross-modal:



- Main effect of relatedness $p < .001$
- No effect of direction, $p < .001$
- No interaction

Visual delayed:



- Main effect of relatedness $p < .001$
- No effect of direction
- No interaction

Key Findings

In the **cross-modal** tasks:

a) Both prefixed and suffixed primes triggered a similar degree of facilitation (Ex 1).
b) There was significantly greater facilitation of prefixed targets compared to suffixed targets when primed with a stem (Ex 2).
   - ➢ For prefixed targets only the morphological cohort is activated initially
c) Prefixed words did not prime suffixed words more than vice versa (Ex 3).

The asymmetric results of the cross-modal tasks are in line with the uniqueness point (UP) predictions made by models such as the Cohort Model (Gaskell & Marslen-Wilson, 1997, 2002). However, this asymmetry is **not** present in the visual delayed tasks.

In the **visual delayed** tasks:

a) There was no difference in facilitation between the suffix/prefix → stem (Ex 1) or the stem → suffix conditions and the stem → prefix conditions (Ex 2).
b) There was no effect of direction of priming between affixed words (Ex 3).

- ➢ Visual delayed priming tasks remove possible effects of orthographic and semantic facilitation (no form or semantic priming)
- ➢ Facilitation effects in the cross-modal tasks are due, in part, to the activation of the phonological cohort alongside the morphological cohort through auditory priming
- ➢ These effects degrade or disappear in the visual delayed tasks, resulting in no significant difference between degree of priming or response latencies

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