What Makes a Compound a Compound? Evidence from Connected Speech

Hilary S. Z. Wynne & Aditi Lahiri

Language and Brain Laboratory, University of Oxford

Introduction

- In **connected speech**, auxiliaries (e.g. *is, are*) regularly reduce and attach leftwards to phonological words (ω), forming a single, larger phonological word:

$$(My)_{\omega}\ (poster)_{\omega}\ (is)_{\omega}\ (wrinkled)_{\omega} \ >>\ (My)_{\omega}\ (poster's)_{\omega}\ (wrinkled)_{\omega}$$

- English **compounds** are often identified by specific semantic, morphological, and prosodic criteria (cf. Bauer, 2009). A number of psycholinguistic tasks (cf. Wheeldon & Lahiri, 2002; Janssen et al., 2008, Wynne et al., 2018) have revealed that English compounds, which contain two (or more) lexical words (and therefore by definition, two phonological words), are regularly treated as single phonological words by native speakers:

$$(dog)_{\omega}\ (house)_{\omega} \ >>\ (doghouse)_{\omega}$$

- This is supported by the finding (Wynne et al., 2018) that auxiliaries readily cliticise to compound words, forming single phonological units:

$$(Teacups)_{\omega}\ (are)_{\omega}\ (nice)_{\omega} \ >>\ (Teacups're)_{\omega}\ (nice)_{\omega}$$

- However, this evidence comes from tasks which display semantically transparent, visually concatenated compound target words (e.g. [nightgown]) and visually separated phrases (e.g. [nice gown]). This begs the question: **are the differences in response latencies elicited in production tasks simply due to semantic transparency and/or visuo-spatial cues**?

- To examine this, we examine how speakers encode other common types of English compounds: **spaced** (e.g. *time zone*) and **semantically opaque** (*toadstool*) compounds.

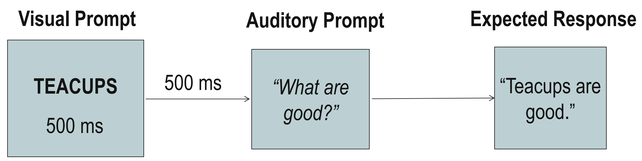
Research Questions

- Do speakers treat visually spaced compounds (e.g. [time zone]) similarly to visually concatenated compounds (e.g. [teacup]) for the purposes of phonological encoding?
- Do speakers treat semantically opaque compounds (e.g. [toadstool]) similarly to semantically transparent (e.g. [teacup]) compounds for the purposes of phonological encoding?

Design

Online naming task: participants were instructed to answer as quickly and accurately as possible after the question prompt.

- Question prompts consisted of five questions, rotated across experiment versions: *What are good? What are nice? What are dry? What are big? What are clean?*
- Latencies were measured from the end of the auditory prompt to the onset of speech.



Stimuli

Six Experimental Conditions:

1. Concatenated, semantically transparent, noun-noun **compounds** (NN)
2. Concatenated, semantically opaque, noun-noun **compounds** (Opaque)
3. Spaced, semantically transparent, noun-noun **compounds** (N_N)
4. Semantically transparent adjective-noun **phrases** (Phrase)
5. Disyllabic **monomorphemic** words (Disyll)
6. Monosyllabic **monomorphemic** words (Mono)

Example Stimuli:

(1) NN	(2) Opaque	(3) N_N	(4) Phrase	(5) Disyll	(6) Mono
saucepans	scapegoats	slash marks	soft gloves	soldiers	sails
teacups	toadstools	time zones	tame sharks	targets	teams
bedposts	bullseyes	bus fares	blind monks	blankets	bricks

- Stimuli were matched as follows:
  1. The **first** constituents of all compound types were matched in frequency to the first constituent of the phrasal condition.
  2. Disyllabic and monosyllabic targets were matched in frequency to the **first** constituent of all compound types, as well as the first constituent of the phrasal condition.
  3. In addition, four different variants of compound and phrase frequency were included in the statistical analysis: first constituent (e.g. *tea*), second constituent (e.g. *cup*), the sum of the two constituents (e.g. *tea* + *cup*), and whole word frequency.
- Word familiarity and stress placement was confirmed using a native speaker judgement task (N= 35). All compound types were judged as having initial stress.
- Spaced NN compounds were selected based on a judgement task (N=40), in which native English speakers were asked to judge correct spacing of a target, e.g. [time zone] or [timezone]. All stimuli were rated above 87.7% for correct spacing.

Participants

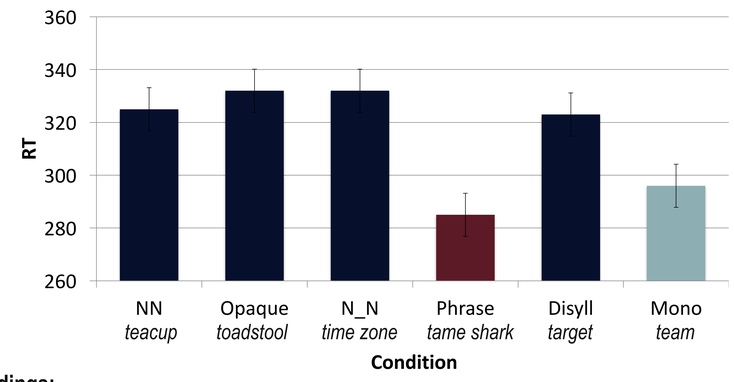
- 25 native British English speakers (all students from the University of Oxford, ages 18-37)
- Tested individually in a sound-attenuated room
- Received compensation for their participation

Predictions

- Spaced compounds (e.g. [time zone]), although presented visually with a space, will still be planned as a single phonological word with reaction times **similar** to standard compounds. That is, the auxiliary will reduce and attach to a spaced compound to form a single prosodic unit.
- Likewise, semantically opaque compounds (e.g. [toadstool]) will **not** result in significantly longer naming latencies than those for semantically-transparent compounds

Results

Naming Latencies (in ms):



Findings:

- RT for phrases were significantly shorter than all other conditions (all p<.001*).
- Concatenated (NN), spaced (N_N) and opaque compounds all elicited similar RTs to each other, and to disyllabic (Disyll) simple words (all p>.32).
- Monosyllabic (Mono) simple words elicited longer RTs than the phrasal condition (p<.001*), but significantly shorter than all types of compounds (all p<.001*) and disyllabic simple words (p=.002*).
- There was no effect of any of the four frequency measures, in any combination.

Key Findings

a) RTs reflected the complexity of the *first* prosodic unit, indicated that the clitic *are* attached leftwards to the entire compound unit (e.g. **[dishcloths]are]**), but only to the noun in the phrasal condition (e.g. [soft] **[gloves]are]**).

Condition	Example Response	First Prosodic Unit	PW	Syllables
1- NN	**Teacups** are good.	(teacups are)	1	3
2- Opaque	**Toadstools** are good.	(toadstools are)	1	3
3- N_N	**Time zones** are good.	(time zones are)	1	3
4- Phrase	**Tame sharks** are good.	(tame)	1	1
5- Disyll	**Targets** are good.	(targets are)	1	3
6- Mono	**Teams** are good.	(teams are)	1	2

b) Spaced compound structures such as [time zones] and [slash marks], even though they had a visual space between the two constituents, were treated in a similar fashion to concatenated compounds: the auxiliary *are* reduced and attached leftwards to the compound as a single prosodic unit, e.g. $(time\ zones\ are)_{\omega}$.

c) Semantically opaque compounds (e.g. [toadstools]) elicited RTs similar to transparent NN compounds and spaced compounds, lending evidence to the argument that this experimental paradigm exclusively taps into post-lexical encoding processes.

Contact

http://brainlab.clp.ox.ac.uk/people/hilarywynne
hilary.wynne
@ling-phil.ox.ac.uk

Selected References

Bauer, L. (2009). Typology of compounds. In R. Lieber & P. Štekauer. *The Oxford Handbook of Compounding*. Oxford: Oxford University Press, 343-356. **Janssen, N., Bi, Y., & Caramazza, A.** (2008). A tale of two frequencies: Determining the speed of lexical access for Mandarin Chinese and English compounds. *Language and Cognitive Processes*, *23*(7-8), 1191-1223. **Wheeldon, L. R., & Lahiri, A**. (2002). The minimal unit of phonological encoding: prosodic or lexical word. *Cognition*, *85*(2), B31-B41. **Wynne, H. S. Z., Wheeldon, L., & Lahiri, A**. (2018). Compounds, phrases and clitics in connected speech. *Journal of Memory and Language*, *98*, 45-58.

QR Code