Probing adaptive resource allocation in discourse: Evidence from foci and filled gaps

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Given limited resources, one possible way to optimize the processing of linguistic material is to allocate fewer resources to those parts conveying less important information. Here, we test if readers utilize fewer resources processing discourse-given (≈repeated [1]) material, like the underlined part of (1b), than they do processing linguistically focused material, like *Lily* in (1b). Unlike foci, to which comprehenders generally allocate more processing resources [2-11], it may be that given material is *de*prioritized: It is often (but not always) defocused [11-12], and since it has already been parsed before, its (re)interpretation is not crucial for understanding the main message of an utterance. However, we show that reading slowdowns typically found on foci can still be observed when foci are given in E1, showing that additional resources to interpret foci are still being expended when they occur in a potentially deprioritized position. E2 extends this finding to filler-gap processing, showing filled-gap effects [13-14] even on given material, which suggests that readers do not sufficiently adapt their parsing strategies such that structure-building processes like these are absent in given material.

E1a (n=48) tested if focus slowdowns also arise on given (second-occurrence; SOF) foci, using 48 target sentences as in (2), presented in the Maze task [15]. To obtain reading time measures on given foci, different preceding contexts manipulated the Type (NEW, SOF) and Size of a focus bound by the particle *only* in those target sentences (held constant within each item). The |target| region in these sentences was always the first object NP as WIDE-NARROW RT differences there index focus marking (this word was focused in the WIDE but not the NARROW conditions). **Results.** Bayesian mixed effects models [16] revealed a main effect of Size (faster RTs in WIDE than NARROW conditions), Type (faster RTs on SOF than NEW foci), and a SizexType interaction, such that the Type effect was only reliable in WIDE conditions. E1 thus found given focus slowdowns even for SOF. **E1b** (n=42) extended E1a to foci not bound by a focus particle, to test if readers perhaps use a basic heuristic by which they always slow down on foci following those particles rather than using discourse properties like givenness to manage resource allocation. The particle was removed from E1a's SOF materials, creating conditions in which the |target| was either the second occurrence of a BOUND focus as in (3b) or that of a FREE focus as in (3d). Maze RTs were analyzed as in E1a. **Results.** revealed both a main effect of Size and Type, as well as an interaction, indicating slowdowns for both BOUND and FREE SOF. **E1c.** was identical to E1b, except that it used targets with a cleft construction as in (4) to overtly demarcate the target region as given. **Results.** revealed a Size effect, again indicating given slowdowns for foci of either type (BOUND and FREE).

E2 (n=42) compared embedded WH-clauses with an indirect object gap with embedded IF clauses, again in both NEW and GIVEN conditions as in (5). The object NP was the |target| region in all conditions, and a comparison between the WH and IF conditions at this region index a 'filled-gap effect'. **Results.** revealed a main effect of clause-Type, a main effect of Givenness and an interaction, indicating a general givenness speed-up as well as a reduced but reliable filled-gap effect in the GIVEN compared to NEW conditions.

In sum, these results do not support a view in which fewer resources are allocated to processing of material expressing less crucial information to the extent that the ramifications of focus marking (E1) and structure-building operations like filler-gap processing (E2) are not present. Future work should determine whether the obtained effects carry over to other types of deprioritized material and constructions as well.

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(1) **Speaker A:** Abby **read a book about penguins**.
Speaker B: No, it was LILY$_F$ (who [**read a book about penguins**]$_{GIVEN}$)

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(2)
a. Abby read a book about **penguins$_F$**, Bob read a book about **gorillas$_F$** — NARROW NEW
b. Abby read **a report about penguins**, Bob read **an article about gorillas$_F$** — WIDE NEW
c. Abby read a book about **penguins$_F$**, but Bob only read a book about **bats$_F$** — NARROW SOF
d. Abby read **a report about penguins**, but Bob only read **a book about bats$_F$** — WIDE SOF

Target: {And (NEW) | No, (SOF)} Lily$_{F1}$ only read a |book| about bats

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(3)
a. Abby read a book about **penguins$_F$**, but Bob only read a book about **bats$_F$** — NARROW BOUND
b. Abby read **a report about penguins**, Bob only read **a book about bats$_F$** — WIDE BOUND
c. Abby read a book about **penguins$_F$**, but Bob read a book about **bats$_F$** — NARROW FREE
d. Abby read **a report about penguins**, but Bob read **a book about bats$_F$** — WIDE FREE

Target: No, Lily$_{F1}$ { only (BOUND) | __ (FREE) } read a |book| about bats

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(4) **Target:** No, it wasn't Bob, but Lily$_{F1}$ who { only (BOUND) | __ (FREE) } read a |book| about bats

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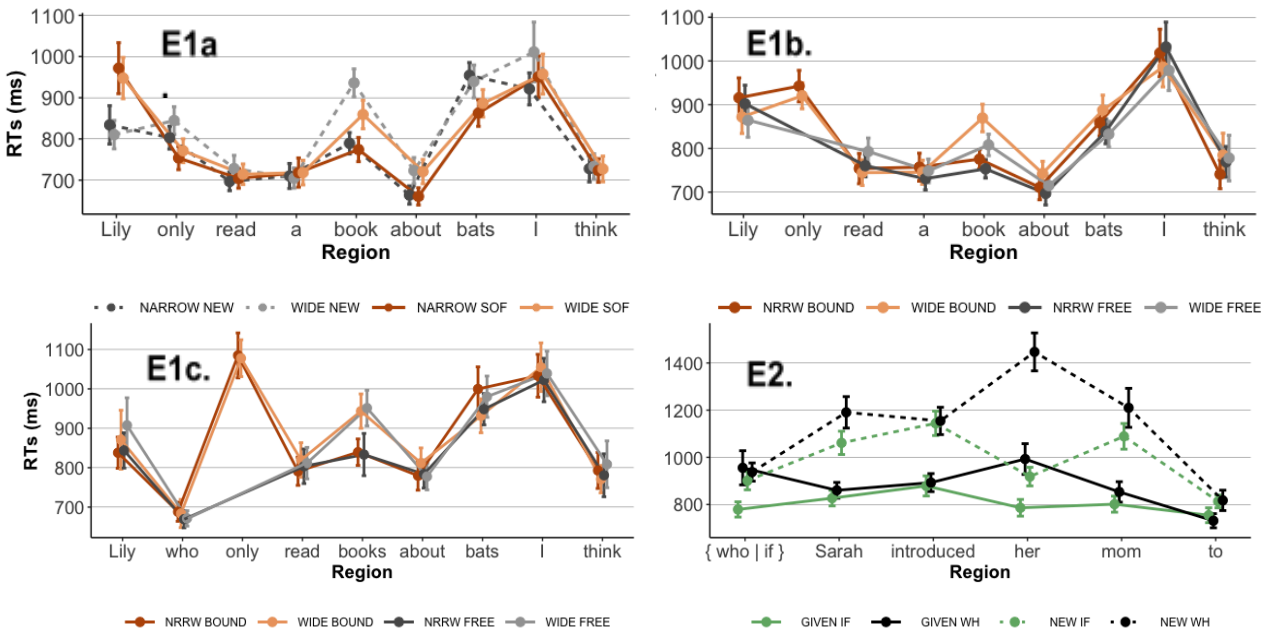
(5)
a. My aunt asked who Fatima introduced my mother to at the party. — GIVEN WH
b. My aunt asked if Fatima introduced my mother to the author at the party. — GIVEN IF
c. My aunt wondered who Jonathan met at the reception. — NEW WH
d. My aunt wondered if Jonathan met the author at the reception. — NEW IF

Target: No, it was my uncle who asked {who | if} Fatima introduced |my mother| to { _$_j$ | the author} at the party.



	E1a			E1b			E1c				E2		
	β	(error)	95% Cr.I.	β	(error)	95% Cr.I.	β	(error)	95% Cr.I.		β	error	95% Cr.I.
Intcpt	2.90	(.01)	[2.87, 2.92]	2.88	(.01)	[2.85, 2.91]	2.92	(.01)	[2.89, 2.94]	**Intcpt**	2.96	(.02)	[2.93, 2.99]
Type	0.05	(.01)	[0.02, 0.04]	0.04	(.01)	[0.03, 0.05]	0.00	(.01)	[-.01, 0.02]	**C-Type**	0.11	(.01)	[0.09, 0.13]
Size	0.03	(.01)	[0.03, 0.07]	0.02	(.01)	[0.01, 0.03]	0.05	(.01)	[0.03, 0.07]	**Given**	0.12	(.02)	[0.08, 0.15]
Ty x Si	0.04	(.01)	[0.01, 0.06]	0.01	(.01)	[–.01, 0.03]	-0.01	(.01)	[-.04, 0.02]	**Ty x Giv**	0.10	(.02)	[0.06, 0.14]

Table 1: Posterior estimates E1a, E1b, E2 and E3 (logRTs) from Bayesian mixed effects models in `brms` [16] fit to log and raw RTs on all target regions (only effects reliable in both measures are reported here).

References **[1]** Schwarzschild (1999) **[2]** Cutler (1976) *Percep. Psychophys.* **[3]** Cutler & Fodor (1979) *Cognition.* **[4]** Bredart & Modolo (1988) *Acta Psych.* **[5]** Sanford & Sturt (2002) *Trends in Cog.Sci.* **[6]** Birch & Garnsey (1995) *JML.* **[7]** McKoon et al. (1993) *JML.* **[8]** Birch & Rayner (1997) *Mem. & Cog.* **[9]** Benatar & Clifton (2013) *JML.* **[10]** Lowder & Gordon (2015) *Psych. Bull.& Rev.* **[11]** Hoeks et al., (2023) *JML.* **[12]** Selkirk (2007) *Int. Stud. on IS* **[13]** Stowe (1986) *Lang. Cog. Proc.* **[14]** Omaki et al. (2015) *Frontiers.* **[15]** Boyce et al. (2020) *JML.* **[16]** Bürkner (2017) *J. Stat. Soft*.