



Silent reading of direct speech quotations promotes low relative-clause attachment in English

DOI:

[10.1016/j.cognition.2018.03.017](https://doi.org/10.1016/j.cognition.2018.03.017)

Document Version

Accepted author manuscript

[Link to publication record in Manchester Research Explorer](#)

Citation for published version (APA):

Yao, B., & Scheepers, C. (2018). Silent reading of direct speech quotations promotes low relative-clause attachment in English. *Cognition*, 176, 248-254. <https://doi.org/10.1016/j.cognition.2018.03.017>

Published in:

Cognition

Citing this paper

Please note that where the full-text provided on Manchester Research Explorer is the Author Accepted Manuscript or Proof version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version.

General rights

Copyright and moral rights for the publications made accessible in the Research Explorer are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Takedown policy

If you believe that this document breaches copyright please refer to the University of Manchester's Takedown Procedures [<http://man.ac.uk/04Y6Bo>] or contact uml.scholarlycommunications@manchester.ac.uk providing relevant details, so we can investigate your claim.



Direct speech quotations promote low relative-clause attachment in silent reading of English

Bo Yao¹, Christoph Scheepers²

1 Division of Neuroscience and Experimental Psychology, University of Manchester, UK

2 Institute of Neuroscience and Psychology, University of Glasgow, UK

*Corresponding author:

Dr Bo Yao

Division of Neuroscience and Experimental Psychology

University of Manchester

Manchester M13 9PL

United Kingdom

bo.yao@manchester.co.uk

t: +44 (0)161 275-2696

Abstract

The implicit prosody hypothesis (Fodor, 1998, 2002) proposes that silent reading coincides with a default, implicit form of prosody to facilitate sentence processing. Recent research demonstrated that a more vivid form of implicit prosody is mentally simulated during silent reading of direct speech quotations (e.g., *Mary said, "This dress is beautiful"*), with neural and behavioural consequences (e.g., Yao, Belin, & Scheepers, 2011; Yao & Scheepers, 2011). Here, we explored the relation between 'default' and 'simulated' implicit prosody in the context of relative-clause (RC) attachment in English. Apart from confirming a general low RC-attachment preference in both production (Experiment 1) and comprehension (Experiments 2 and 3), we found that during written sentence completion (Experiment 1) or when reading silently (Experiment 2), the low RC-attachment preference was reliably enhanced when the critical sentences were embedded in direct speech quotations as compared to indirect speech or narrative sentences. However, when reading aloud (Experiment 3), direct speech did not enhance the general low RC-attachment preference. The results from Experiments 1 and 2 suggest a *quantitative boost* to implicit prosody (via auditory perceptual simulation) during silent production/comprehension of direct speech. By contrast, when reading aloud (Experiment 3), prosody becomes *equally salient* across conditions due to its explicit

nature; indirect speech and narrative sentences thus become as susceptible to prosody-induced syntactic biases as direct speech. The present findings suggest a shared cognitive basis between default implicit prosody and simulated implicit prosody, providing a new platform for studying the effects of implicit prosody on sentence processing.

Keywords: implicit prosody; relative-clause attachment; inner voice; direct quotations; indirect speech; mental simulation

1. Introduction

The implicit prosody hypothesis (IPH) proposes that a default, implicit form of prosody (e.g., speech intonation, stresses, rhythms) is mentally activated during silent reading of written text (Fodor, 1998, 2002). Research shows that such implicit prosody can bias syntactic attachment interpretation in structurally ambiguous sentences. For example, in a sentence like *“Someone shot the servant of the actress who was on the balcony”*, the relative clause (RC) *“who was on the balcony”* can be attached either *high* to the complex noun phrase *“the servant of the actress”* (NP1) or *low* to the more recent noun phrase *“the actress”* (NP2). English native speakers typically prefer the low attachment interpretation when reading such sentences (e.g., Carreiras & Clifton, 1993, 1999). Implicit prosody is *assumed* to bias RC-attachment interpretation because the latter is influenced by prosodic features such as pitch accents (Maynell, 1999; Quinn, Abdelghany, & Fodor, 2000) and prosodic boundaries (Clifton, Carlson, & Frazier, 2002; Lovrić, Bradley, & Fodor, 2000, 2001) when sentences are overtly spoken. However, the effect of implicit prosody on RC-attachment has not yet been studied in the context of quotations.

New research suggests that implicit prosody may be enhanced during silent reading of direct speech quotations (e.g., *Mary said: “The dress is beautiful”*) as compared to indirect speech sentences (e.g., *Mary said that the dress was beautiful*). Most notably, enhanced implicit prosody becomes evident in higher activation of temporal voice areas in the auditory cortex (Yao et al., 2011; Yao, Belin, & Scheepers, 2012; see also Belin, Zatorre, Lafaille, Ahad, & Pike, 2000). Moreover, implied speech rates of quoted speakers were shown to influence the speed of silent reading, but only in direct speech quotations (e.g., Stites, Luke, & Christianson, 2013; Yao & Scheepers, 2011). This more enhanced implicit prosody may rely on audible speech-like representations that are mentally *simulated* (Barsalou, 1999) specifically during silent reading of direct speech quotations. Little is known, however, about the precise relationship between mentally ‘simulated’ implicit prosody (SIP)

in direct speech and Fodor et al.'s 'default' implicit prosody (DIP) which is assumed to be activated regardless of pragmatic reporting style (direct speech, indirect speech, or narrative).

Theoretically, DIP and SIP may entail distinct cognitive processes. DIP is routinely projected onto written stimuli during silent reading. It adds a constant channel of information to aid parsing, especially when syntactic or semantic disambiguation cues are unavailable. In contrast, SIP is a speech-like experience that is highly dependent on linguistic context and pragmatics. It allows readers to mentally re-enact *how* a described protagonist spoke. These differences, however, do not necessarily rule out a common underlying cognitive basis for DIP and SIP. Acoustic properties of DIP and SIP are both correlated with that of explicit prosody in speech (Lovrić et al., 2000, 2001, Yao & Scheepers, 2011, 2015), indicating the involvement of similar mental representations. Yao and Scheepers (2015) therefore conjectured that SIP may be an enriched form of DIP. They proposed to embed ambiguous RC-attachment structures in direct speech quotations so as to examine whether attachment preferences during silent reading of such structures would be 'enhanced' when compared to those in meaning-equivalent narrative sentences (Yao & Scheepers, 2015, p. 301). The absence of such an enhancing influence of direct speech (vs. narrative) on attachment preferences would suggest that DIP and SIP are cognitively distinct.

The present studies tested this hypothesis. English RC-attachment structures were embedded in direct speech, indirect speech or narrative sentences. Participants either completed sentence fragments ending in incomplete RCs (Experiment 1) or rated the felicity of unambiguous low vs. high RC-attachments in silent reading (Experiment 2) and in oral reading (Experiment 3), respectively. Given the general low RC-attachment bias in English, we expected that this bias should be more pronounced for direct speech quotations than for indirect speech or narrative sentences in Experiment 1 (sentence completion). For Experiment 2 (comprehension), we predicted, apart from a general low-attachment preference, a more pronounced felicity difference between low vs. high RC-attachments in the direct speech condition than in the indirect speech or narrative condition. By

contrast, we expected no such enhancement of the low RC-attachment bias in direct speech under oral reading instructions (Experiment 3). This is because oral reading activates *explicit* prosody, which should enhance the salience of prosody (and in turn, its influence on syntactic preferences) *equally* across the three conditions. Thus, we only expected an overall low RC-attachment preference (regardless of reporting style) in Experiment 3.

2. Experiment 1

Participants in all three experiments gave written consent and the experimental procedures were approved by the Research Ethics Committee at the University of Manchester.

2.1 Participants

Fifty-four native English speakers (mean age 23 years, $SD=6.9$, 41 females) from the University of Manchester participated in exchange for £2. The experiment took about 15 min.

2.2 Materials and design

Twenty-four sets of written scenarios were created (Appendix A). Each set contained a common background sentence to set up a scenario. This was followed by a critical sentence that was either a direct speech (DS), an indirect speech (IS), or a narrative sentence (NS). Each critical sentence contained a matched target sentence fragment (underscored in Table 1). The fragment consisted of a subject noun phrase followed by a verb and a complex object noun phrase with a prepositional-phrase modifier. The fragments ended in a relative pronoun (*that* or *who*), prompting the generation of a sentence-final relative clause that could either attach *low* to the most recent noun-phrase (NP2, *the church*) or *high* to the whole preceding object noun-phrase (NP1, *the bells of the church*). The critical host noun-phrases were either both animate or both inanimate and differed in number such that NP1 was plural in half of the items and singular in the other half. Contrasting number marking in this way aided later response scoring; e.g., in “the bells of the church that was beautiful” and “the bells of the church that were beautiful”, relative-clause attachment was determined by assessing

whether the RC-verb was singular or plural. The reading materials were allotted to three stimulus lists, counterbalanced using a Latin square (6 stories per condition per list). The order of the stories was pseudo-randomised for each list. Each list was assigned to 18 participants.

Table 1. Example stimuli for Experiment 1 and 2.

Experiment 1	
<i>Frank and his friends were visiting some lovely places on their trip to Germany last year.</i>	
DS	<i>He told the group: “I really liked the bells of the church that ...</i>
IS	<i>He told the group that he really liked the bells of the church that ...</i>
NS	<i>It seemed that he really liked the bells of the church that ...</i>
Experiments 2 and 3	
<i>Frank and his friends were visiting some lovely places on their trip to Germany last year.</i>	
DS	LA <i>He told the group: “I really liked the bells of the church that was right next to the town hall.”</i>
	HA <i>He told the group: “I really liked the bells of the church that were chiming every hour.”</i>
IS	LA <i>He told the group that he really liked the bells of the church that was right next to the town hall.</i>
	HA <i>He told the group that he really liked the bells of the church that were chiming every hour.</i>
NS	LA <i>It seemed that he really liked the bells of the church that was right next to the town hall.</i>
	HA <i>It seemed that he really liked the bells of the church that were chiming every hour.</i>

DS=direct speech; IS=indirect speech; NS=narrative sentence; LA=low attachment; HA=high attachment.

2.3 Procedure

The RC completions were collected using pen and paper. Participants read written instructions and practised on an example trial. The stimuli were printed on A4 sheets. Each story was printed in two or three lines. The target sentence fragment was always presented in a single line to prevent structural biases via line breaks. The fragment ended in an underscored blank space “_____”, prompting participants to complete the fragment. There was no time limit to the task.

2.4 Results

Response coding

Responses were independently coded by two condition-blind annotators. Target completions were coded as low attachment (LA), high attachment (HA) or unclassifiable (UC). The classification was based on the number of the verb (singular or plural) in the completed RC and/or on plausibility criteria (e.g., “the bells of the church that stood near the town hall” was coded as LA, and “the bells of the church that chimed every hour” was coded as HA). Ambiguous and controversial completions were coded as UC, which also included ungrammatical responses or responses that did not result in a RC. Cross-tabulation of response codes indicated ‘strong’ inter-coder agreement (82%, expected

agreement *by chance*: 41%, *Cohen's Kappa*=.687, $p<.001$). Cases of disagreement were re-inspected and discussed to determine a final classification. The distribution of the final classifications is summarised in Table 2.

Table 2. The distribution of different types of responses by condition.

	All trials			Classifiable only	
	%LA	%HA	%UC	%LA	%HA
DS	56.7	31.0	12.3	64.6	35.4
IS	51.6	32.2	16.2	61.6	38.4
NS	47.7	37.3	15.0	56.1	43.9
Total	52.0	33.5	14.5	60.8	39.2

LA=low attachment; HA=high attachment; UC=unclassifiable; DS=direct speech; IS=indirect speech; NS=narrative sentence

Analysis

Generalised Linear Mixed Models (GLMMs) were fitted using the *glmer* function in *R*. We dummy-coded the three conditions into two contrast variables: The first variable encoded the DS-NS contrast, the second the IS-NS contrast (the *narrative* condition served as the baseline). We employed the maximal random effect structure justified by the design (cf. Barr, Levy, Scheepers, & Tily, 2013) with *subject* and *item* as crossed random factors. Given that the dependent variable was dichotomous, we specified a *binary logistic* model in the family argument of the *glmer* function.

A GLMM on UC (versus non-UC) responses indicated no significant cross-condition differences ($p>.7$ per contrast). Excluding UC responses, a GLMM on low-attachment (coded 1) versus high-attachment (coded 0) completions showed that the DS condition elicited a significantly higher proportion of LA completions than the NS condition ($b=0.48$, $SE=0.20$, $z=2.38$, $p=.018$). In contrast, the IS condition did not differ reliably from the NS baseline ($b=0.29$, $SE=0.20$, $z=1.45$, $p=.148$). The model-estimated LA-completion probabilities are shown in Figure 1.

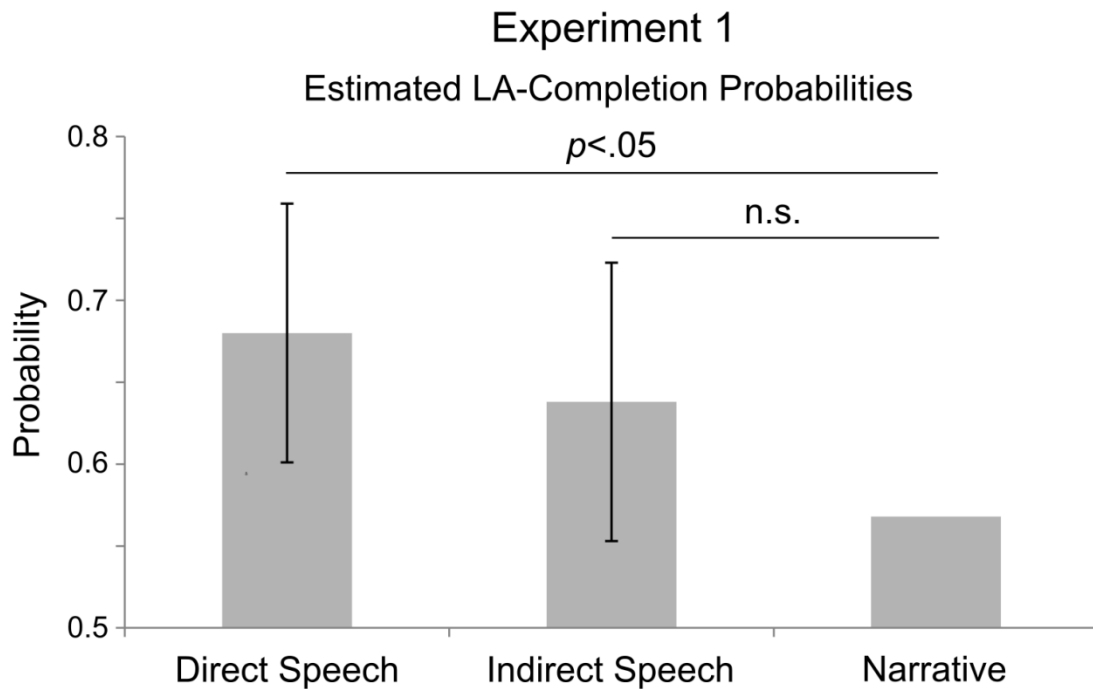


Figure 1. Estimated low-attachment completion probabilities (classifiable responses-only) across the three conditions. Error bars indicate 95% confidence intervals for contrasts with the *Narrative* baseline. n.s.= not significant.

2.5 Discussion

Experiment 1 replicated the low-attachment preference typically found in English (e.g., Carreiras & Clifton, 1993, 1999). Importantly, the probability of a low-attachment completion was significantly higher when RC-attachment structures were embedded in a *direct speech* quotation than in a *narrative* sentence; for *indirect speech* quotations, proportions of LA-completions were descriptively higher than for the *narrative* baseline, but not reliably so. These results support our hypothesis, suggesting that simulated implicit prosody (SIP) in silent reading of direct speech may be an enriched form of default implicit prosody (DIP); such enriched prosody apparently promotes low attachment decisions when completing English relative clause sentences.

Indirect speech only descriptively enhanced the likelihood of a low RC-attachment; it may reflect a lesser degree of SIP during indirect speech processing. This agrees well with previous neuroimaging

results showing that silent reading of indirect speech leads to an above-baseline activation of temporal voice areas, but significantly less so than silent reading of direct speech (Yao et al., 2011).

3. Experiment 2

Experiment 2 investigated whether RC-attachment preferences are modulated by reporting style in the context of *sentence comprehension*. Participants silently read unambiguously low-attached or high-attached RC-attachment structures in direct speech, indirect speech, or narrative sentences. After reading, participants rated the felicity of the sentences. We predicted that, overall, participants would rate sentences with low-attached RCs as more felicitous than sentences with high-attached RCs. Critically, this felicity difference should be most pronounced in the direct speech (DS) condition and weakest in the narrative (NS) baseline condition, resulting in an interaction between RC-attachment (low, high) and reporting style (DS, IS, and NS).

3.1 Participants

Twenty-four native English speakers (mean age 28 years, $SD=8.2$, 16 females) from the University of Manchester participated in exchange for £1. The experiment took about 5-10 min.

3.2 Materials and design

The 24 items from Experiment 1 were modified such that the target fragments were now completed with an unambiguously low-attached (LA) or a high-attached (HA) relative clause (see Appendix B). To constrain RC-attachments, we not only relied on number agreement between the host-NP and the verb of the RC, but also on plausibility criteria (cf. Table 1). This resulted in a 3 (Reporting Style) × 2 (RC-Attachment) within-subjects and within-items design. The stimuli were allotted to 6 lists and counterbalanced using a Latin square (4 stories per condition per list). The order of the stories was randomised per participant. Each list was assigned to 6 participants.

3.3 Procedure

Stimulus presentation and data collection were implemented in OpenSesame (Mathôt, Schreij, & Theeuwes, 2012) on a Dell Optiplex lab computer. The stories were presented in 15pt sans font in the centre of the screen. Participants read the instructions and practised on an example trial before the experiment began.

Each trial started with the trial number in the centre of the screen for 1 second, followed by the story. Each story contained 2-3 sentence-segments that were presented sequentially in single lines without line breaks. The final segment of each story contained the critical sentence. Participants silently read each segment at a normal pace, and pressed space on a keyboard as soon as they finished segment-reading. The button press cleared the display of the current segment, recorded the reading time, and triggered the display of the next segment. Participants could not return to previously read segments, ensuring that they would base their judgements more on the final (critical) sentence. After the final segment, a 9-point 'readability' scale (1='very odd'; 9='reads very well') was displayed. Participants were instructed to judge how readable each story was based on first impressions. They gave ratings using the number keys on the keyboard.

3.4 Results

We fitted linear mixed models of readability ratings for the critical sentences using the *lmer* function in *lme4*. We deviation-coded the three Reporting Style conditions into two contrast variables (*DS-NS* and *IS-NS*, respectively). Mean-centred deviation coding was also used for the RC-Attachment predictor. Again, we used the maximal random effect structure justified by the design (Barr et al., 2013), but excluding random correlation terms due to convergence issues. The results are reported in Table 3 (upper panel). Condition means and pairwise contrasts are shown in Figure 2 (left).

Table 3. Linear mixed-effect model estimates of readability ratings in Experiment 2

Fixed Effects	Estimate	S.E.	<i>t</i>	<i>p</i>
DS-NS	.18	.20	.90	.373
IS-NS	.45	.20	2.26	.024
Att(LA-HA)	.41	.24	1.73	.099
DS-NS × Att(LA-HA)	1.34	.40	3.35	<.001
IS-NS × Att(LA-HA)	.51	.40	1.27	.204

DS=direct speech; IS=indirect speech; NS=narrative sentence; Att=attachment type; LA=low attachment; HA=high attachment. Significant effects ($p<.05$) are highlighted in bold.

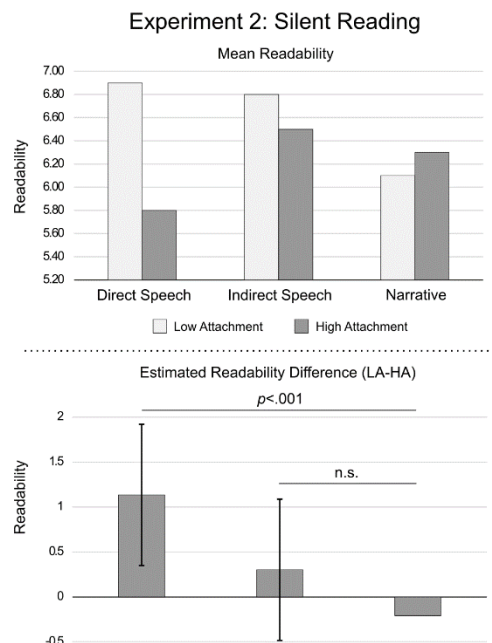


Figure 2. (Top) mean readability ratings after silent reading, Experiment 2. (Bottom) readability rating differences (low- vs. high-attachment) per reporting style condition, Experiment 2. Error bars indicate 95% confidence intervals for readability contrasts (low- vs. high-attachment) in relation to the narrative (baseline) condition. n.s.= not significant.

There was a significant Reporting Style effect such that readability ratings were higher for *indirect speech* than for *narrative* sentences; the readability of *direct speech* sentences did not differ from the *narrative* condition. There was also a marginal RC-Attachment main effect ($p=.099$), indicating higher readability for *low-* rather than *high-*attachment structures. Our central question concerns the extent to which the readability of *low-* vs. *high-*attachment structures differs across different reporting styles. Indeed, the two predictors interacted: Relative to the *narrative* baseline, the low vs. high-attachment contrast was significantly larger (+1.34 scale points $\pm .40$ SE) in the DS condition, but only descriptively larger (+.51 scale points $\pm .40$ SE) in the IS condition.

3.5 Discussion

In Experiment 2 (comprehension), we again found evidence for a general low RC-attachment preference in English: Regardless of reporting style, unambiguously low-attached RCs were rated as marginally more readable than unambiguously high-attached RCs.

Crucially, the difference in rated readability for low- vs. high-attached RCs was significantly ($p < .001$) more pronounced for RC structures that were embedded in direct speech quotations than for RC structures in narrative contexts; indirect speech, by contrast, boosted the low RC-attachment preference relative to the narrative baseline only descriptively ($p = .204$). This finding supports our hypothesis, suggesting that SIP in silent reading of (particularly) direct speech boosts the low RC-attachment preference in English.

However, the more pronounced low RC-attachment preference in direct speech may not necessarily be driven by a primarily *quantitative* boost in the salience of implicit prosody via perceptual simulation. As suggested by an anonymous reviewer, there may be *qualitative* differences in prosodic phrasing between the direct speech and both the indirect speech and the narrative conditions. For example, readers may be more likely to place an implicit phrase boundary [*] before a direct speech quotation (e.g., *He told the group: [*] "I really liked the..."*) than before an indirect speech quotation (e.g., *He told the group [*] that he really liked the...*) or a narrative sentence (e.g., *It seemed [*] that he really liked the...*). This early phrase boundary in direct speech could potentially trigger the insertion of an additional phrase boundary after the head of NP1 (e.g., *"I really liked the bells [*] of the church that..."*), thereby favouring a low-attachment interpretation of the RC (Lovrić, Bradley, & Fodor, 2000, 2001; Quinn, Abdelghany, & Fodor, 2000; see also Selkirk, 2000).

Although the “quantitative” and “qualitative” accounts are both consistent with our results in silent reading, they would make different predictions if participants read the sentences out loud. Indeed, if the Reporting Style × RC-Attachment interaction in the readability ratings from Experiment 2 was driven by a *quantitative* boost of implicit prosody for direct speech (via SIP), there should be no such

interaction in oral reading. This is because under *explicit* prosody conditions, the indirect speech and narrative conditions would now experience a similar boost to the salience of prosodic phrasing. In fact, prosodic phrasing would become *equally salient* (via explicit prosody) across the three reporting style conditions. We would thus observe similar low RC-attachment preferences in all conditions. By contrast, if the Reporting Style × Attachment interaction in Experiment 2 was driven by *qualitative* differences in prosodic phrasing (as discussed earlier), we should still observe the same interaction after oral reading of the sentences.

Moreover, we assumed that qualitative differences in prosodic phrasing between (specifically) direct speech and the remaining two conditions should be measurable in different distributions of audible pauses in various critical sentence positions. These predictions were tested in the following experiment.

4. Experiment 3

Experiment 3 examined the effects of explicit prosody and prosodic phrasing on RC-attachment preferences in *oral* reading. Using materials from Experiment 2, participants orally read unambiguously low-attached or high-attached RC-attachment structures in direct speech, indirect speech, or narrative sentences. After reading the sentences aloud, participants rated their felicity on a 9-point scale, just as in Experiment 2.

4.1 Participants

Twenty-four native English speakers (mean age 28 years, $SD=9.1$, 11 females) from the University of Manchester participated in exchange for £1. The experiment took about 10 min.

4.2 Materials and design

The materials and design were identical to Experiment 2.

4.3 Procedure

The procedure was the same as in Experiment 2. The only difference was that participants were instructed to read the stories out loud (instead of silently) and that their responses were audio-recorded throughout the experiment.

4.4 Results

We first fitted a linear mixed model to the readability ratings, in exactly the same manner as in Experiment 2. The results are reported in Table 4. Condition means and pairwise contrasts are shown in Figure 3.

Table 4. Linear mixed-effect model estimates of readability ratings in Experiment 3

Fixed Effects	Estimate	S.E.	<i>t</i>	<i>p</i>
DS-NS	.04	.17	.25	.806
IS-NS	-.04	.19	-.22	.827
Att(LA-HA)	.57	.25	2.25	.033
DS-NS × Att(LA-HA)	.15	.34	.43	.667
IS-NS × Att(LA-HA)	-.04	.34	-.12	.904

DS=direct speech; IS=indirect speech; NS=narrative sentence; Att=attachment type; LA=low attachment; HA=high attachment. Significant effects ($p < .05$) are highlighted in bold.

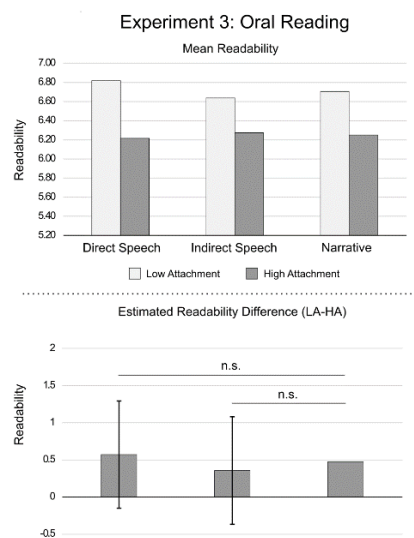


Figure 3. (Top) mean readability ratings after oral reading, Experiment 3. (Bottom) readability rating differences (low- vs. high-attachment) per reporting style condition, Experiment 3. Error bars indicate 95% confidence intervals for readability contrasts (low- vs. high-attachment) in relation to the narrative (baseline) condition. n.s.= not significant.

There was a significant main effect of RC-Attachment: readability ratings were about .57 ($\pm .25 SE$) scale points higher for low- than for high-attached RC structures. Unlike in Experiment 2, however, RC-Attachment did not interact with either the *DS-NS* or the *IS-NS* contrast.

Next, we performed acoustic analyses of the audio recordings in order to explore the differences in prosodic phrasing. Specifically, we focused on audible pauses (≥ 100 ms in duration) as an explicit marker for prosodic boundaries (Cutler, Dahan, & Van Donselaar, 1997) in three critical sentence positions: (i) before the critical quotation passage (e.g., *He told the group: [*] "I really liked the..." / He told the group [*] that he really liked the... / It seemed [*] that he really liked the...*), (ii) after NP1 (e.g., *...really liked the bells [*] of the church that...*), and (iii) after NP2 (e.g., *...really liked the bells of the church [*] that...*). Note that a pause after NP1 should support low-attachment and a pause after NP2 high-attachment of the critical RC. The relevant percentage distributions (by condition and position) are reported in Table 5.

Table 5. Percentages of pauses in each experimental condition: Before the critical quotations, after NP1, and after NP2.

		Before	After NP1	After NP2
<i>DS</i>	<i>LA</i>	39.6 (5.0)	9.4 (3.0)	29.2 (4.7)
	<i>HA</i>	42.7 (5.1)	12.5 (3.4)	29.2 (4.7)
<i>IS</i>	<i>LA</i>	13.5 (3.5)	7.3 (2.7)	32.3 (4.8)
	<i>HA</i>	9.4 (3.0)	15.6 (3.7)	36.5 (4.9)
<i>NS</i>	<i>LA</i>	9.4 (3.0)	9.4 (3.0)	27.1 (4.6)
	<i>HA</i>	7.3 (2.7)	4.2 (2.1)	31.3 (4.8)

DS=direct speech; IS=indirect speech; NS=narrative sentence; LA=low attachment; HA=high attachment. Values in parentheses represent standard errors.

For each of the three critical sentence positions, occurrences of pauses were fitted in terms of binary logistic GLMMs. As before, all predictors were mean-centred (deviation coding). Fixed effects included the *DS-NS* and the *IS-NS* main effect contrasts (*NS* served as baseline), the *RC-Attachment* main effect, the *DS-NS* \times *RC-Attachment* interaction, and the *IS-NS* \times *RC-Attachment* interaction. Maximal (by subjects and items) random effect structures were used, but excluding random correlation terms due to convergence issues.

The GLMM results confirmed that participants were reliably more likely to insert a pause before direct speech quotations than before narrative sentences ($b=2.48$, $SE=.66$, $z=3.79$, $p<.001$ for the *DS-*

NS main effect contrast). No further effects were registered in this position (all $ps > .44$). In post-NP1 position, occurrences of pauses were rare (9.7% overall) and only the *IS-NS* \times *RC-Attachment* coefficient was significant ($b = -1.76$, $SE = .79$, $z = -2.22$, $p = .027$). The latter confirmed a reliably different low versus high RC-attachment contrast in the indirect speech relative to the narrative (baseline) condition. Finally, in post-NP2 position, no reliable effects were registered (all $ps > .41$).

We also examined by-trial correlations (*phi*-coefficients for binary data) in occurrences of pauses across the three critical sentence positions. We found a small negative correlation between pauses occurring before quotation and pauses occurring after NP1 ($\phi = -.093$, $p = .026$), a small positive correlation between pauses after NP1 and pauses after NP2 ($\phi = +.123$, $p = .003$), and no discernible correlation between pauses before quotation and pauses after NP2 ($\phi = -.039$, $p = .352$).

4.5 Discussion

The readability ratings from Experiment 3 (oral reading) again confirmed a general low RC-attachment bias in English. Importantly, unlike in Experiment 2 (silent reading), the difference in rated readability for low- vs. high-attached RCs did not reliably interact with reporting style. We examined the differential patterns of results between Experiment 2 and 3 in a supplemental mixed model analysis using a 3-factorial *Experiment* \times *Reporting Style* \times *RC-Attachment* fixed effects design (treating *Experiment* as between-subjects/within-items variable). This analysis indeed confirmed a significant *Experiment* \times *DS-NS* \times *Attachment* estimate ($b = -1.20$, $SE = .53$, $z = -2.27$, $p = .023$). We take this as support for a SIP-related ‘quantitative’ prosodic boost explanation of the results from Experiment 2: in silent reading, the enhanced (more salient) implicit prosody for direct speech engenders a more pronounced low RC-attachment preference relative to indirect speech or narrative sentences; in oral reading, by contrast, prosodic phrasing is *equally salient* (i.e., explicit) in all three conditions. Indirect speech and narrative sentences become as susceptible to prosody-induced syntactic biases as direct speech sentences. The non-significant *Reporting Style* \times *RC-Attachment* interaction in the readability ratings of Experiment 3 was therefore not unexpected.

Also important were the acoustic analyses of the oral reading data from Experiment 3, based on occurrences of audible pauses (≥ 100 ms in duration) in three critical sentence positions: before quotation, after NP1, and after NP2. Research suggests that in English, pauses after NP1 support a low-attachment interpretation of RC structures and pauses after NP2 a high-attachment interpretation (Quinn et al., 2000). While our analyses showed that speakers were about four times more likely to insert a phrasal boundary before direct quotes than before indirect quotes or narrative sentences (Table 4), there was no convincing evidence that this had consequences for attachment-relevant prosodic phrasing further downstream, i.e. with regards to pauses after NP1 or after NP2, respectively. If anything, correlation analyses suggested that inserting a pause before the critical quotation sentence was somewhat *negatively* associated with inserting a pause after NP1, which might predict more prosodic support for high RC-attachment in the direct speech condition (where pre-quote pauses were very likely). Taken together, our data show no compelling evidence for qualitative differences in prosodic phrasing being the driving force behind the findings from Experiments 1 and 2.

5. General discussion

Using a sentence completion task (Experiment 1) and an off-line readability judgement task (Experiments 2 and 3), we replicated the general low-attachment preference for RC structures in English.

Crucially, in both silent production and comprehension, we found that this low attachment preference was more pronounced when the RC-structures were embedded in direct speech, as compared to indirect speech or (particularly) narrative sentences. This interaction disappeared when the RC structures were read aloud, and there was no clear evidence for qualitative differences in attachment-relevant prosodic patterns in the reading aloud data from Experiment 3.

How do our findings relate to default implicit prosody (DIP) and simulated implicit prosody (SIP) discussed in the introduction? Presuming that the low-attachment preference for RCs in English is driven by prosodic factors, it appears plausible that the direct speech reporting style would quantitatively enhance the salience of implicit prosody (via perceptual simulation of speech) specifically during *silent* reading and/or completion of sentences (cf. Experiments 1 and 2). Previous work has shown that silent reading of direct speech elicits higher activation of temporal voice areas in the auditory cortex than indirect speech (Yao et al., 2011), suggesting more enhanced, mentally simulated prosodic representations in silent reading of direct speech. Relative to other factors, implicit prosody would hence play a more important role in silent reading of direct speech quotations, thereby leading to a more pronounced low RC-attachment preference compared to other reporting style conditions (Experiments 1 and 2).

It is also possible that direct speech would induce a *qualitatively* different pattern of implicit prosodic phrasing (e.g., higher probabilities of placing a phrasal boundary after the head of NP1, which would strengthen the low RC-attachment bias in direct speech as well). However, while our oral reading data (Experiment 3) indicated that speakers were more likely to place a phrasal boundary before direct speech quotations than equivalent indirect speech or narrative sentences, the probabilities of placing a phrasal boundary after NP1 or NP2 were largely unaffected by reporting style. Critically, the readability ratings from Experiment 3 (oral reading) did not show a more pronounced low RC-attachment bias for direct speech quotations, contrasting with Experiments 1 and 2. We interpret this as additional evidence for a more *quantitative* account (in terms of salience of implicit prosody) whereby prosodic phrasing is equally salient (i.e., explicit) across the three conditions during oral reading, resulting in similar low RC-attachment biases also in indirect speech and narrative conditions.

In conclusion, our findings provide the first suggestion of a shared cognitive basis (Yao & Scheepers, 2015) between ‘default’ implicit prosody (Fodor, 1998, 2002) and ‘simulated’ implicit prosody (Yao

et al., 2011; Yao & Scheepers, 2011). Although research on SIP is still young, it complements research on DIP by providing a potentially useful platform to directly manipulate and ‘enhance’ implicit prosody during silent reading, namely via the use of direct speech quotations. Future research may consider replicating the effects of SIP on RC-attachment in other languages. For instance, French, German and Spanish are known to have a high RC-attachment preference. If attachment decisions are influenced by implicit prosody, then embedding RC structures in direct quotes should yield a stronger high-attachment preference, specifically during *silent* reading or sentence completion in those languages.

ACKNOWLEDGEMENTS

We thank the editor Jennifer E. Arnold and two anonymous referees for their insightful comments and helpful suggestions. This work was presented at the 23rd Architectures and Mechanisms of Language Processing conference and the Experimental Psychology Society meeting in January 2018. This research was supported by Economic and Social Research Council Grant [ES/N002784/1] to B. Yao.

SUPPLEMENTAL MATERIAL

All data and R scripts in this research are archived at <http://reshare.ukdataservice.ac.uk/853105/> (Yao & Scheepers, 2018).

REFERENCES

- Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, *68*(3), 255–278.
<http://dx.doi.org/10.1016/j.jml.2012.11.001>
- Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences*, *22*(4), 577–660.
- Belin, P., Zatorre, R. J., Lafaille, P., Ahad, P., & Pike, B. (2000). Voice-selective areas in human auditory cortex. *Nature*, *403*(6767), 309–312. <http://dx.doi.org/10.1038/35002078>
- Carreiras, M., & Clifton, C. (1993). Relative clause interpretation preferences in Spanish and English. *Language and Speech*, *36*(4), 353–372. <http://dx.doi.org/10.1177/002383099303600401>
- Carreiras, M., & Clifton, C. (1999). Another word on parsing relative clauses: Eyetracking evidence from Spanish and English. *Memory and Cognition*, *27*(5), 826–833.
<http://dx.doi.org/10.3758/BF03198535>
- Clifton, C., Carlson, K., & Frazier, L. (2002). Informative prosodic boundaries. *Language and Speech*,

45(2), 87–114. <http://dx.doi.org/10.1177/00238309020450020101>

Cutler, A., Dahan, D., & Van Donselaar, W. (1997). Prosody in the comprehension of spoken language:

A literature review. *Language and Speech*, 40(2), 141–201.

Fodor, J. D. (1998). Learning to parse? *Journal of Psycholinguistic Research*, 27(2), 285–319.

<http://dx.doi.org/10.1023/A:1023258301588>

Fodor, J. D. (2002). Prosodic disambiguation in silent reading. In *PROCEEDINGS-NELS* (Vol. 1, pp.

113–132).

Lovrić, N., Bradley, D., & Fodor, J. D. (2000). RC attachment in Croatian with and without preposition.

Poster presented at the 6th Annual Conference on Architectures and Mechanisms for Language Processing (AMLaP), Leiden.

Lovrić, N., Bradley, D., & Fodor, J. D. (2001). Silent prosody resolves syntactic ambiguities: Evidence

from Croatian. Paper presented at the 2nd SUNY/CUNY/NYU Conference, Stonybrook, NY.

Mathôt, S., Schreij, D., & Theeuwes, J. (2012). OpenSesame: An open-source, graphical experiment

builder for the social sciences. *Behavior Research Methods*, 44(2), 314–324.

<http://dx.doi.org/10.3758/s13428-011-0168-7>

Maynell, L. A. (1999). Effect of pitch accent placement on resolving relative clause ambiguity in

English. Poster presented at the 12th Annual CUNY Conference on Human Sentence Processing, New York.

Quinn, D., Abdelghany, H., & Fodor, J. D. (2000). More evidence of implicit prosody in reading:

French and Arabic relative clauses. Poster presented at the 13th Annual CUNY Conference on Human Sentence Processing, La Jolla, CA.

Selkirk, E. (2000). The interaction of constraints on prosodic phrasing. In *Prosody: Theory and*

experiment (pp. 231–261). Springer.

- Stites, M. C., Luke, S. G., & Christianson, K. (2013). The psychologist said quickly, "Dialogue descriptions modulate reading speed!" *Memory and Cognition*, *41*(1), 137–151.
<http://dx.doi.org/10.3758/s13421-012-0248-7>
- Yao, B., Belin, P., & Scheepers, C. (2011). Silent reading of direct versus indirect speech activates voice-selective areas in the auditory cortex. *Journal of Cognitive Neuroscience*, *23*(10), 3146–3152. http://dx.doi.org/10.1162/jocn_a_00022
- Yao, B., Belin, P., & Scheepers, C. (2012). Brain "talks over" boring quotes: Top-down activation of voice-selective areas while listening to monotonous direct speech quotations. *NeuroImage*, *60*(3), 1832–1842. <http://dx.doi.org/10.1016/j.neuroimage.2012.01.111>
- Yao, B., & Scheepers, C. (2011). Contextual modulation of reading rate for direct versus indirect speech quotations. *Cognition*, *121*(3), 447–453.
<http://dx.doi.org/10.1016/j.cognition.2011.08.007>
- Yao, B., & Scheepers, C. (2015). Inner Voice Experiences During Processing of Direct and Indirect Speech. In L. Frazier & E. Gibson (Eds.), *Explicit and Implicit Prosody in Sentence Processing* (pp. 287–307). Springer International Publishing. http://dx.doi.org/10.1007/978-3-319-12961-7_15
- [dataset] Yao, B., & Scheepers, C. (2018). Direct speech quotations promote low relative-clause attachment in silent reading of English. [Data Collection]. Colchester, Essex: UK Data Archive.
<http://dx.doi.org/10.5255/UKDA-SN-853105>

Appendix A

1 Councillor Nora was passionate about music education in the local area.

DS When she met a friend, she said: "I recently visited the students of the piano teacher who _____."

IS When she met a friend, she said that she recently visited the students of the piano teacher who _____.

NS It appeared that she recently visited the students of the piano teacher who _____.

2 Manager Garry was asked why tonight's concert was running late.

DS He explained: "I'm still waiting for the musicians of the pop star who _____."

IS He explained that he was still waiting for the musicians of the pop star who _____.

NS Apparently, he was still waiting for the musicians of the pop star who _____.

3 The charity Save the Children had recently received a series of large donations.

DS In a press conference, the charity CEO said: "We cannot reveal the source of the donations that _____."

IS In a press conference, the charity CEO said that they could not reveal the source of the donations that _____.

NS In a press conference, the charity CEO refused to reveal the source of the donations that _____.

4 Chauffeur James was sharing his recent experience with friends in a local pub.

DS He boasted: "Yesterday I met the representative of the state guests who _____"

IS He boasted that yesterday he met the representative of the state guests who _____.

NS Apparently, yesterday he met the representative of the state guests who _____.

5 Superintendent Larry had been reviewing a report of a money laundering case but the numbers did not add up.

DS He called the finance officer and said: "I need to check the earnings of the company that _____."

IS He called the finance officer and said that he needed to check the earnings of the company that _____.

NS 1. Apparently, he needed to check the earnings of the company that _____.

6 The Smiths had been busy working on their family farm all day long. Over dinner, Mr Smith realised that he had forgotten something important.

DS He said to his wife: "I still need to feed the calves of the cow that _____"

IS He said to his wife that he still needed to feed the calves of the cow that _____.

NS He still needed to feed the calves of the cow that _____.

7 Factory owner John was not happy about the performance figures in the past few months.

DS He called his PA and said: "I need to speak to the supervisor of the employees who _____."

IS He called his PA and said that he needed to speak to the supervisor of the employees who _____.

NS 2. He wanted to speak to the supervisor of the employees who _____.

8 The manager of Sainsbury's was questioned about the drastic drop in fruit sales over the last month.

DS He explained: "The terrible frost ruined the harvest of the fruit farms that _____."

IS He explained that the terrible frost had ruined the harvest of the fruit farms that _____.

NS 3. Apparently, the terrible frost had ruined the harvest of the fruit farms that _____.

9 Professor Bob was reviewing an extensive research report and had doubts over the quality of the work.

DS He shook his head and commented: "I simply cannot agree with the method of the studies that _____."

IS He shook his head and commented that he simply could not agree with the method of the studies that _____.

NS He shook his head because he simply could not agree with the method of the studies that _____.

10 Kelly and Gemma were laughing out loud on a train, which obviously annoyed some fellow passengers.

DS Kelly apologised and explained: "Sorry, we were amused at the articles of the newspaper that _____."

IS Kelly apologised and explained that they were amused at the articles of the newspaper that _____.

NS They continued laughing because they were amused at the articles of the newspaper that _____.

11 Social worker Tom had been volunteering at a local hospital for over a year. His friends did not understand why he would not get a properly paid job elsewhere.

DS He blushed and murmured: "I .. actually fancy the nurse of the senior-citizens who _____."

IS He blushed and murmured that he actually fancied the nurse of the senior-citizens who _____.

NS He blushed because he actually fancied the nurse of the senior-citizens who _____.

12 The insurer was surveying a tenement housing complex owned by a rich oligarch.

DS He told the landlord: "We need to insure the furniture of the apartments that _____."

IS He told the landlord that they needed to insure the furniture of the apartments that _____.

NS He assumed that they needed to insure the furniture of the apartments that _____.

- 13 Millions of usernames and passwords had recently been stolen from one of the biggest social network site.**
DS The Head of Internet Security said: "The hackers attacked the web sites of the service provider that _____."
IS The Head of Internet Security said that the hackers attacked the web sites of the service provider that _____.
NS It appeared that the hackers attacked the web sites of the service provider that _____.
- 14 Windsor Castle had recently been closed due to domestic affairs. Tipped by an insider, Royal Correspondent Peter spilled the beans.**
DS He explained: "A stranger blackmailed the butler of the royals who _____."
IS He explained that a stranger blackmailed the butler of the royals who _____.
NS It seemed that a stranger blackmailed the butler of the royals who _____.
- 15 The MI5 had recently intercepted a terrorist attack on London undergrounds. It turned out that the terrorists were working undercover in a trading company.**
DS A spokesman of the MI5 announced: "The secret service had confiscated all files of the organisation that _____."
IS A spokesman of the MI5 announced that the secret service had confiscated all files of the organisation that _____.
NS The secret service had confiscated all files of the organisation that _____.
- 16 There had been a bombing at the embassy today, injuring several people. A local shopkeeper witnessed the incident.**
DS He said: "I saw the bodyguard of the diplomats who _____."
IS He said that he saw the bodyguard of the diplomats who _____.
NS He saw the bodyguard of the diplomats who _____.
- 17 Astronomer Deborah was presenting her latest findings at an international conference.**
DS She said: "I observed the stars of the spiral galaxy that _____."
IS She said that she observed the stars of the spiral galaxy that _____.
NS She observed the stars of the spiral galaxy that _____.
- 18 Steven Fry went to Africa to record a BBC documentary on languages.**
DS He said: "I am thrilled to get to study the language of the tribes that _____."
IS He said that he was thrilled to get to study the language of the tribes that _____.
NS He was thrilled to get to study the language of the tribes that _____.
- 19 Finance consultant Louise was coaching students about domestic finances management.**
DS She said: "I always keep the letters of the bank that _____."
IS She said that she always kept the letters of the bank that _____.
NS Her advice was to always keep the letters of the bank that _____.
- 20 A new, child-friendly hotel was recently opened in south London.**
DS At the opening ceremony, the owner announced: "We offer free nutritious meals to the children of the hotel resident who _____."
IS At the opening ceremony, the owner announced that they offered free nutritious meals to the children of the hotel resident who _____.
NS At the opening ceremony, they offered free nutritious meals to the children of the hotel resident who _____.
- 21 At the crime scene, the police were investigating a murder case.**
DS An eye witness said, "Someone shot the servants of the actress who _____."
IS An eye witness said that someone shot the servants of the actress who _____.
NS It seemed that someone shot the servants of the actress who _____.
- 22 At the local museum, snake expert Thea was hosting an exhibition displaying her discoveries in Malaysia this summer.**
DS Addressing the audience, she said: "First I would like to show you videos of the snake that _____."
IS Addressing the audience, she said that first she would like to show them videos of the snake that _____.
NS First, she would show the audience some videos of the snake that _____.

23 Frank and his friends were visiting a local church on their travels to Germany.

DS He told the group: "I really liked the bells of the church that _____."

IS He told the group that he really liked the bells of the church that _____.

NS It seemed that he really liked the bells of the church that _____.

24 A series of scandals over corruption in the government had recently been reported by the BBC.

DS To address the public outrage, the Prime Minister promised: "We will carry out a full investigation into the advisors of the minister who _____."

IS To address the public outrage, the Prime Minister announced that they would carry out a full investigation into the advisors of the minister who _____.

NS To address the public outrage, the Prime Minister was determined to carry out a full investigation into the advisors of the minister who _____.

Appendix B

1 Councillor Nora was passionate about music education in the local area.

- LA-DS When she met a friend, she said: "I recently visited the students of the piano teacher who was also a composer."
LA-IS When she met a friend, she said that she recently visited the students of the piano teacher who was also a composer.
LA-NS It appeared that she recently visited the students of the piano teacher who was also a composer.
HA-DS When she met a friend, she said: "I recently visited the students of the piano teacher who were given free piano lessons."
HA-IS When she met a friend, she said that she recently visited the students of the piano teacher who were given free piano lessons.
HA-NS It appeared that she recently visited the students of the piano teacher who were given free piano lessons.

2 Manager Garry was asked why tonight's concert was running late.

- LA-DS He explained: "I'm still waiting for the musicians of the pop star who is headlining the concert."
LA-IS He explained that he was still waiting for the musicians of the pop star who was headlining the concert.
LA-NS Apparently, he was still waiting for the musicians of the pop star who was headlining the concert.
HA-DS He explained: "I'm still waiting for the musicians of the pop star who are tuning their instruments."
HA-IS He explained that he was still waiting for the musicians of the pop star who were tuning their instruments.
HA-NS Apparently, he was still waiting for the musicians of the pop star who were tuning their instruments.

3 The charity Save the Children had recently received a large donation.

- LA-DS In a press conference, the charity CEO said: "We cannot reveal the source of the donations that we have gratefully received."
LA-IS In a press conference, the charity CEO said that they could not reveal the source of the donations that they had gratefully received.
LA-NS In a press conference, the charity CEO refused to reveal the source of the donations that they had gratefully received.
HA-DS In a press conference, the charity CEO said: "We cannot reveal the source of the donations that has asked to remain anonymous."
HA-IS In a press conference, the charity CEO said that they could not reveal the source of the donations that had asked to remain anonymous.
HA-NS In a press conference, the charity CEO refused to reveal the source of the donations that had asked to remain anonymous.

4 Chauffeur James was sharing his recent experience with friends in a local pub.

- LA-DS He boasted: "Yesterday I met the representative of the state guests who were going to a fancy dinner at the White House."
LA-IS He boasted that yesterday he met the representative of the state guests who were going to a fancy dinner at the White House.
LA-NS Apparently, yesterday he met the representative of the state guests who were going to a fancy dinner at the White House.
HA-DS He boasted: "Yesterday I met the representative of the state guests who was very impressed with my driving."
HA-IS He boasted that yesterday he met the representative of the state guests who was very impressed with his driving.
HA-NS Apparently, yesterday he met the representative of the state guests who was very impressed with his driving.

5 Superintendent Larry had been reviewing a report of a money laundering case but the numbers did not add up.

- LA-DS He called the finance officer and said: "I need to check the earnings of the company that is located in Russia."
LA-IS He called the finance officer and said that he needed to check the earnings of the company that was located in Russia.
LA-NS Apparently, he needed to check the earnings of the company that was located in Russia.
HA-DS He called the finance officer and said: "I need to check the earnings of the company that are not yet accounted for."
HA-IS He called the finance officer and said that he needed to check the earnings of the company that were not yet accounted for.
HA-NS Apparently, he needed to check the earnings of the company that were not yet accounted for.

6 The Smiths had been busy working on their family farm all day long. Over dinner, Mr Smith realised that he had forgotten something important.

- LA-DS He said to his wife: "I still need to feed the calves of the cow that has been butchered this morning."
LA-IS He said to his wife that he still needed to feed the calves of the cow that had been butchered that morning.
LA-NS He still needed to feed the calves of the cow that had been butchered that morning.
HA-DS He said to his wife: "I still need to feed the calves of the cow that were born two days ago."
HA-IS He said to his wife that he still needed to feed the calves of the cow that were born two days ago.
HA-NS He still needed to feed the calves of the cow that were born two days ago.

- 7** **Factory owner John was not happy about the performance figures in the past few months.**
LA-DS He called his PA and said: "I need to speak to the supervisor of the employees who weren't pulling their weight."
LA-IS He called his PA and said that he needed to speak to the supervisor of the employees who weren't pulling their weight.
LA-NS He wanted to speak to the supervisor of the employees who weren't pulling their weight.
HA-DS He called his PA and said: "I need to speak to the supervisor of the employees who was managing workers' performance."
HA-IS He called his PA and said that he needed to speak to the supervisor of the employees who was managing workers' performance.
HA-NS He wanted to speak to the supervisor of the employees who was managing workers' performance.
- 8** **The manager of Sainsbury's was questioned about the drastic drop in fruit sales over the last month.**
LA-DS He explained: "The terrible frost ruined the harvest of the fruit farms that are supplying fruits to the company."
LA-IS He explained that the terrible frost had ruined the harvest of the fruit farms that were supplying fruits to the company.
LA-NS Apparently, the terrible frost had ruined the harvest of the fruit farms that were supplying fruits to the company.
HA-DS He explained: "The terrible frost ruined the harvest of the fruit farms that was growing so well."
HA-IS He explained that the terrible frost had ruined the harvest of the fruit farms that was growing so well.
HA-NS Apparently, the terrible frost had ruined the harvest of the fruit farms that was growing so well.
- 9** **Professor Bob was reviewing an extensive research report and had doubts over the quality of the work.**
LA-DS He shook his head and commented: "I simply cannot agree with the method of the studies that were carried out last year."
LA-IS He shook his head and commented that he simply could not agree with the method of the studies that were carried out last year.
LA-NS He shook his head because he simply could not agree with the method of the studies that were carried out last year.
HA-DS He shook his head and commented: "I simply cannot agree with the method of the studies that was used by the researchers."
HA-IS He shook his head and commented that he simply could not agree with the method of the studies that was used by the researchers.
HA-NS He shook his head because he simply could not agree with the method of the studies that was used by the researchers.
- 10** **Kelly and Gemma were laughing out loud on a train, which obviously annoyed some fellow passengers.**
LA-DS Kelly apologised and explained: "Sorry, we were amused at the articles of the newspaper that we picked up at the station."
LA-IS Kelly apologised and explained that they were amused at the articles of the newspaper that they picked up at the station.
LA-NS They continued laughing because they were amused at the articles of the newspaper that they picked up at the station.
HA-DS Kelly apologised and explained: "Sorry, we were amused at the articles of the newspaper that are written by comedians."
HA-IS Kelly apologised and explained that they were amused at the articles of the newspaper that were written by comedians.
HA-NS They continued laughing because they were amused at the articles of the newspaper that were written by comedians.
- 11** **Social worker Tom had been volunteering at a local hospital for over a year. His friends did not understand why he would not get a properly paid job elsewhere.**
LA-DS He smiled and said: "I actually enjoy helping the nurse of the senior-citizens who are suffering from dementia."
LA-IS He smiled and said that he actually enjoyed helping the nurse of the senior-citizens who were suffering from dementia.
LA-NS He smiled because he actually enjoyed helping the nurse of the senior-citizens who were suffering from dementia.
HA-DS He smiled and said: "I actually enjoy helping the nurse of the senior-citizens who is always so cheerful."
HA-IS He smiled and said that he actually enjoyed helping the nurse of the senior-citizens who was always so cheerful.
HA-NS He smiled because he actually enjoyed helping the nurse of the senior-citizens who was always so cheerful.
- 12** **The insurer was surveying a tenement housing complex owned by a rich oligarch.**
LA-DS He told the landlord: "We need to insure the furniture of the apartments that are currently vacant."
LA-IS He told the landlord that they needed to insure the furniture of the apartments that were currently vacant.
LA-NS He assumed that they needed to insure the furniture of the apartments that were currently vacant.
HA-DS He told the landlord: "We need to insure the furniture of the apartments that is antique and valuable."
HA-IS He told the landlord that they needed to insure the furniture of the apartments that was antique and valuable.
HA-NS He assumed that they needed to insure the furniture of the apartments that was antique and valuable.

- 13 Millions of usernames and passwords had recently been lost at one of the fastest-growing start-up companies in Asia.**
- LA-DS** An internet security expert said: "Some hackers deleted all customer details of a service provider that is based in India."
LA-IS An internet security expert said that some hackers deleted all customer details of a service provider that was based in India.
LA-NS It appeared that that some hackers deleted all customer details of a service provider that was based in India.
HA-DS An internet security expert said: "Some hackers deleted all customer details of a service provider that were saved on standard hard-drives."
HA-IS An internet security expert said that some hackers deleted all customer details of a service provider that were saved on standard hard-drives.
HA-NS It appeared that some hackers deleted all customer details of a service provider that were saved on standard hard-drives.
- 14 Windsor Castle had recently been closed due to domestic affairs. Tipped by an insider, Royal Correspondent Peter spilled the beans.**
- LA-DS** He explained: "A stranger blackmailed the butler of the royals who have employed him for 30 years."
LA-IS He explained that a stranger blackmailed the butler of the royals who had employed him for 30 years.
LA-NS It seemed that a stranger blackmailed the butler of the royals who had employed him for 30 years.
HA-DS He explained: "A stranger blackmailed the butler of the royals who has served them for 30 years."
HA-IS He explained that a stranger blackmailed the butler of the royals who had served them for 30 years.
HA-NS It seemed that a stranger blackmailed the butler of the royals who had served them for 30 years.
- 15 The MI5 had recently intercepted a terrorist attack on London undergrounds. It turned out that the terrorists were working undercover in a trading company.**
- LA-DS** A spokesman of the MI5 announced: "The secret service confiscated all files of the organisation that has contacted the terrorists."
LA-IS A spokesman of the MI5 announced that the secret service confiscated all files of the organisation that had contacted the terrorists.
LA-NS In a recent coup, the secret service confiscated all files of the organisation that had contacted the terrorists.
HA-DS A spokesman of the MI5 announced: "The secret service confiscated all files of the organisation that were found at the scene."
HA-IS A spokesman of the MI5 announced that the secret service confiscated all files of the organisation that were found at the scene.
HA-NS In a recent coup, the secret service confiscated all files of the organisation that were found at the scene.
- 16 There had been a bombing at the embassy today, injuring several people. A local shopkeeper witnessed the incident.**
- LA-DS** He said: "I saw the bodyguards of the diplomat who was visiting from France."
LA-IS He said that he saw the bodyguards of the diplomat who was visiting from France.
LA-NS He saw the bodyguards of the diplomat who was visiting from France.
HA-DS He said: "I saw the bodyguards of the diplomat who were injured protecting the diplomat."
HA-IS He said that he saw the bodyguards of the diplomat who were injured protecting the diplomat.
HA-NS He saw the bodyguards of the diplomat who were injured protecting the diplomat.
- 17 Astronomer Deborah was presenting her latest findings at an international conference.**
- LA-DS** She said: "I observed the stars of the spiral galaxy that is 10 times larger than the Milky Way."
LA-IS She said that she observed the stars of the spiral galaxy that was 10 times larger than the Milky Way.
LA-NS She observed the stars of the spiral galaxy that was 10 times larger than the Milky Way.
HA-DS She said: "I observed the stars of the spiral galaxy that are expected to collide with one another."
HA-IS She said that she observed the stars of the spiral galaxy that were expected to collide with one another.
HA-NS She observed the stars of the spiral galaxy that were expected to collide with one another.
- 18 Steven Fry went to Africa to record a BBC documentary on languages.**
- LA-DS** He said: "I am thrilled to get to study the language of the tribes that live deep in the Sahara Desert."
LA-IS He said that he was thrilled to get to study the language of the tribes that lived deep in the Sahara Desert.
LA-NS He was thrilled to get to study the language of the tribes that lived deep in the Sahara Desert.
HA-DS He said: "I am thrilled to get to study the language of the tribes that contains only vowels but not consonants."
HA-IS He said that he was thrilled to get to study the language of the tribes that contained only vowels but not consonants.
HA-NS He was thrilled to get to study the language of the tribes that contained only vowels but not consonants.

- 19 Finance consultant Louise was lecturing students about how to deal with financial correspondence.**
LA-DS She said: "One should always keep the letters of the bank that is managing one's investments."
LA-IS She said that one should always keep the letters of the bank that is managing one's investments.
LA-NS Her advice was to always keep the letters of the bank that is managing one's investments.
HA-DS She said: "One should always keep the letters of the bank that are posted in December."
HA-IS She said that one should always keep the letters of the bank that are posted in December.
HA-NS Her advice was to always keep the letters of the bank that are posted in December.
- 20 A new, child-friendly hotel was recently opened in South London.**
LA-DS At the opening ceremony, the owner announced: "We offer free nutritious meals to the children of any customer who books a room for five nights or more."
LA-IS At the opening ceremony, the owner announced that they offered free nutritious meals to the children of any customer who books a room for five nights or more.
LA-NS At the opening ceremony, they offered free nutritious meals to the children of any customer who books a room for five nights or more.
HA-DS At the opening ceremony, the owner announced: "We offer free nutritious meals to the children of any customer who are less than twelve years old."
HA-IS At the opening ceremony, the owner announced that they offered free nutritious meals to the children of any customer who were less than twelve years old.
HA-NS At the opening ceremony, they offered free nutritious meals to the children of any customer who were less than twelve years old.
- 21 At the crime scene, the police was investigating a murder case.**
LA-DS An eye witness said, "Someone shot the servants of the baroness who was attending a charity event."
LA-IS An eye witness said that someone shot the servants of the baroness who was attending a charity event.
LA-NS It seemed that someone shot the servants of the baroness who was attending a charity event.
HA-DS An eye witness said, "Someone shot the servants of the baroness who were from a poor neighborhood."
HA-IS An eye witness said that someone shot the servants of the baroness who were from a poor neighborhood.
HA-NS It seemed that someone shot the servants of the baroness who were from a poor neighborhood.
- 22 At the local museum, snake expert Thea was hosting an exhibition about a new species she recently discovered in Malaysia.**
LA-DS Addressing the audience, she said: "First I would like to show you some videos of the snake which is capable of swallowing a whole armadillo."
LA-IS Addressing the audience, she said that first she would like to show them some videos of the snake which was capable of swallowing a whole armadillo.
LA-NS First, she would show the audience some videos of the snake which was capable of swallowing a whole armadillo.
HA-DS Addressing the audience, she said: "First I would like to show you some videos of the snake which are all in high definition."
HA-IS Addressing the audience, she said that first she would like to show them some videos of the snake which were all in high definition.
HA-NS First, she would show the audience some videos of the snake which were all in high definition.
- 23 Frank and his friends were visiting some lovely places on their trip to Germany last year.**
LA-DS He told the group: "I really liked the bells of the church that was right next to the town hall."
LA-IS He told the group that he really liked the bells of the church that was right next to the town hall.
LA-NS It seemed that he really liked the bells of the church that was right next to the town hall.
HA-DS He told the group: "I really liked the bells of the church that were chiming every hour."
HA-IS He told the group that he really liked the bells of the church that were chiming every hour.
HA-NS It seemed that he really liked the bells of the church that were chiming every hour.
- 24 The BBC reported yet another series of scandals over corruption in the government last week.**
LA-DS To address the public outrage, the Prime Minister announced: "We will carry out a full investigation into the advisors of the minister who was accused of money laundering."
LA-IS To address the public outrage, the Prime Minister announced that they would carry out a full investigation into the advisors of the minister who was accused of money laundering.
LA-NS To address the public outrage, the Prime Minister was determined to carry out a full investigation into the advisors of the minister who was accused of money laundering.
HA-DS To address the public outrage, the Prime Minister announced: "We will carry out a full investigation into the advisors of the minister who are refusing to comment on the issue."
HA-IS To address the public outrage, the Prime Minister announced that they would carry out a full investigation into the advisors of the minister who were refusing to comment on the issue.
HA-NS To address the public outrage, the Prime Minister was determined to carry out a full investigation into the advisors of the minister who were refusing to comment on the issue.

