

Online processing of subjective and objective causal relations: The role of genre cues and reading experience

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Understanding causal relations is central to discourse comprehension. While objective causal relations describe real-world cause-consequence relations, subjective causal relations involve the reasoning of a thinking entity (subject of consciousness, Sanders and Spooren, 2015). Interpreting subjective relations often incurs a cognitive cost, manifested as extra processing time (Canestrelli et al., 2013; Wei et al., 2019). Genre cues, which provide information about the context in which a discourse relation is embedded, might help readers to build up subjective mental representation in advance and facilitate reading comprehension. Previous research on genre expectations only examined the facilitation effects of local cues, such as a modal adverb *perhaps* (Canestrelli et al., 2016). The present study introduces a more fine-grained genre manipulation, which systematically combines local cues (i.e., uncertainty and evaluation markers) and global cues (i.e., sentence structure and indicator of source of information) (see table 1). We examined whether the manipulated genre cues influence the processing time of subjective and objective causal relations. We also aim to explore how linguistic experience modulates reading comprehension (see Freed et al., 2017; Scholman et al., 2020), particularly in the processing of subjectivity and the use of genre cues.

In a 2×2 eye-tracking-while-reading experiment, 54 native Mandarin-speaking participants read short texts creating either an opinion piece genre or a news brief genre. These contexts were followed by either a subjective causal sentence introduced by a subjective connective *kejian* ‘so’ or an objective causal sentence introduced by an objective connective *yin’er* ‘as a result’. We hypothesized that an opinion piece genre, which is more argumentative, would help readers generate expectations for subjective reasoning and thereby reduces the processing delay associated with subjective relations. After the reading experiment, participants’ reading experience was measured using the Simplified Chinese Author Recognition Test (SCART). It is predicted that readers with more reading experience will use genre cues to generate expectations more efficiently, and show reduced subjectivity-related processing costs compared to readers with less reading experience.

For each reading time measure and critical region, log-transformed reading times were analyzed using linear mixed-effects models¹. The results showed that in both genre contexts, subjective connectives and region after connective were read faster than the objective ones in two late-stage reading measures: Region 7 (connective), regression-path duration ($\beta = -0.129$, $t(555.04) = -2.00$, $p = 0.047$) and total reading time ($\beta = -0.232$, $t(566.11) = -3.78$, $p < .001$); Region 8 (region after connective), total reading time ($\beta = -0.157$, $t(874.68) = -3.12$, $p = 0.002$). In addition, interactions between reading experience and relation type were found at the connective region in total reading time ($\beta = -0.092$, $t(554.58) = -2.17$, $p = 0.031$) and the region after connective in first-pass reading time ($\beta = -0.068$, $t(862.34) = -2.27$, $p = 0.023$).

These findings contrast with the subjectivity-related delays widely reported in previous studies. Instead, the results point to a general facilitative effect of genre context: both opinion-piece and news-brief contexts facilitated the processing of a subsequent subjective causal

¹ $\log rt \sim \text{relation} \times \text{genre} + \text{SCART} \times \text{relation} + \text{SCART} \times \text{genre} + (1 | \text{participant}) + (1 | \text{item})$

relation compared to an objective one. A preceding context that elaborates the background may provide a broader reasoning frame that supports the processing of subjective relations. Moreover, readers with more reading experience also showed stronger facilitation for subjective than for objective relations.

Table 1. Genre manipulation list

Genre context	Manipulations	EN_examples
Subjective genre		
Global cue: sentence structure	Active voice	<i>ba</i> -construction, active verbs
Global cue: indicator of source of information	First person SoC	<i>we, our</i>
	Cognition verbs	<i>consider, think, believe, suppose...</i>
Local cue: uncertainty markers	Epistemic stance markers	<i>perhaps, maybe, probably, about...</i>
	Modal verbs	<i>may, could, should...</i>
Local cue: evaluation markers	Evaluative adverbs	<i>highly, greatly, terribly...</i>
Objective genre		
Global cue: sentence structure	Passive voice	<i>bei</i> -construction, passive verbs
Global cue: indicator of source of information	Third person SoC	<i>researchers, relevant personnel...</i>
	Reporting verbs	<i>shows, express, indicates, states...</i>

Table 2. Mean total reading times (and SDs in milliseconds).

Measure	Genre	Relation	Region 7	Region 8	Region 9	Region 10
First-pass reading time	News Briefs	Objective	250 (123)	319 (189)	583 (413)	286 (156)
		Subjective	233 (101)	319 (185)	544 (378)	280 (166)
	Opinion Pieces	Objective	267 (149)	321 (208)	598 (473)	272 (147)
		Subjective	238 (101)	312 (168)	515 (343)	267 (143)
Regression-path duration	News Briefs	Objective	382 (322)	549 (499)	1052 (795)	562 (629)
		Subjective	354 (344)	469 (323)	899 (703)	558 (485)
	Opinion Pieces	Objective	346 (247)	540 (445)	1140 (813)	585 (586)
		Subjective	319 (233)	446 (326)	942 (742)	520 (501)
Total reading time	News Briefs	Objective	385 (240)	665 (411)	1101 (630)	394 (265)
		Subjective	308 (177)	571 (337)	1037 (648)	394 (244)
	Opinion Pieces	Objective	367 (226)	696 (453)	1265 (786)	418 (287)
		Subjective	332 (207)	610 (411)	1048 (687)	410 (278)

Note. Region 7: connective region; Region 8: region after the connective (same across conditions); Region 9: region between Region 8 and 10; Region 10: sentence-final region (same across conditions).

Reference

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