Plausibility and garden-paths: online aural cue use in L1, L2, and heritage speakers of Mandarin

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Garden-path (GP) sentences reveal comprehenders' expectations for a continuation based on a particular cue. In 1a), for example, verb bias leads comprehenders to expect a direct object (DO) following *edited,* resulting in a GP effect at *amused*. Given a conflicting cue, however, GP readings can be discouraged. For example, [1] observed a "reverse plausibility" effect, i.e. decreased processing difficulty at the syntactic disambiguation *amused* in 1b) compared to 1a) due to the implausibility of a noun like *magazine* acting as the DO of *sail*. Thus, comprehenders used the semantic plausibility cue to maintain or reduce commitment to the misleading GP reading.

1a) *While the woman edited the magazine amused all the reporters.*

1b) *While the woman sailed the magazine amused all the reporters.*

Cue use by bilingual populations may differ from that of L1 monolingual speakers [2]. Replication studies of [1] suggest that L2 speakers with age of acquisition (AoA) > 5 may not use the early-occurring plausibility information online to impact the strength of the DO attachment [3]. Furthermore, for L2 speakers, semantic cues may be prioritized over syntactic cues, since the former generally have higher utility given limited L2 resources [4]. While AoA has been implicated in some L2 studies, no previous studies of GP processing have included heritage speakers of any language, whose unique background can help distinguish effects of AoA from effects of language proficiency and dominance.

The present study investigates the online aural processing and offline interpretation of garden-path sentences by L1, advanced L2, and heritage speakers (HS) of Mandarin (n = 25, 20, 28, respectively) to examine how different groups use plausibility cues to maintain or decrease commitment to a GP structure. L2 and HS groups were matched for Mandarin proficiency and share a dominant language (English). Stimuli were constructed to have either a plausible or implausible initial reading, similar to 1a-b), based on the semantics of the causative relation encoded using the object marker *ba*. To achieve the final correct interpretation, comprehenders must reanalyze the causative object preceded by *ba* as the subject of a relative clause at R5 (Fig. 1). A self-paced listening task was used to avoid a potential confound with literacy for HS; note that SPL is a more natural task for studying GP processing in Mandarin as compared to English, since in tone languages, prosody does not reveal clausal boundaries. An agent decision task was used to test offline comprehension after each trial.

Results showed clear group differences in online processing patterns. For the L1 group, no effects of Plausibility were found at any region (Fig. 2). Similar findings by [5] and [6] suggest that self-paced measures may result in a "ceiling effect" for L1 processing. In contrast, a significant effect of Plausibility was found at the plausibility cue (R3) between conditions for both the HS (β = -0.5343, SE = 0.1772, t = -3.016, p = 0.0133*) and L2 (β = -0.4135, SE = 0.1325, t = -3.12, p = 0.012*) groups (Fig. 2). Additionally, both groups showed a clear and equal slowdown (i.e, the GP effect) at the syntactic disambiguation (R5) in both conditions. This suggests HS and L2 groups did not use the plausibility cue to mitigate the GP effect during online processing. However, interactions showed some fine-grained group differences. For HS, a significant interaction between Plausibility and Trial was found at R5, with a reverse plausibility effect emerging gradually over the course of the experiment. Thus, HS appear able to recruit cues to impact structure-building online. For the L2 group, greater differences at R3 were observed with greater Proficiency and Mandarin Exposure. Regarding offline comprehension, the L2 group had chance level accuracy, while the HL group had high comprehension across conditions; neither group was less accurate in the plausible condition than the implausible condition. Overall, our findings suggest that AoA subtly impacts cue use in online processing, with HL speakers showing more structure-building over time during the experiment, and with L2 speakers showing greater online sensitivity to semantic cues with more exposure and skill.

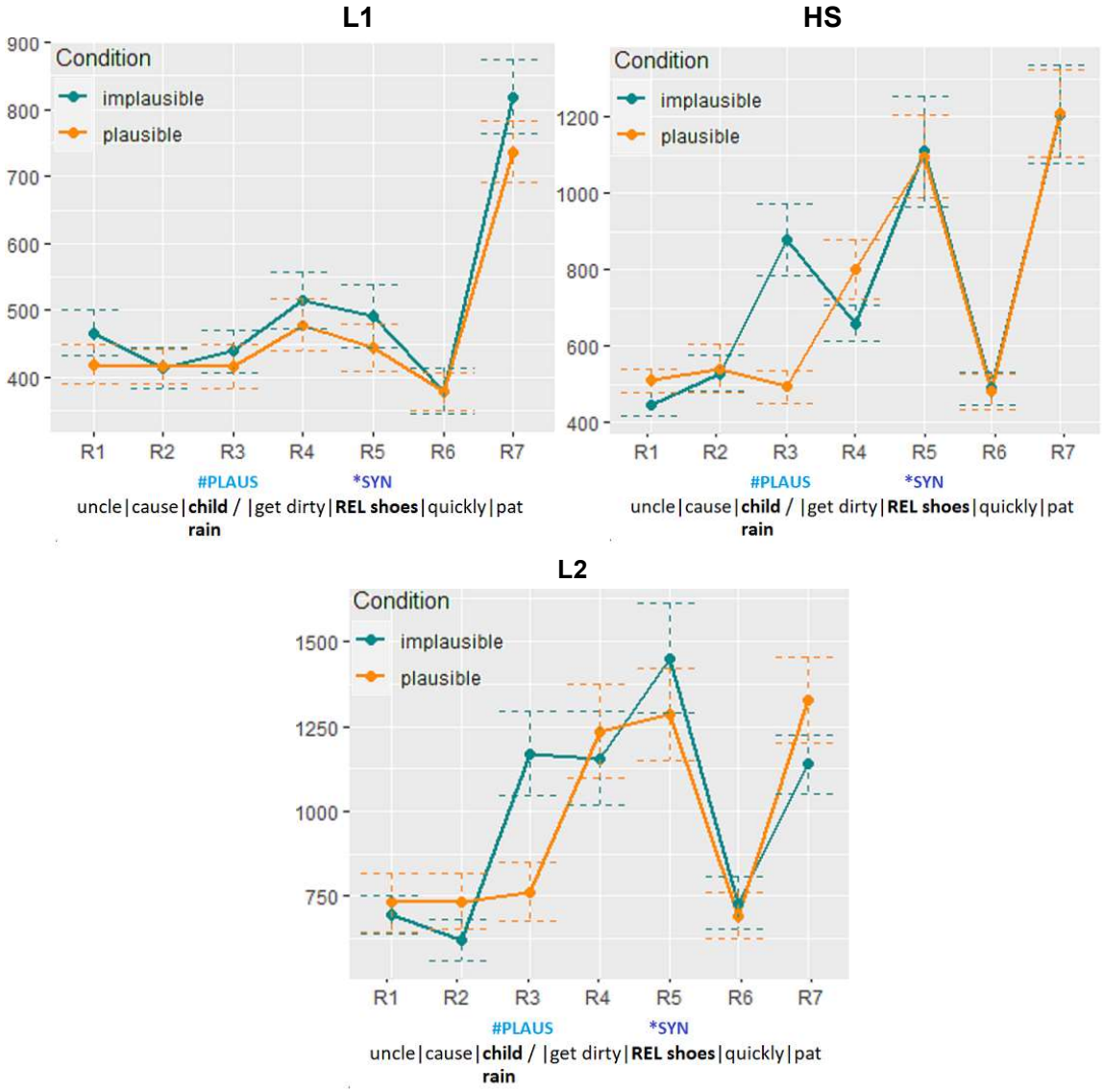
Figure 1. Mandarin causative *ba* + object relative clause GP with plausible/implausible readings.

Shushu/	ba /	haizi/dayu	nongzang/	***de xiezi** /	gan-kuai-de/	pai-yi-pai
Uncle /	*caused* /	child/rain	get dirty /	*PT.RC shoes/	quickly /	pat
R1	R2	R3	R4	*R5	R6	R7
				***syntactic dismabiguation**		

'Uncle quickly dusted off the shoes that the child/rain got dirty.'

Plausible GP reading:	'Uncle caused the child to get dirty…'	= commitment to GP
Implausible GP reading:	'Uncle caused the rain to get dirty…'	= reduced commitment to GP

Figure 2. Self-paced listening RTs in ms for Mandarin GPs.



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