

Existing in time has a cost: A judgment acceptability study on the temporal concord processing of the auxiliary verbs *you* and *hui* in Taiwan Mandarin

Aymeric Collart, Institute of Linguistics, Academia Sinica

How the temporal reference of a sentence (whether the event is interpreted as holding in the past, present or future time) is processed has been investigated with past/present tense marking in Dutch (Germanic language) [1] and realis/irrealis mood marking in Paiwan (Formosan language) [2]. The results of these studies indicate that the temporal concord violation of past-time related morphemes by deictic present and future time adverbs (i.e., **Tomorrow, the fisherman fished salmon*s) leads to lower accuracy rates and higher RTs than non-past-time related morpheme (i.e., **Yesterday, the fisherman will fish salmon*s), regardless of whether such morphemes express tense or mood distinctions. This pattern has been generalized under the *Past Discourse Linking Hypothesis*, explaining this difference of processing difficulty as past time reference requires an additional temporal linking to a higher context [1]. Yet, a closer inspection to the abovementioned experiments shows that the past-time related morphemes used in the Dutch and Paiwan paradigms may also involve perfective aspect meaning, whose relation to the time of speech is less straightforward. Therefore, it is not completely clear whether past time reference in general or perfective aspect marking in particular triggers greater complexity concerning the processing of temporal concord violation.

The present study aims to explore this question by investigating the processing of the temporal concord of two auxiliary verbs in Taiwan Mandarin (tenseless language), *you* and *hui*. *You* (originally a verb meaning 'to have') is used to express the existence of an event in time and is generally ungrammatical after a future time adverb [3]. *Hui* is analyzed as expressing predictions about a future event and is ungrammatical with a past time adverb [4]. Crucially, *you* and *hui* do not encode perfective aspect meaning. Placing these two auxiliary verbs in a temporal concord paradigm (see examples in Table 1) allows us to state different hypotheses:

- (i) The temporal violation of *you* is more complex to process than *hui* because of its inherent meaning, as it would be predicted by the PADILIH;
- (ii) Processing the violation of a future-related (unrealized) event with *hui* is more complex than a past-related (realized) event with *you*, as argued by some linguists in their analysis of tenseless languages [5].

A total of 148 native speakers of Taiwan Mandarin (98F, mean age = 28.8, range: 20–70) took part in an online judgment acceptability experiment (7-point Likert scale; results in Figure 1). Sentences with *you* were accepted in the past but not in the future. The reverse was found for *hui*. *Fut-You* sentences were also not judged as negatively as *Past-Hui* sentences (Time x Aux interaction: $\beta = 2.25$, $SE = 0.01$, $t = 260$, $p < .0001$). Accuracy results were further computed by taking responses above 4 for grammatical sentences as accurate and below 4 as erroneous (and vice-versa for ungrammatical sentences). While ungrammatical sentences were judged less accurately than grammatical sentences, this was even more pronounced for ungrammatical *you*-sentences (Time x Aux interaction: $\beta = 0.67$, $SE = 0.10$, $z = 7$, $p < .0001$). A similar pattern was found for the RT, as it took more time to judge ungrammatical sentences, and the RT was even higher *Fut-You* sentences (Time x Aux interaction: $\beta = -235$, $SE = 22.29$, $t = -11$, $p < .0001$).

Overall, the results indicate that judging the temporal concord violation of *you* (past-time related) is harder than *hui* (future-time related). This greater difficulty may be related with the meaning of *you*: as it expresses the existence of an event in time, the range of possible assertions of the event is broader than the past/future distinction and depends on subjective factors (i.e., a future event could be seen as 'mentally existing' to some extent when planned or very likely to occur). Crucially, this mental operation is not available when *hui* is temporally violated. This can explain the 'less-rejected' pattern, higher SD of judgment, lower accuracy and higher RT of *Fut-You*. This explanation slightly differs from the one originally stated in the PADILIH, suggesting multiple cognitive ways to access the temporal interpretation of an event.

References

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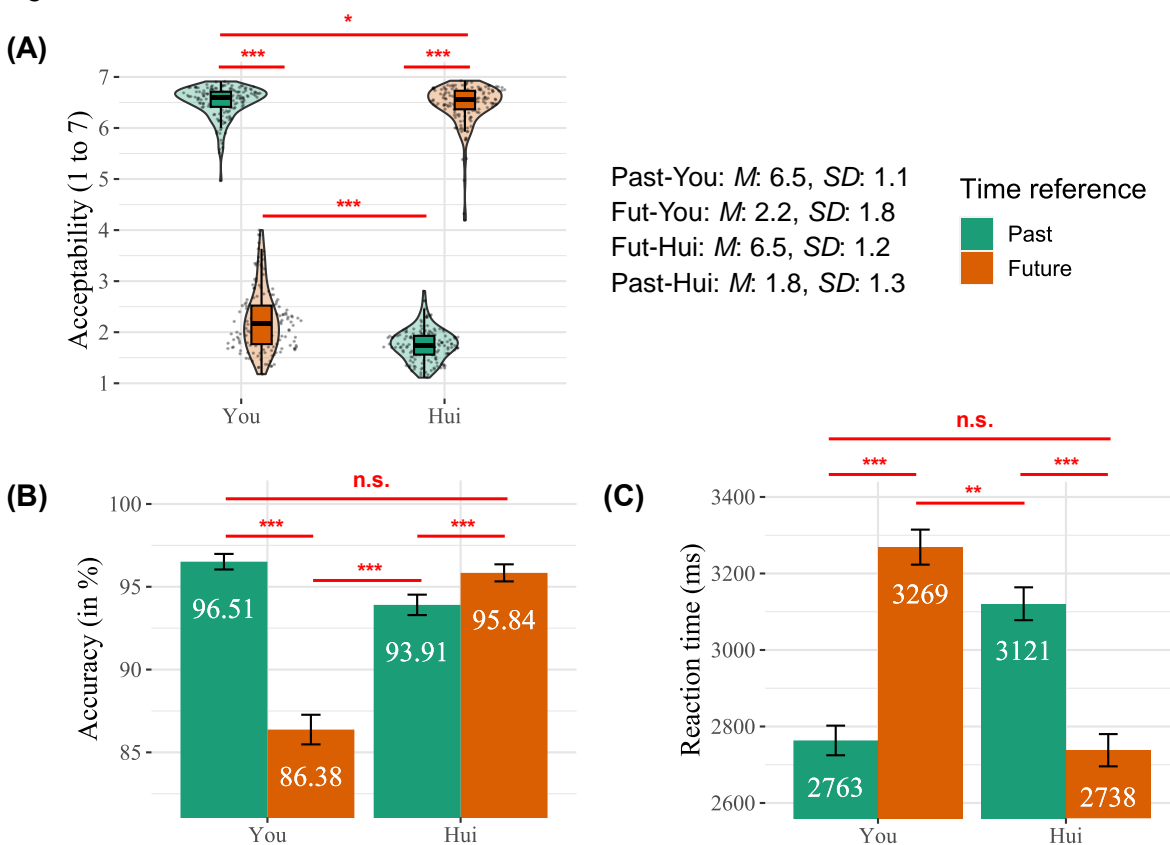


Figure 1. Panel A: acceptability ratings; B: mean accuracy rate (in %); C: mean reaction time (in ms). Error bars: 95% CI; '***' = $p < .0001$; '**' = $p < .001$; '*' = $p < .05$; 'n.s.' = 'not significant'

Table 1. Sample items from the experiment (168 items; 42 per condition dispatched in four lists), controlled for the frequency of the nouns and verbs (Academia Sinica corpus), the number of characters, the aspectual category of the verb (non-stative verbs) and the agency of the subject

Conditions	Sentence examples (ungrammatical sentences indicated by '*')
(1) you-conditions (Past: grammatical; Future: ungrammatical)	Yufu zuotian/*mingtian you diao guiyu. fisherman yesterday/*tomorrow YOU fish salmon 'Yesterday/*Tomorrow, the fisherman fished salmon.'
(2) hui-conditions (Past: ungrammatical; Future: grammatical)	Yufu *zuotian/mingtian hui diao guiyu. fisherman *yesterday/tomorrow HUI fish salmon '*Yesterday/Tomorrow, the fisherman will fish salmon.'