

Conjunctive Disjunction: A Japanese Counterexample to Grice's Nondetachability

Grice postulated *nondetachability* as one characteristic of implicature: If sentences S and S' have the same literal meaning, they also must have the same implicatures. We discuss a counterexample to this claim from Japanese (also Sudo 2014). It concerns the phenomenon of conjunctive disjunction: cases where *or* is strengthened pragmatically not to exclusive XOR, but to conjunction AND (Bowler 2015, Meyer 2012, 2015, Singh et al. 2015). We argue that the connectives *ka* and *ya* both literally mean disjunction OR. But, while *ka* can be strengthened to the exclusive disjunction XOR, *ya* is strengthened to conjunction AND via implicature. In fact, Kuno (1973), Ohori (2004) and others describe the Japanese junctor *ya* as a conjunctive coordination. We, however, show that *ya* is a disjunction, and the conjunctive meaning of it is derived as first proposed by Sudo (2014). To make our argument, we use data from a mouse-tracking experiment that corroborate a core prediction of Sudo's account. In part 2, we show that some more detailed predictions of Sudo's account aren't born out by the mouse-tracking data, but argue that a modification of the account relating it to other work on conjunctive disjunction and that of van Tiel and Schaeken (2016) on implicature processing.

Background: In example (1), *ya* like the other NP-conjunctions of Japanese *mo* and *to* (and unlike the disjunction *ka*) triggers the conjunctive inference that Taro drank coffee **and** tea.

- (1) Tarou-wa kouhii {*ya* / *to* / *mo* / *ka*} koucha-o nonda
Taro-TOP coffee YA / and / and / or tea-ACC drank

But, Sudo (2014) points out (2) and other examples, where *ya* is embedded in a downward entailing environment. In (2), *ya* unlike *to* and *mo* has a disjunctive interpretation.

- (2) [Tarou-ga kouhii *ya* koucha-o nom-eba] yoru nemur-e-nai darou
[Taro-NOM coffee YA tea-ACC drink-if] night sleep-can-NEG INFER
'If Taro drinks coffee **or** tea, he won't be able to sleep at night.'

Sudo proposes that *ya*'s conventional meaning is always disjunction \vee . In downward entailing environments where implicatures are blocked, the disjunctive interpretation is apparent. To derive the conjunctive inference in (1), Sudo proposes that the other disjunction *ka* is a scalar alternative of *ya*, and that implicatures are computed recursively for *ya*. Since *ka* triggers an anti-conjunctive XOR implicature, a conjunctive implicature results for *ya* (i.e. $\text{OR} \wedge \neg \text{XOR} = \text{AND}$).

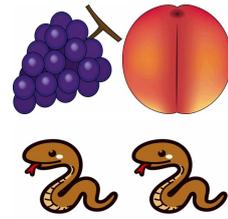
Methods: We compared the conjunctive inference of *ya* with logical content and scalar implicatures using mouse-tracking. We showed single Japanese sentences such as (3a) on the screen for 2 seconds. Then subjects saw a two-image picture (as in (3a)) and had to decide whether the sentence-picture correspondence was 'good' or 'bad' (a forced choice decision task). The 'good'/'bad' response buttons were located in opposite corners of the screen (left/right counterbalanced across participants). Participants had to move the mouse from an initial position at the bottom center of the screen. The experiment included 8 items of condition *ya*1 like (3a) and 4 each of condition *mo*1 and *to*1 like (3b). For all three, the expected response was 'bad' because of the conjunctive inference of *ya*, *mo* and *to*.

- (3) a. *ya*1: kuma-*ya* gorira-ga imasu.
bear-YA gorilla-NOM exist
'There're a bear YA a gorilla.'
- b. *mo*/*to*1: kuma-*mo* gorira-*mo* imasu. / kuma-*to* gorira-ga imasu.
bear-AND gorira-AND exist / bear-AND gorilla-NOM exist
'There're a bear and a gorilla.'



We also compared the conjunctive inference of *ya* with two other implicatures: the anti-conjunctive implicature of the disjunction *ka* and the upper bound implicature of the numeral *one*. 16 items of condition *ka*2 in (4a), and 4 item of condition *one*2 in (4b) tested these.

- (4) a. ka2: budo-ka momo-(ka)-ga arimasu.
 grape-or peach-or-NOM exist
 ‘There’re grapes or a peach.’
 b. one2: hebi-ga ip-piki imasu.
 snake-NOM one-CL exist
 ‘There’s one snake.’



In addition, the experiment contained 164 controls and filler items. Data from 67 native Japanese speakers were recorded with the Mousetracker software (Freeman and Ambady 2010). Each participant saw 200 items in total and took about 25 minutes per participant.

Results: Overall accuracy on controls and fillers was 97%. Our data show a clear difference between *ya* and the lexical conjunctions *to* and *mo* in response accuracy, reaction times, and mouse tracks. Accuracy: For *to1* and *mo1*, accuracy was 95%, but for *ya1* significantly lower at 75%. Reaction times: For *to1* and *mo1*, mean reaction time of correct responses was 1743 ms, while it was significantly longer (2037 ms) for *ya1*. Mouse tracks: Figure 1a compares mouse movements towards the correct ‘bad’ response (always shown on the right, but for half of the subjects was actually on the left) with individual tracks in light red/blue and means as the dotted lines. The mouse paths for *ya1* diverge more from the straight line to the target as shown by a significant difference in the area-under-the-curve (AUC). The difference between *ya1* on the one hand and *mo1* and *to1* on the other argues against an analysis of *ya* as a lexical conjunction and corroborates the implicature analysis of Sudo (2014).

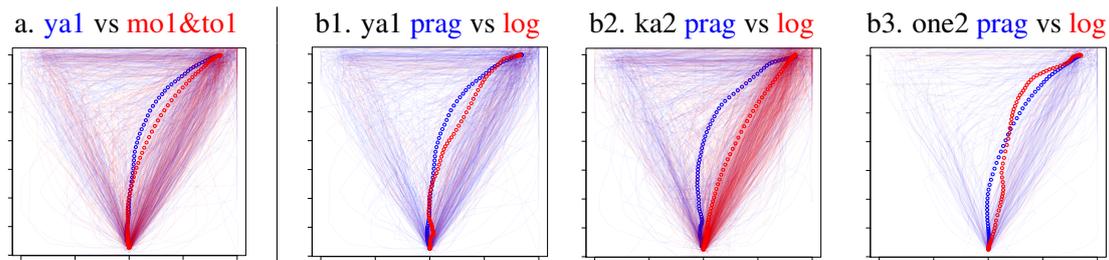


Figure 1: *Mousetracks: a. ya vs. coordinations, b. logical (red) vs pragmatic (blue) responders*

However, our further results don’t support the Sudo’s implementation of the implicature analysis. His account predicts that *ya1* should pattern with *ka2*. This is not what we find: the implicature rates for *ka2* (34%) is significantly lower than for *ya1* (75%). The comparison of mouse tracks of the logical and pragmatic responders corroborates this picture: in *ka2*, there is a significant difference, but not in condition *ya1* (see figure 1b1 and 1b2). A linear mixed model analysis of the area under the curve of the interaction between condition and response type confirms that the *ya1*-condition significantly differs from *ka2* ($t = -4.1, p < .0001$), which it is not significantly different from *one2* ($t = 1.3, p = .201$).

Discussion We propose that *ya* has a purely disjunctive meaning, but in contrast to *ka* is not associated lexically with a conjunctive alternative. Therefore ‘A *ya* B’ only has the substring alternatives ‘A’ and ‘B’ as also proposed for *or-else*-disjunction in adult English (Meyer 2015), disjunction in child language (Singh et al. 2015), and adult Warlpiri (Bowler 2015). With recursive implicature computation, the conjunctive implicature is predicted from the substring alternatives. Furthermore the lexical-access hypothesis of (van Tiel and Schaeken 2016) predicts the difference between *ya1* and *ka1*.

References

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