The role of negation, clause order and face in derivation of Conditional Perfection

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Introduction. Quantity inferences which are derived on the basis of conditional sentences were coined as Conditional Perfection (CP) in Geis and Zwicky (1971), cf. (1).

(1) *If you mow the lawn, I'll give you five dollars*.
Inference: If you don't mow the lawn, I won't give you five dollars.

Relying upon Fillenbaum (1975), we conducted a more systematic study of the role of negation and the role of various types of speech acts (SAs) in the derivation of CP. Additionally, we tested the role of clause order. **Hypothesis A** was that conditionals with zero negation would yield more inferences and faster processing than conditionals with single negation, which give rise to more inferences and faster processing than conditionals with double negation. **Hypothesis B** was that the derivation of inferences from conditionals with direct order ("if p, q") would yield more yes-answers and take a lesser timing than the derivation of inferences from conditionals with inverse order ("q, if p"), since inference derivation starts from an antecedent and in case of "q, if p" the hearer changes the order of the clauses and then derives an inference, and this might take extra time. **Hypothesis C** was that face SAs facilitate the derivation of CP since they concern damage to/respecting the hearer's interests.

Methods. Relying upon Fillenbaum (1975), we distinguished among 5 types of SAs that conditionals express: promises and threats (face SAs), causal and temporal sentences, contingent universals (non-face SAs). Moreover, according to the questions and predictions, each of the 5 groups came into the following schemas:

1) affirmations without negation, with single negation, with double negation presented in the direct order: If P, Q; If not P, Q; If P, not Q; If not P, not Q;
2) affirmations without negation, with single negation, with double negation presented in the inverse order: Q, if P; Q, if not P; Not Q, if P; Not Q, if not P.

All the sentences were unique. It means that their lexical contents were different. Each of the schemas was represented in 2 different versions distributed between 2 experimental lists. We did this to decrease a potential effect that some sentence might have. All in all, we generated 80 targets (5 types of SAs x 2 types of order x 4 types of (non-)negated sentences x 2 versions) distributed between 2 lists, with 40 targets per list. We used an inference task. Participants were presented with a conditional on a slide followed (on the next slide) with the question whether it is possible to make an inference from a given conditional sentence as well as with yes/no answers. The key "G" on the keyboard was reserved for "yes" answers and the key "J" for the "no" answers. There was a time interval of 10 seconds to read a conditional and an interval of 15 seconds to answer the question. The latter interval was maximum, that is, participants had to choose an answer within this interval and their reaction times were recorded.

The experiment was conducted in the Russian language. The next sentences illustrate targets.

(2) Promise; If P, Q

Esli	*ty pol'yoš*	*mne*	*tsvety, ja*	*nakormlju*	*tebja*	*pirogami*.
if	you will.water	me	flowers I	will.feed	you	with.pies

Možete li Vy sdelat' iz etogo vyvod, čto esli ty ne pol'yoš mne tsvety,
can whether you make from this inference that if you not will.water flowers

ja ne nakormlju tebja pirogami?
I not will.feed you with.pies

'If you water my flowers, I will give you the pies. Would you infer from that that if you don't water the flowers, I won't give you the pies?'

(3) Contingent Universal; Not Q, if not P

Desertnoj vilkoj		*ne pol'zujutsja, esli*		*v menju ne predusmotren*		*desert*.	
dessert fork		not use	if	in menu not foreseen		dessert	
Možete li	*Vy sdelat'*	*iz*	*etogo*	*vyvod, čto*	*desertnoj*	*vilkoj*	*pol'zujutsja,*
can	whether you make	from	this	inference that	dessert	fork	use

esli v menju predusmotren desert?
if in menu foreseen dessert

'One does not use a dessert fork if the menu does not contain a dessert. Would you infer from this that one uses a dessert fork if the menu contains a dessert?'

The fillers were affirmations which denoted sequences of events and were followed with a question that violated the order of the events. They were expected to receive a definite "yes" response or a definite "no" response. There were 46 fillers. 6 of them were presented at the beginning of the experiment in order to train participants for the further experimental materials. The same fillers were used in both lists. Due to a big number of targets and fillers, each 20 items were followed with a small break for 10 seconds in order to give some rest for participants. The experiment was conducted via IbexFarm, which is a free online platform for conducting experiments. 68 people were involved (49 female, age range = 19-39 y.o., mean age = 22).

Results. Out of 2720 responses, 80 responses for targets were removed due to null answer and 238 responses for targets were excluded due to the extraordinarily slow (>10000 ms) or fast RTs (<250 ms). As for the fillers, similarly, out of 2720 answers 182 were extracted either because of null answer or because of extraordinary high (<250 ms) or extraordinary low RTs (> 8000 for correctly answered fillers and >10000 for incorrectly answered fillers). Generalized mixed-effects model for yes/no-answers and Linear mixed-effects model for RTs were used. The distribution of answers among the fillers was uniform, whereas the one among the targets was biased ($p<.001$); the fillers were answered significantly faster than the targets ($p<.001$). Focusing on the targets only, the overall acceptance of CP was significantly high, with average 76,34% ($p<.001$). Both for answers and RTs, the interaction between SAs vs. Negation was significant ($p<.05$), but not between Negation vs. Order or SAs vs. Order ($p>.05$). Pairwise comparisons among types of Negation for answers and RTs revealed that double negation significantly facilitates the CP derivation and is processed faster than the single/zero types of Negation ($p<.01$). Hypothesis A was not confirmed. A plausible reason for this is that in case of double negation, both clauses of a conditional are marked with negation and, in this sense, are parallel in processing. Another plausible reason is that double negation is tantamount to affirmation (cf. $\neg\neg p=p$). Pairwise comparisons among the types of clause order for answers and RTs revealed no significant difference between direct vs. inverse types of Order ($p>.05$). Hypothesis B was not confirmed. Finally, pairwise comparisons among SAs for answers and RTs revealed that face SAs facilitate the derivation of CP. Hypothesis C was confirmed. This suggests that inferential reasoning is dependent upon face/politeness factor.

References

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