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Title: A Quasi-Self-Dual Interpretation of Negative Raising

Academic area: Formal Semantics

Chow Ka Fat
Hong Kong Polytechnic University
Department of Chinese and Bilingual Studies

Negative raising (NR) refers to the phenomenon that the negation of a complex sentence with a subordinate clause is read as negation of the subordinate clause, as in

(1) I don't think he is reliable. \approx I think he is not reliable.

where " \approx " means "has approximately the same meaning as". Logically speaking, the two propositions are not equivalent, but they satisfy the following entailment relation:

(2) I think he is not reliable. \Rightarrow I don't think he is reliable.

where " \Rightarrow " means "entails". The phenomenon of NR only appears in complex sentences with certain predicates, called "negative raising predicates" (NRPs), such as "believe", "think", "likely", etc. Our problem is to characterize these NRPs.

NR was originally studied from the syntactic perspective and was seen as a kind of syntactic movements. But later some scholars began to study the phenomenon from the semantic / pragmatic perspective. Both Horn (1978, 1989) and Levinson (2000) characterized NRPs as "mid-scalar members", i.e. members around the middle position of scales. For instance, "likely" is around the middle position of the following scale of modal adjectives:

(3) <certain, likely, possible>

In this study, I adopt Horn (1978, 1989) and Levinson (2000)'s views towards NRPs. But instead of just characterizing NRPs as mid-scalar members, I will explain this fact by pointing out that they are quasi-self-duals. The notion of "quasi-self-duals" comes from Keenan (2003, 2008)'s studies on duality inferences from the perspective of Generalized Quantifier Theory.

Duality inferences are inferences involving negation of the quantifier and / or the argument(s). Keenan (2003, 2008) studied three types of negation: outer negation, inner negation and dual. The first two notions correspond to negation of the whole sentence and the predicate, respectively, while the third notion is the combination of the first two. Representing a normal quantified statement in the form $Q(A)(B)$ with Q , A and B representing the determiner, subject (without the determiner) and the predicate respectively, the dual can then be defined as $\sim Q(A)(\sim B)$.

A self-dual is a quantifier Q that is equivalent to its dual and thus satisfies the following condition:

$$(4) \quad \sim Q(A)(B) \Leftrightarrow Q(A)(\sim B)$$

Keenan (2003, 2008) has identified a number of self-duals in natural language, including proper nouns, reflexive pronouns and certain partitive constructions such as “(*exactly 1 or 2 or 4 or all of the 7*)”. According to a theorem in Keenan (2003), when $n = 2k + 1$, then “(*more than k of the n*)” is a self-dual. Even though $n / 2$ is not a self-dual when n is even, it is very similar to a self-dual, i.e. we have the following approximate equivalence relation that resembles (1):

$$(5) \quad \sim(\text{more than } n / 2 \text{ of the } n)(A)(B) \approx (\text{more than } n / 2 \text{ of the } n)(A)(\sim B)$$

and so we may say “(*more than $n / 2$ of the n*)” is a quasi-self-dual. Interestingly, the aforesaid quantifier also satisfies the following entailment relation that resembles (2):

$$(6) \quad (\text{more than } n / 2 \text{ of the } n)(A)(\sim B) \Rightarrow \sim(\text{more than } n / 2 \text{ of the } n)(A)(B)$$

Moreover, for $|A| = n$, we can construct the following scale of quantifiers:

$$(7) \quad \langle (\text{none of the } n), (\text{some of the } n), (\text{more than } 1 \text{ of the } n), \dots (\text{more than } n / 2 \text{ of the } n), \dots (\text{more than } n - 2 \text{ of the } n), (\text{all of the } n) \rangle$$

One can see that “(*more than $n / 2$ of the n*)” is approximately in the middle position of the scale.

The above facts suggest that NRPs are quasi-self-duals. To associate NRPs with quantifiers, we need to borrow an idea from modal logic that views modal predicates as quantifiers on the possible worlds domain. For instance, the modal adjective “certain” in (3) may be viewed as a universal quantifier on the epistemic possible worlds domain, i.e. we have

$$(8) \quad \text{I am certain that } p. \equiv \text{In every possible world consistent with my knowledge, } p \text{ is true.}$$

Thus, we may view “believe” as a quasi-self-dual in the epistemic possible worlds domain and the phenomenon of NR is just a manifestation of the quasi-self-duality of the NRPs.

References

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