Not a Fallacy - Experimental Data Concerning Focus Effects on Conjunction Judgments

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Building on the seminal work of Partee (1991), many linguists have argued that focused material goes to the nuclear scope, while non-focused material goes to the restrictor of tripartite structures. Some linguists (e.g. Aquist et al 1980 ; Cohen 1996, 1999) argue that tripartite structures receive a conditional probability interpretation. But a direct correlation between focus and conditional probability has not been formulated or examined. We propose such a correlation, using Tversky & Kahneman's (T&K) (1983) 'Conjunction Fallacy' (CF) as a test case. The CF plays a central role in the debate on whether human beings are driven by cognitively rational mechanisms, suggests otherwise, and thus far has proven robustly resistant to criticism (e.g. Moro 2009 for a review). The fallacy consists of judging the conjunction of two statements as more likely than one of the conjuncts, seemingly irrational (A&B must be less likely than either A or B). Consider the following:

(1) Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations.

In this famous scenario (and a similar scenario concerning a different individual, *Bill)* participants judge (2b) type sentences as more likely than (2a) type, in a series of experiments (cf. Hertwig & Chase 1998 for a review of consequent experiments):

(2) a. Linda is a bank teller.
   b. Linda is a bank teller and is active in the feminist movement.

Many attempts have been made to explain these irrational results in a rational manner, so far unsuccessfully. We propose a linguistics-based account for the seemingly fallacious results of T&K. This account relies on the information structure of (2b), specifically focus assignment. Following Cohen (1996, 1999), we expect that focus plays the same role in mechanisms of domain restriction and restriction of the reference class of probability judgments, i.e. the participants in T&K's and subsequent experiments interpret the likelihood of (2b) by assigning focus to 'feminist', thus having 'bank teller' as a background, yielding the following judgment task:

(3) What is the likelihood that Linda is active in the feminist movement *given* that Linda is a bank teller?

The likelihood of (3) would of course be higher than (2a), because of Linda's background which favors 'feminist' and disfavors 'bank teller'. Thus, an experimental investigation of these claims is of importance to both linguists interested in the connection between focus domains (i.e. restrictor and scope) and probability judgments, and psychoinguists interested in role that focus plays in judgments under uncertainty and human rationality.

To this end, we conducted a number of experiments. The first, a replication experiment in Hebrew, in which we established the same fallacy magnitudes as T&K for the original scenarios (79% for Linda, 75% for Bill). The next 3 experiments (in Hebrew) utilized order as a means to invoke foci. Participants read Linda and Bill's descriptions and were them asked to provide a likelihood measure (between 0-100) to the following items (examples are from the Linda scenario, but Bill was also used. The order varied across experiments):

> (4) a. Linda is a bank teller. (Unexpected property)
>> b. Linda is a bank teller and is active in the feminist movement. (Conjunction)
>> c. Linda is a teacher. (Filler)
>> d. Linda is active in the feminist movement. (Expected property)

Predictions: Probability judgments would be affected by the order of items, when the items which are introduced first form the background and the later items are focused.

The next 2 experiments (in Hebrew) utilized auditory stress to invoke focus. Participants read descriptions and were then asked to provide a likelihood measure to *auditory* items in which 'feminist' and 'bank teller' were stressed (in a relative clause conjunction):

> (5) a. Linda is a bank teller who is active in the feminist movement / Linda is feminist who works in a bank. (No special stress)
>> b. Linda is a BANK teller who is active in the feminist movement / Linda is FEMINIST who works in a bank. (Head noun stress)
>> c. Linda is a bank teller who is active in the FEMINIST movement / Linda is feminist who works in a BANK. (Embedded clause stress)

Predictions: Probability judgments would be affected by the stress, when a stress on the *expected* property (feminist) would yield a conjunction error and a stress on the *nonexpected* property (bank) would not. **Results**: Significant effects for order and mixed results for stress, to be discussed in the talk.

Conclusion: We provide experimental data in favor of a conditional probability interpretation for tripartite focus structures and in favor of a rational interpretation for conjunction judgments in Tversky & Kahneman's *Linda* scenarios.

References

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