Certainty in Extensional Probabilistic Reasoning

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Certainty and Uncertainty

Human beings have a natural need for certainty, behaving in their daily life as natural born verifiers (see the pseudodiagnosticity effect). Certainty is rare and extraordinarily valuable. One can expect our cognitive system to be prepared to deal with the two extremes, the genuine certainty and the ubiquitous uncertainty.

We will try to throw some light on the validity of the certainty-uncertainty distinction in an extensional based probability calculus task.

Experiments and Results

We present 3 experiments. The first deals with the certainty-uncertainty distinction in a bet and a probability calculus task. The second tries to answer some questions arisen from the first two experiments about the influence of number of alternatives. Finally, the third experiment uses the same task as experiment Ib, but this time controlling number of alternatives and thus allowing us to distinguish the certainty-uncertainty from the difficulty influence.

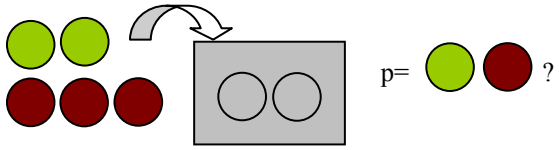

Figure 1: Task (Fill the box randomly with the balls you have. What is the probability of having only 1 green inside the box?)

Experiments Ia and Ib

We compare certainty (p=0) with uncertainty (p=0.2). There was a significant effect of certainty on RT (the certain situations were solved faster) but not on the amount of bets (exp. Ia) or calculated probability (cp; exp. Ib). There were no differences between experiments Ia and Ib (bets vs. cp).

Table 1: Certainty vs. uncertainty [bet or cp (RT)]

	certainty (p=0)	**uncertainty (p=0.2)**
Exp. Ia	3.4 (1808)	3.6 (2018)
Exp. Ib	3.8 (1880)	3.7 (2176)

Experiment II

The task here was to determine whether the probability was higher or lower than 0.5. It's a 2x2 design (number of alternatives [2 and 3] x probability [high and low]). We found a significant effect of the number of alternatives and an interaction between number of alternatives and probability (due allegedly to task constraints).

Table 2: Number of alternatives x probability [accuracy (RT)]

	p=0.4	**p=0.6**
2	0.78 (2137)	0.84 (1871)
3	0.74 (2406)	0.63 (2661)

Experiment III

Here we assess the certainty-uncertainty issue comparing p=0 with 1 and 2 alternatives and p=0.2 with 2 alternatives. Both comparisons were significant.

Table 3: Certainty vs. uncertainty [cp (RT)]

p=0 (1 alternative)	1.7 (1510)
p=0 (2 alternatives)	2.4 (2094)
p=0.2 (2 alternatives)	4.2(2294)

Discussion

There is a significant effect of certainty (about 200ms. with comparable difficulty). We discovered also the strong influence of number of alternatives, which can serve as a measure of extensional difficulty.

References

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